NAGA REPORT

Volume 4, Part 4

Scientific Results
of Marine Investigations of the South China Sea
and the Gulf of Thailand
1959-1961

Sponsored by

South Viet Nam, Thailand
and the
United States of America

The University of California
Scripps Institution of Oceanography
La Jolla, California
1973

NAGA REPORT

Volume 4, Part 4

Scientific Results
of Marine Investigations of the South China Sea
and the Gulf of Thailand
1959-1961

Sponsored by

South Viet Nam, Thailand
and the
United States of America

The University of California
Scripps Institution of Oceanography
La Jolla, California
1973

EDITORS:
EDWARD BRINTON, WILLIAM A. NEWMAN, WARREN S. WOOSTER
ASSISTANT EDITOR: NANCE F. NORTH

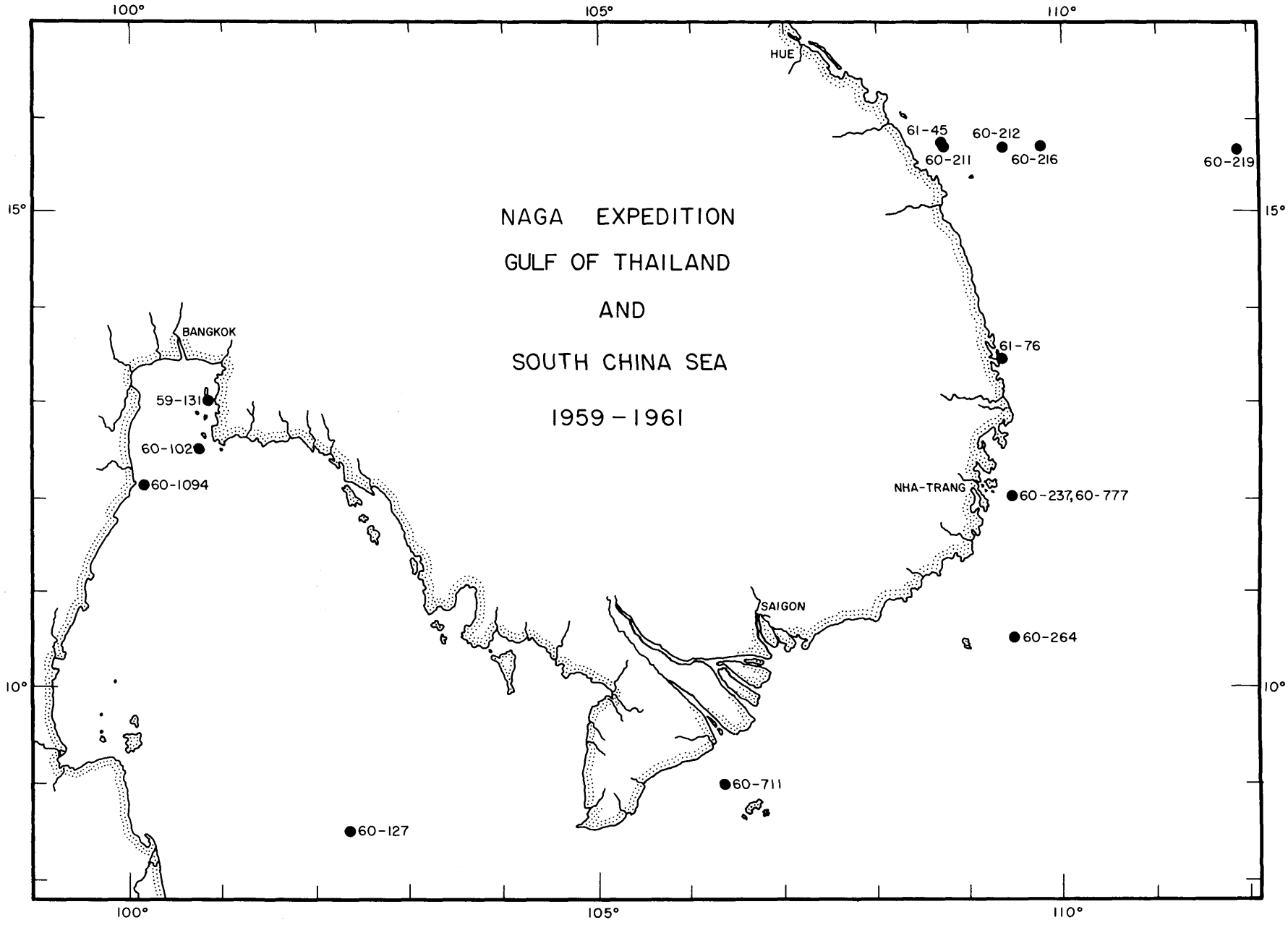
Printing of this volume was made possible through the National Science Foundation Grant GN-32570. The NAGA Expedition was supported by the International Cooperation Administration Contract ICAc-1085.

THE BRACHYURA (CRUSTACEA : DECAPODA) COLLECTED BY THE NAGA EXPEDITION, INCLUDING A REVIEW OF THE HOMOLIDAE

by

R. SERENE* AND P. LOHAVANIJAYA**

*formerly UNESCO Science Regional Expert for South East Asia, National Museum of Singapore; now 46, Boulevard Pasteur, Paris 75015, France.
**Applied Scientific Research Corporation of Thailand, Bangkok.


NAGA EXPEDITION
GULF OF THAILAND
AND
SOUTH CHINA SEA
1959 – 1961
100°
105°
110°
15°
10°
HUE
61-45
60-212
60-211
60-216
60-219
BANGKOK
61-76
59-131
60-102
60-1094
NHA-TRANG
60-237, 60-777
SAIGON
60-264
60-711
60-127

THE BRACHYURA (CRUSTACEA : DECAPODA) COLLECTED BY THE NAGA EXPEDITION, INCLUDING A REVIEW OF THE HOMOLIDAE

CONTENTS

ABSTRACT

This report covers some forty species of Brachyura (Crustacea: Decapoda) collected by the NAGA Expedition (1959-1961) from the Gulf of Thailand and the South China Sea. Special attention is given to the Homolidae including a key to the genera. Keys for all species of *Cryptodromia, Dromidiopsis, Paraphiculus, Pleistacantha, Cyrtomaja, Platymaja, Carcinoplax, Heteroplax, Lophoplax* and *Zalasius,* as well as keys for the Indo-Pacific species of *Paromola, Ethusa, Maja* and *Rochinia,* are also included. Some material from other collections, or from the literature, is included as comparative material.

ACKNOWLEDGMENTS AND INTRODUCTION

The NAGA Expedition was mainly devoted to an oceanographic survey of the water masses and the pelagic life; the collection of benthic fauna was partly an accessory activity. It was a great pleasure for me to participate on board the "Stranger" in the collection of Brachyura and other invertebrates. The material studied in the present report comes from a few stations made in the South China Sea and the Gulf of Thailand. The most interesting forms were taken by trawlings or dredgings made in the deep waters of the South China Sea. Some forms, such as *Paramolopsis boasi* and *Hypsophrys superciliosa,* were only known previously from the Indian Ocean and the Arabian Sea region or from Japan or South Africa.

An unpublished preliminary report, compiled at the end of the operation after the sorting made in Bangkok (October, 1960), included a provisional list of all the Brachyura collected during the NAGA cruises of the "Stranger". Of the total number of eighty species, more than half are common. The entire collection was deposited in the Institut Océanographique de Nhatrang (ION), Vietnam, where the identification of the remaining species was begun. When I left Nhatrang, 1961, the common species were left with the Institut, but the species of the present report were taken with me for further study. The study was made in the National Museum of Singapore with the collaboration of the co-author, Dr. Prasert Lohavanijaya, from the Applied Scientific Research Corporation of Thailand (ASRCT).

The NAGA Expedition included, in addition to the scientific survey, training of marine scientists of the two participating countries, Thailand and Vietnam. The present brachyuran studies were in part conducted at the Institut Océanographique de Nhatrang. Mr. Quang Nhut Ban, photographer at the institute, should be credited for a part of the photographs included. We thank the Director (ION) for his help and permission to publish these photographs.

Considering that carcinologists working in South East Asian countries have little material for comparison and type specimens are generally not available, and that the reference literature is frequently difficult to obtain, keys to species of several genera have been tentatively proposed. In order to prepare these keys, some specimens not represented among NAGA material have been added to the study. We thank particularly the Fisheries Research Station of Hongkong for providing us with material collected in the South China Sea by their ship "Cap Sainte Marie".

Special thanks should be given to the National Museum of Singapore, in particular to the curator of Zoology, Mr. E. Alfred, who provided us with good working facilities including access to his collection of Brachyura and to the library.

Without the support of the Office of Oceanography of UNESCO, which afforded me some free time for the present study, this report would not have been possible.

This report is limited to Brachyura collected by dredging or trawling operations during the NAGA Expedition as well as some specimens collected by trawl in the South China Sea by

the Fisheries Research Station of Hongkong. However, those Brachyura found in the Petersen grab samples obtained by Mr. V.A. Gallardo (Hancock Foundation, University of Southern California) and Mr. T.N. Loi (ION) during the Expedition will be discussed at a later time. They include some new species representing a valuable contribution to our knowledge of the small forms (generally less than 10 mm in size) of the sand and mud bottom of the South East Asian benthos. Some specimens including new species from these samples have already been treated in published papers (Serène, 1964a, 1964b).

It should also be mentioned here that the NAGA Expedition in the Gulf of Thailand collected a few stomatopods such as *Pseudosquillopsis dehaani* Holthuis, 1941, previously recorded only from Japan and Formosa (Serène, 1962).

The study of the portunid crabs of the NAGA Expedition has been published by Stephenson, 1967.

Singapore, 2 April, 1968
R. Serène

Editors Note: We wish to express our appreciation to the authors for their patience in view of the unexpectedly long delay in publishing this work. The manuscript was submitted in April, 1968, when funds for publication were not available. Dr. Serène's recent attention to updating the bibliography and incorporating information available since 1968 has been most helpful.

Most NAGA Expedition specimens are identified here under "Material" by their Ng... number, which, in fact, was an arbitrary shipboard designation included on each label. We felt it safer to retain these numbers. However, each will receive a new catalogue number upon final deposition at the Thai National Collection located in the Applied Scientific Research Corporation of Thailand in Bangkok. Holotypes of *Rochinia strangeri* new species and *Paromola alcocki faughni* new subspecies and the paratype of *Lophoplax teschi* Serène, 1971, will be deposited at the United States National Museum (USNM). A specimen of *Zalasius sakaii* is deposited at the Musèe Nationale d'Histoire Naturelle de Paris (MNHN). The holotype of *Eucrate alcocki,* indicated ION. 9688, is also in the MNHN in Paris.

Sources of material included in this work are referred to by the following abbreviations:

NMS. National Museum of Singapore

IMR. Institute of Marine Research Indonesia, Jakarta

NMRC. National Museum of Philippines, Manila

ION. Institut Océanographique de Nhatrang, Vietnam (ION. Ph. indicates their photograph number)

ZSI. Zoological Survey of India, Calcutta

R.S. personal (author's) collection, and are now included with the Thai Danish Expedition (1966) specimen in the NAGA collection at Bangkok.

LIST OF SPECIES

Subsection DROMIACEA de Haan, 1834

Family DROMIIDAE Alcock, 1899

Conchoecetes andamanicus Alcock, 1899
Cryptodromia areolata Ihle, 1913
Dromidiopsis cranioides (de Man, 1888)

Subsection HOMOLIDEA Alcock, 1899

Family HOMOLIDAE Henderson, 1888

Homola orientalis Henderson, 1888
Paromola alcocki faughni new subspecies
Paromolopsis boasi Wood-Mason, 1891
Hypsophrys superciliosa Wood-Mason, 1891
Latreillopsis bispinosa Henderson, 1888
Latreillia valida de Haan, 1839

Subsection OXYSTOMATA H. Milne Edwards, 1834

Family DORIPPIDAE Dana, 1852

Subfamily Dorippinae Alcock, 1899

Ethusa gracilipes (Miers, 1886)

Family LEUCOSIIDAE Dana, 1852

Subfamily Phylirinae Rathbun, 1937

Pariphiculus coronatus Alcock, 1896
Pariphiculus mariannae (Herklots, 1852)
Pariphiculus agariciferus Ihle, 1918
Ixoides cornutus MacGilchrist, 1905
Ixa cylindra (Fabricius, 1777)*
Ixa edwardsi Lucas, 1858*
Ixa pulcherrima (Haswell, 1880)

Subsection BRACHYGNATHA Borradaile, 1907

Superfamily OXYRHYNCHA Latreille, 1803

Family MAJIDAE Samouelle, 1918

Subfamily Inachinae Alcock, 1895

Alliance Macrocheiroida Balss, 1929

Pleistacantha oryx Ortmann, 1893
Pleistacantha sancti-johannis Miers, 1879
Cyrtomaja owstoni Terazaki, 1903
Platymaja remifera Rathbun, 1916

Subfamily Majinae Alcock, 1895 (Balss, 1929)

Maja japonica Rathbun, 1932

Subfamily Pisinae Alcock, 1895

Naxioides mamillata (Ortmann, 1893)
Hyastenus aries (Latreille, 1825)

*Discussed under Genus *Ixa;* photographs in plates.

Hyastenus diacanthus (de Haan, 1835)**
Rochinia pulchra (Miers, 1886)
Rochinia strangeri new species
Rochinia rivers-andersoni (Alcock, 1895)
Rochinia velutina (Miers, 1886)

Superfamily BRACHYRHYNCHA Borradaile, 1907

Family PORTUNIDAE Rafinesque, 1815

Subfamily Polybiinae Ortmann, 1893

Parathranites orientalis Miers, 1886

Family XANTHIDAE Alcock, 1898

Subfamily Xanthinae Ortmann, 1898

Demania rotundata Serène, 1968
Ralumia balssi Sakai, 1935

Family GONEPLACIDAE Miers, 1886

Subfamily Carcinoplacinae H. Milne Edwards, 1852

Carcinoplax longimana (de Haan, 1835)
Carcinoplax purpurea Rathbun, 1914
Carcinoplax bispinosa Rathbun, 1914
Carcinoplax meridionalis Rathbun, 1923
Carcinoplax confragosa Rathbun, 1914?
Carcinoplax longipes (Wood-Mason, 1891)
Neopilumnoplax heterochir (Studer, 1882)

Subfamily ? Euryplacinae Stimpson, 1871

Eucrate alcocki Serène, 1971
Heteroplax dentatus Stimpson, 1858
Heteroplax transversus Stimpson, 1858
Heteroplax nitidus Miers, 1879

Goneplacidae pilumnien s. str. Guinot, 1969

? Lophoplax teschi Serène, 1971

Family ? PARTHENOPIDAE-XANTHIDAE

Subfamily Zalissiinae Serène, 1968

Zalasius sakaii Balss, 1938

**discussed under *H. aries;* drawings and photograph in plates.

SYSTEMATICS

Subsection DROMIACEA de Haan, 1839
Superfamily DROMIIDEA Alcock, 1901
Family DROMIIDAE Alcock, 1899

Genus *Conchoecetes* Stimpson, 1858

Conchoecetes Stimpson, 1859, p. 226; 1907, p. 180. Henderson, 1893, p. 407. Alcock, 1899, p. 150; 1901, p. 40. Stebbing, 1910, p. 346; 1920, p. 253. Ihle, 1913, p. 50. Balss, 1922, p. 110. Sakai, 1936, p. 41; 1965, p. 11. Barnard, 1950, p. 308.

HISTORY:

The genus comprises only two species:

C. artificiosus (Fabricius, 1798)

C. andamanicus Alcock, 1899

The first, frequently recorded, has a wide geographical distribution from South Africa to Japan. The second is studied here. They can be separated by:

1. Carapace and all appendages covered with a velvet tomentum. Carapace relatively depressed, flat with regions well defined by grooves; the subhepatic (cervical) and branchial furrows both equally well cut; a prominent tooth immediately behind the subhepatic furrow; the tooth behind the branchial furrow almost rudimentary. The antero superior orbital angle and two lateral frontal teeth acute ..... *artificiosus*

2. Carapace and appendages almost naked. Carapace slightly convex, smoother with furrows separating the regions obsolete; antero lateral margin of carapace rounded without indication of subhepatic (cervical) furrow and tooth; branchial furrow faintly indicated; the antero superior orbital angle and two lateral frontal teeth blunted ..... *andamanicus*

Conchoecetes andamanicus Alcock, 1899

Figs. 1-4; Pl. I, A-D

Conchoecetes andamanicus Alcock, 1899, p. 152; 1901, p. 43, pl. 3, fig. 17. Laurie, 1906, p. 353. Ihle, 1913, p. 50.

Conchoecetes sp. Chang, 1963, p. 100, pl. 1, fig. 2.

MATERIAL:

Ng. 137, male of 19 x 19 mm

Locality: NAGA S3, St. No. 60-102, Gulf of Thailand, off Ko Kram Yoi, 12° 33′ N, 100° 44′ E, bottom; coarse loose green sand, 6′ Beam Trawl, 27 m, January 19, 1960.

HISTORY:

Alcock (1899) described the species for three small specimens, the largest of 7.5 mm from Port Blair, Andamans Sea. Laurie (1906) recorded a male of 10.25 mm from Ceylon. Ihle (1913) reported one ovigerous female of 5 mm and one small male from the West Coast of New Guinea from 32 m. Chang (1963) recorded from the Formosan waters, under the name of *Conchoecetes* sp., three specimens. The characters separating those specimens from other specimens of *C. artificiosus* of the same locality, leave no doubt about their identity with *andamanicus;* the

three specimens are two males of 20.5 x 22.0 mm and 21.5 x 23.5 mm and one female of 31.0 x 32.0 mm.

OBSERVATIONS:

The NAGA specimen is characterized by its carapace without tooth on the lateral border and not covered by a velvet tomentum. It agrees generally with the specific characters of *andamanicus* given by Alcock (1901), Laurie (1906) and Ihle (1913). The carapace is as long as wide, in agreement with Alcock's (1901) and Laurie's (1906) measurements, but on Chang's (1963) specimens the carapace is wider than long, like that of *artificiosus*, and the specific value of this character is doubtful. The two lateral frontal teeth are deflexed as mentioned by Laurie (1906), slightly conspicuous and rounded as indicated by Alcock (1900) and Chang (1963). The supero orbital angles are indicated but feebly and rounded. By those characters our specimen is close to (if not absolutely identical with) the illustrations of *andamanicus* given by Alcock (1901, pl. 3, fig. 17) and Chang (1963, pl. 1, fig. 2). It differs clearly from the illustrations of *artificiosus* given by Alcock (1900, pl. 3, fig. 16) and Barnard (1950, fig. 58a), on which the lateral frontal teeth and antero-superior orbital angle are longer and acute, the subhepatic (cervical) tooth of the lateral margin of the carapace strongly marked. Those characters are not so clear on the illustrations of Sakai (1937, pl. 8, fig. 2) and Chang (1963, pl. 1, fig. 1) for *artificiosus* because the velvet tomentum has not been brushed away. The illustration given by Chang (1963) for the two species are the most demonstrative.

Alcock (1899, 1901) expressed some doubt on the validity of *andamanicus*, referring to its small size. Ihle (1913) referring to the small size (5 mm) of his ovigerous female thought that *andamanicus* is a much smaller species than *artificiosus*. Our specimen of 19 mm, and more clearly those of Chang (1963) of 22 mm and 31 mm, show that the species reaches the same size as *artificiosus* and the development of the subhepatic lateral teeth of the carapace are not related to the size of the specimens but are a valid character for specific differentiation. The figures of the male pleopod have not been published for any species of *Conchoecetes*. The pleopod 2 is as long as the pleopod 1. The penis is very well developed. The geographical record from Andaman to New Guinea and Formosa indicates a wide distribution of the species.

Genus *Cryptodromia* Stimpson, 1858

Cryptodromia Stimpson, 1858, p. 225; 1907, p. 172. Miers, 1884, p. 57. Haswell, 1882, p. 138. Henderson, 1888, p. 5. Ortmann, 1894, p. 1155. Alcock, 1899, p. 140; 1901, p. 48. Borradaile, 1903, p. 299. Stebbing, 1910, p. 344; 1918, p. 56; 1920, p. 251; 1923, p. 4. Ihle, 1913, p. 32. Balss, 1922, p. 106. Sakai, 1936, p. 15; 1965, p. 8. Barnard, 1950, p. 328. Gordon, 1950, p. 206.

HISTORY:

Stimpson (1858, 1907) established *Cryptodromia* to include four new species; his suggestion to move into the new genus four other species described previously in other genera has not been followed. Alcock (1901) mentioned that *Petalomera* "closely resembles *Cryptodromia*, especially those species (e.g. C. *ebaloides* and *gilesi)* in which the carapace is granular and areolated, and indeed only differs from *Cryptodromia* in having the upper border of the meropodite of the chelipeds and the next, or the next two pairs of legs crestiform". The separation between *Cryptodromia* and *Petalomera* is not very easy, the main discrepancy being the presence in *Petalomera* on the coxa of the cheliped of one epipodite which does not exist in *Cryptodromia*, and the presence in *Petalomera* of "a plate-like expansion on the anterior inner portion of the

merus of the cheliped" (Sakai, 1965). Referring to the branchial formula, Gordon (1950) gives for *Petalomera:* "usually 14+4, but in certain species there may be only 12-13 or even as few as 9 gills on the adults, for *Cryptodromia* 14+13, but again the number of gills may be reduced to 12 or 9".

In the two genera there are two groups of species: one with granular carapace and the other with smooth or very little granular carapace. *Cryptodromia* includes seven granular species: *granulata, areolata, ornata, gilesi, ebaloides, sculpta, nodulifera.*

Ihle (1913) gave a key for twenty-six species and varieties, of which four have further been moved into *Petalomera.* Rathbun (1923) has done it for *C. lamellata* Ortmann, *wilsoni* Fulton and Grant, *lateralis* Gray, and Sakai (1936) for *japonica* Henderson. From the twenty-two remaining species of the genus the following are not included in the key of Ihle (1913): *C. sculpta* Haswell, *depressa* Baker, *octodentata* Haswell, *tomentosa* Hilgendorf, *hirsuta* Borradaile. The species and varieties described since Ihle (1913) have also to be added: *C. monodus* Stebbing, 1918, *C. oktahedros* Stebbing, 1923, *C. tumida spinifera* Montgomery, 1929, *C. tumida bispinosa* Sakai, 1937, *C. tumida trispinosa* Sakai, 1937, *C. nipponensis* Yokoya, 1933, *C. trituberculata* Buitendijk, 1939.

Our list of the species is given in the order of our key which refers mainly to that in German of Ihle (1913), but we have supplemented it. We add to the list some indication on the synonyms, some already accepted, others possible. The use of the antero-lateral teeth, which present individual variation, is not very satisfactory for the separation of the species; sometimes the lateral teeth are not similar on the two sides; the main difficulty is to appreciate which are the true antero-lateral teeth and their position infra, supra or on the marginal rim; are some subhepatic or antero-lateral? The confusion is clearly demonstrated by the fact that Ihle (1913) (and we have followed him on this point) situated *canaliculata typica* in his key in two different places. No doubt our key can be improved. Possibly comparison between specimens identified under different names will increase the number of synonyms and reduce the total number of species. For example *canaliculata sibogae, canaliculata obtusifrons* are not very different from *pentagonalis,* which is perhaps synonymous with *tomentosa* and *hirsuta,* in spite of the fact that those forms are not very close in our key. *Cryptodromia octodentata* Haswell, 1881, is probably synonymous with *Dromidiopsis cranioides.* Rathbun (1923) mentioned that "this species differs from Borradaile's description of *Cryptodramia* in that the walking legs are not knobbed or ridged and there is a thorn on the outer side of the dactylus of the last leg". The thorn is very clear on the illustration of Rathbun (1923, pl. 41); a similar "thorn" exists on the same place on *D. cranioides.*

Species (in the order of appearance in the key)

Cryptodromia demani Alcock, 1899
incisa Henderson, 1893
fallax (Lamarck) H. Milne Edwards, 1837
nipponensis Yokoya, 1933
mariae Ihle, 1913
trituberculata Buitendijk, 1939
amboinensis de Man, 1888
tuberculata Stimpson, 1858
pileifera Alcock, 1899

tumida tumida Stimpson, 1858
tumida bispinosa Sakai, 1937
tumida trispinosa Sakai, 1937
tumida spinifera Montgomery, 1929
bullifera Alcock, 1899
coronata Stimpson, 1958
hilgendorfi de Man, 1888
nierstraszi Ihle, 1913
pentagonalis Hilgendorf, 1878
tomentosa Heller, 1861
laevis Ihle, 1913
canaliculata canaliculata Stimpson, 1858
canaliculata sibogae Ihle, 1913
canaliculata obtusifrons Ihle, 1913
ornata Rathbun, 1911
ebalioides Alcock, 1899
nodulifera Henderson, 1886
granulata Kossmann, 1880
gilesi Alcock, 1899
areolata Ihle, 1913
sculpta Haswell, 1880

Synonyms (or moved to other genera)
ihlei Balss, 1922 = *areolata* Ihle, 1913
?*hirsuta* Borradaile, 1903 = *tomentosa* Heller, 1861
?*pentagonalis* Hilgendorf, 1878 = *tomentosa* Heller, 1861
?*octodentata* Haswell, 1880 = *Dromidiopsis cranioides*
?*oktahedros* Stebbing, 1918 = *nodulifera* Henderson, 1886
?*monodus* Stebbing, 1918 = *Dromidiopsis cranioides*
depressa Baker, 1907 = *Petalomera depressa*
lamellata Ortmann, 1894 = *Petalomera lamellata*
wilsoni Fulton and Grant, 1902 = *Petalomera wilsoni*
lateralis (Gray, 1831) = *Petalomera lateralis*
japonica Henderson, 1888 = *Petalomera japonica*
stearnsii Ives, 1892 = *Petalomera japonica*
asiatica Parisi, 1915 = *Petalomera japonica*
canaliculata ophryoessa Ortmann, 1892 = *Petalomera japonica*

Key to the Species of *Cryptodromia*

1. Dorsal surface of carapace even or with distinct sulci but not granular.
   A. Dorsal surface of carapace with hepatic tubercle behind the extra orbital angle . . . . . *demani* Alcock, 1899
   B. Dorsal surface of carapace without hepatic tubercle.
      a. No antero-lateral tooth. . . . . *incisa* Henderson, 1893
      b. Antero-lateral teeth present
         a1. Three (or more) antero-lateral teeth (extra orbital, subhepatic and postero-lateral not included).
            a2. Three lateral teeth close together, the first being the largest.

a3. Extraorbital teeth triangular and strong .....
..... *fallax* (Lamarck) H. Milne Edwards, 1837

b3. Extraorbital teeth very obtuse; front truncated; lateral teeth feeble; carpus of cheliped with two tubercles on the outer margin . . *nipponensis* Yokoya, 1933

b2. The lateral teeth not close together and extra-orbital angle normal.

a3. Median frontal tooth weak, hardly visible from above.

a4. Lateral frontal teeth prominent; antero-lateral teeth weak but acute; the tooth 2 very small; no subhepatic tooth..... *mariae* Ihle, 1913

b4. Lateral frontal teeth less prominent; antero-lateral teeth subequal, rounded; all larger than on *mariae;* one large subhepatic tooth, and a smaller suprasutural tooth..... *trituberculata* Buitendijk, 1939

b3. Median frontal tooth well marked and clearly visible from above; one or two subhepatic teeth.

a4. Antero-lateral teeth 2 larger than teeth 1 and 3, but situated on an inframarginal rim ..... *ambomensis* de Man, 1888

b4. Antero-lateral teeth not larger than teeth 1 and 3.

a5. Two or more subhepatic teeth.

a6. Three to five subhepatic teeth and two to three suprasutural teeth ..... *tuberculata* Stimpson, 1858

b6. Only two subhepatic teeth and one suprasutural .....
..... *pileifera* Alcock, 1899

b5. Only one subhepatic tooth and one suprasutural.

a6. Distal border of the last male abdominal segment concave without spine ..... *tumida tumida* Stimpson, 1858

b6. Distal border of the last male abdominal segment with terminal spines.

a7. That border with two long lateral terminal but no median spines ..... *tumida bispinosa* Sakai, 1937

b7. That border with two short lateral terminal and a median spine ..... *tumida trispinosa* Sakai, 1937

c7. ..... *tumida spinifera* Montgomery, 1927

b1. Two (or less) antero-lateral teeth.

a2. Two antero-lateral teeth.

a3. A pearl-like tubercle in the middle of the merus of the third maxilliped, on the second segment of antenna and below the suborbital lobe .....
..... *bullifera* Alcock, 1899

b3. No such tubercle on the merus of third maxilliped, etc. Regions of carapace sensibly well defined.

a4. Carpus of cheliped with acute projection at the outer angle .....
..... *canaliculata canaliculata* Stimpson, 1858

b4. Carpus of cheliped without acute projection at the outer angle .....
..... *coronata* Stimpson, 1858

b2. Only one antero-lateral tooth.

a3. Distance between extraorbital angle and tooth shorter than distance between tooth and branchial sulcus.

a4. The first distance half of the second; frontal median tooth very small..... *hilgendorf* de Man, 1888

b4. The first distance longer than half of the second; frontal median tooth approximately equal to frontal lateral teeth ..... *nierstraszi* Ihle, 1913

b3. Distance between extraorbital angle and tooth approximately equal to that between tooth and branchial sulcus.

a4. Infraorbital angle with a small accessory external tubercle.

a5. One subhepatic tooth on an inframarginal rim; antero-lateral tooth on the marginal rim is obsolete; postero-lateral teeth prominent and supraorbital margin deeply concave ... *pentagonalis* Hilgendorf, 1878

b5. One strong subhepatic tooth on an inframarginal rim; the antero-lateral tooth on the marginal rim is prominent; postero-lateral teeth less prominent and supra-orbital margin less deeply concave than on *pentagonalis* ..... *tomentosa* Heller, 1861

b4. Infraorbital angle without accessory external tubercle.

a5. Regions of carapace ill defined; gastro-cardiac sulcus not distinct; supraorbital angle weak ..... *laevis* Ihle, 1913

b5. Regions of carapace distinctly defined; gastro-cardiac sulcus marked; supraorbital angle well developed.

a6. Tooth present on the suprasutural rim ..... *canaliculata canaliculata* Stimpson, 1858

b6. No tooth on the suprasutural rim.

a7. Lateral and median frontal teeth equal..... *canaliculata sibogae* Ihle, 1913

b7. Lateral frontal teeth longer than the medial..... *canaliculata obtusifrons* Ihle, 1913

2. Dorsal surface of carapace granular and with well defined regions.

A. Postero-lateral border of carapace with teeth ..... *ornata* Rathbun, 1911

B. Postero-lateral border of carapace without teeth

a. Median frontal teeth longer than the lateral; no antero-lateral teeth..... *ebalioides* Alcock, 1899

b. Median frontal teeth small and never longer than the lateral.

a1. Regions feebly marked; granular only on the anterior part of carapace ..... *nodulifera* Henderson, 1886

b1. Regions well developed.

a2. Front not prominent; lines joining frontal lateral teeth to external orbital angles oblique laterally; carapace granulated beyond the branchial sulcus and smooth behind; distal border of the male terminal abdominal segment with a median spine..... *granulata* Kossman, 1880

b2. Front very prominent; the lines joining frontal lateral teeth and external orbital angles are oblique posteriorly.

a3. Carapace pentagonal; supraorbital teeth obsolete; distal border of the male terminal abdominal segment with an emargination..... *gilesi* Alcock, 1899

b3. Lateral border of carapace rounded; two large areola beyond and behind cervical sulcus; distal border of the male terminal abdominal segment convex ..... *areolata* Ihle, 1913

c3. ..... *sculpta* Haswell, 1880

Cryptodromia areolata Ihle, 1913

Figs. 5-7; Pl. II, A

Cryptodromia areolata Ihle, 1913, p. 47, pl. 2, figs. 10, 11. Sakai, 1936, p. 26, pl. 1, fig. 1; 1965, p. 8, pl. 3, fig. 4.

Cryptodromia ihlei Balss, 1920, p. 177; 1922, p. 107, text-fig. 2. Yokoya, 1933, p. 98.

MATERIAL:

Ng. 1026, male of 7 x 7 mm

Locality: NAGA S8, St. No. 60-777, South China Sea, off Nhatrang, 12° 09′ 40″ N, 109° 24′ 00″ E, 6′ Beam Trawl, 93 m, September 20, 1960.

HISTORY:

Ihle (1913) described the species for a male of 10 mm from Timor from 112 m. Sakai (1936, 1965) recorded numerous (thirty in 1965) specimens from various localities from Japan between 30 and 120 m, the largest 7 x 6.8 mm. He established *C. ihlei* as a synonym of *areolata.* Balss (1921, 1922) described *ihlei* for eight specimens from Japan, the largest 7 x 6 mm.

OBSERVATIONS:

The NAGA specimen agrees generally with the observation of Ihle (1913), Balss (1922) and Sakai (1936, 1965) and the illustrations of the authors, which differ in some respects. Ihle (1913) situated *areolata* near *gilesi;* Balss (1922) as close to *gilesi* and *sculpta.* Gordon (1950) figured the male pleopod 1, 2 and the apex of the abdomen in *granulata* and *gilesi.* On the NAGA specimen the apex of the abdomen is without indication of acute spine as on *granulata* and without emargination as on *gilesi.* The species is mainly recorded from Japan; only Ihle's specimen is from Timor Island and the NAGA specimen now from South China Sea.

Genus *Dromidiopsis* Borradaile, 1900

Dromidiopsis Borradaile, 1900, p. 572; 1903, p. 299; 1903b, p. 576. Ihle, 1913, pp. 25, 86, 90. Balss, 1922, p. 106. Rathbun, 1923, p. 67. Sakai, 1937, p. 11. Barnard, 1950, p. 311.

HISTORY:

Borradaile (1903) established the genus as distinct from *Dromidia* and included in it *"D. tridentatus, australiensis, cranioides, orientalis, ? caputmortuum* etc...". Ihle (1913) in his tables (pp. 86, 90) did not separate the species in the two genera *Dromidiopsis* and *Dromidia.* In Borradaile's key (1903, p. 301), the main separation between the two genera is the presence of epipodites on the chelipeds in *Dromidiopsis* and their absence on *Dromidia.* Referring to the literature the inclusion of some species in one genus or in the other is not always easy. For example, Rathbun (1923), followed by Sakai (1937), included in *Dromidiopsis* the species *dormia* (Linne, 1763), which is a *Dromia* as illustrated by the figure of the sternal sulci of the female given by Shen (1931, figs. 3,4) and correctly referred by Barnard (1950, p. 310).

Our list of the species of the genus is given in the order of our key. Since Ihle's (1918) four, the following new species have been described in the genus: *edwardsi* Rathbun, 1919, *abrolhensis* Montgomery, 1929, *cornuta* Barnard, 1947, *michaelseni* Balss, 1935. The genus includes: *excavata* Stimpson, 1858, *cranioides* (de Man, 1888), *edwardsi* Rathbun, 1919,

tridentatus Borradaile, 1903, *australiensis* Haswell, 1881, *albrolhensis* Montgomery, 1929, *cornuta* Barnard, 1950, *michaelseni* Balss, 1935. The species *edwardsi, tridentatus, australiensis* and *abrolhensis* are very close to one another; *michaelseni* is not situated in our key.

Key to the Species of *Dromidiopsis*

A. Lateral frontal teeth normal, not particularly long and acute.
  a. A dense transverse fringe of hairs from side to side between the antero-lateral angles; lateral borders of carapace without teeth, only divided into two subequal halves by a cervical groove; two subhepatic tubercles . . . . . *excavata* Stimpson, 1858
  b. No similar dense transverse fringe of hairs; lateral border of carapace with teeth or indication of teeth.
    a1. Four (at least) antero-lateral teeth well marked, at least on the adult male, not included external orbital angel; a tooth on the supraorbital border; superior border of carpus and propodus of male chelipeds each with (3-4) acute spinulous tubercles . . . . . *cranioides* (de Man, 1888)
    b1. Four or three antero-lateral teeth little marked sometimes only indicated; no tooth or tubercle on the supraorbital border.
      a2. Infra orbital angle rounded.
        a3. Antero-lateral teeth very blunt-like sinousity; superior border of propodus of male cheliped with only two small blunted tubercles . . *edwardsi* Rathbun, 1919
        b3. Antero-lateral teeth like "three small blunt knobs" . . . . . *tridentatus* Borradaile, 1903
      b2. Infra orbital angle as a strong tooth.
        a3. Four antero-lateral small teeth; blunt tooth 1 close to the pointed tooth 2; distance between teeth 1-3 equal to that between teeth 3-4 (postero-lateral) . . . . . *australiensis* Haswell, 1881
        b3. Four small antero-lateral teeth more conspicuous than on *austaliensis;* the tooth 2 rudimentary and barely distinguished from the tooth 1 which is pointed (not acute); distance between teeth 1-3 little shorter than between 3-4 . . . . . *abrolhensis* Montgomery, 1929

B. Frontal teeth long and acute; the median slightly shorter; antero-lateral margins rounded without tooth; terminal abdominal segment of male ending in a sharp point . . . . . *cornuta* Barnard, 1947

Dromidiopsis cranioides (de Man, 1888)

Figs. 8-16; Pl. II, B-D

?*Dromidia orientalis* Miers, 1880, p. 370, pl. 15, figs. 1, 2.

Dromidia cranioides de Man, 1888, p. 208, pl. 14, figs. 6-8. Nobili, 1903, p. 22 (not seen). Rathbun, 1910, p. 366; 1911, p. 194.

Dromia cranioides Alcock, 1899, p. 138; 1901, p. 46, pl. 2, fig. 5.

Dromidiopsis cranioides Borradaile, 1903, p. 299. Ihle, 1913, p. 26, pl. 1, fig. 4, text figs. 8a, 8b, 18. Balss, 1922, p. 106. Sakai, 1937, pl. 12. Buitendijk, 1950, p. 59.

MATERIAL:

Ng. 690A, male of 29 x 30 mm

Locality: NAGA S4, St. No. 60-212, South China Sea, 15° 40.0′ N, 109° 22.9′ E, Bottom; shell, detritus and sand, 10′ Beam Trawl, 60-80 fathoms, February 27, 1960.

Ng. 726, male of 51 x 53 mm

Locality: NAGA S2, St. No. 59-131, Gulf of Thailand, between Ko Lau and Ko Sichon, 13° 01′ 45″N, 100° 50′ 30″ E, 40′ Otter Trawl, 25 m, December 15, 1959 (last station, return leg).

NMS. 1964. 6.11.1, male of 68 x 75 mm
identified by Buitendijk, 1950.

HISTORY:

De Man (1888) described the species for a series of specimens, the largest of 26.5 x 27.5 mm from Elphinstone, Merqui Archipelago. Alcock (1899, 1901) recorded seven specimens from Andamans Sea and Mergui, the largest 28 mm. Borradaile (1903) moved the species into *Dromidiopsis*. Rathbun (1910) recorded two specimens from the Gulf of Thailand. Rathbun (1911) recorded from Amirante one juvenile female and two males of 13.6 x 13.4 mm. Ihle (1913) recorded eleven specimens from Indonesian Seas. Balss (1922) recorded specimens from Japan, and Sakai (1937) only referred to Balss (1922). Buitendijk (1950) recorded two males from Singapore.

OBSERVATIONS:

The two NAGA specimens have been compared with specimens of the National Museum of Singapore; the collection of that Museum includes a large series, from which some have been identified by Buitendijk (1950). As Buitendijk (1950) mentioned the species presents some slight differences from the others and does not agree in all details with the observations and illustrations of the authors. Our small male shows on the postfrontal region (after denudation) of the carapace five large pinkish round spots which do not exist on the other specimens; it has the setae on the border of the legs longer and the tubercles on the articles of the chelipeds less acute, not spinulous. The antero-lateral border is similar on our two specimens. There are four antero-lateral teeth, the external orbital angle not included; the distance is equal between teeth 1-2 and between teeth 2-3, longer between teeth 3-4, shorter between orbital border and tooth 1. On a little lower (ventral) plane our two specimens have between the teeth 1 and 2 two other accessory teeth on the right side; only one on the left side. Those lower accessory teeth are mentioned by Alcock (1899) and indicated on the figure of Ihle (1913, pl. 1, fig. 4); where five teeth can be counted with one divided into two on the left side.

On our larger male the trigonal merus of the cheliped is armed with approximately eight short acute tubercles on each of its three borders; the carpus and the palm have each three acute tubercules (spines) on the inner border. The two fingers are naked, polished and with the "beautiful rose-colour", quoted by de Man (1888). The dactylus of pereiopod 2 and 3 is shorter than the propodus, that of pereiopod 2 more than pereiopod 3; the anterior border of the dactyli are naked; that naked flat face is bordered with one upper and one lower longitudinal row of stiff hairs, as described on *Dromia dehaani* by Sakai (1937, p. 9); the posterior margin of the dactyli has a longitudinal row of seven acute chitinous spinules, increasing progressively in size distally. The chitinous spinules of the carpus and dactylus of the pereiopods 4 and 5 are illustrated. These chitinous spinules, mainly those of pereiopod 5, can be seen on the illustrations of Alcock (1901, pl. 2, fig. 5); one distal at the inferior and one shorter distal also at the superior borders of propodus; one proximal at the superior border of the dactylus. On the illustrations of Ihle (1913, pl. 1, fig. 4) that of the dactylus is indicated and also the median between the propodus and dactylus.

The male pleopods 1 and 2 are illustrated. In the natural condition, the second pleopod is fitted in the first in exactly the same position as illustrated by Stephensen (1945) for *Dromidiopsis (=Dromia) dormia*. The male of 68 x 75 mm, identified by Buitendijk (1950) is the largest recorded until the present; it shows the specific characters at their full development. On the fingers of the chelipeds the setae leave bare only the borders. Practically six antero-lateral teeth can be counted; the posterior border of the teeth 2 and 3 present a large gibbosity, which is feebly indicated on the NAGA specimen. On the dorsal surface of the carapace there are several tufts of long setae in some symmetrical order.

Family HOMOLIDAE Henderson, 1888

Figs. 17-18

Homoliens (part), H. Milne Edwards, 1837, p. 180.

Homolidae Henderson, 1888, p. 18. Ortmann, 1897, p. 1155. Alcock, 1899, p. 103; 1901, p. 59. Calman, 1909, p. 314. Stebbing, 1910, p. 347, Ihle, 1913, pp. 52, 88, 92. Sakai, 1936, p. 45. Balss, 1923, p. 111; 1957, p. 1606.

Thelxiopeidae Rathbun, 1937, p. 62. Barnard, 1950, p. 338. Monod, 1956, p. 78. Sakai, 1965, p. 14.

Thelxiopidae Gordon, 1950, p. 221.

Homolidea Alcock, 1899, pp. 126, 129; 1901, p. 58. Calman, 1909, p. 314.

Thelxiopeidea Rathbun, 1937, p. 61. Barnard, 1950, p. 306. Gordon, 1950, p. 219. Monod, 1956, p. 24.

REMARKS ON NOMENCLATURE:

Referring to the priority, Rathbun (1937) used *Thelxiope* Rafinesque, 1814, to replace *Homola* Leach, 1815; many authors adopted the change. But *Homola* Leach, 1815, being declared valid under opinion 522 (Int. Comm. Nom., 1958, 19(9), p. 228) has to be used. We thank Dr. Gordon for her kind advise on the matter.

HISTORY AND DISCUSSION:

Henderson (1888) established the family Homolidae, Alcock (1899) the tribe of Homolidea and divided it into two families: Homolidae and Latreillidae. The last family includes *Latreillia* and *Latreillopsis* which differ from the other genera by having 8 pairs of gills instead of 13-14 as in the genera of Homolidae, no epipodite on the chelipeds and the basal segment of the eye-stalks much longer than the terminal segment. Gordon (1950), considering the position of the two genera *Homolochunia* and *Homolomannia* "as forming a bridge between Alcock's two families", followed Ihle (1913) and used better Homolidae in the wider sense without separating the genera into two families. Rathbun (1937) maintained the two families, but like Monod (1956), Sakai (1965) and other authors, we follow Ihle (1913) and Gordon (1950).

In regard to Alcock (1899) the subgenus *Homolax* Alcock, 1899, established for *Homola megalops* (1912), is not maintained by Kemp and Sewell (1912), nor by Ihle (1913) nor Gordon (1950). In regard to Ihle (1913), the genus *Paromola* is separated from *Homola* following Gordon (1950) who made *Moloha* Barnard, 1947, its synonym.

In the order of our key the family includes *Homola* Leach, 1815, *Paromola* Wood-Mason and Alcock, 1891, *Paramolopsis* Wood-Mason, 1891, *Homolomannia* Ihle, 1913, *Homologenus* Henderson, 1888, *Homolochunia* Doflein, 1904, *Hypsophrys* Wood-Mason, 1891, *Latreillopsis* Henderson, 1888, *Latreillia* Roux, 1830.

In our key the terminology for the spines is that of Ihle (1913) with some amendment as will be indicated further. In regards to the key of Ihle (1913) the main differences result from our position on the definition of the genera *Homola, Paromola* and *Latreillopsis,* which need to be briefly explained. *Paromola* was first established (1891) for a European species *H. cuvieri* Risso and further (1899) received an Indo-Pacific species *profundorum,* but it was considered as only a subgenus of *Homola,* and Ihle (1913) did not separate the two taxa.

Gordon (1950) and Barnard (1950) called attention to the close relation between *Paromola* and several species of *Latreillopsis;* in the present paper we maintain in *Latreillopsis* only the species *(bispinosa* and *laciniata)* characterized by an opercular third maxilliped. As a result at least one former species of *Latreillopsis (multispinosa)* with a long ocular peduncle now is included in *Paromola,* and this character can no more be used to separate the two genera as in the key of Ihle (1913). Also in the key of Alcock (1899) it loses value to separate the family Homolidae from Latreillidae.

Referring to the terminology of Ihle (1913) for the spines of the carapace it seems that Griffin (1965) designated as "lateral rostral spine" the "supraorbital spine" of Ihle (1913) and authors. The lateral border of the orbit, which is sometimes (at least in some species) difficult to define, is indicated by the distal end of the *linea homolica;* the supra-orbital spine is just above and the infra-orbital just below. The supra-orbital and infra-orbital spines of Griffin (1965, for *Paromola spinimana)* are (probably) below the *linea homolica* and correspond to the antero-lateral spines of Ihle (1913). The ocular peduncles extend far away from the lateral border of the orbit and their distal end is located between those two antero-lateral spines, which can hardly be called supra and infra orbital. The figures of Ihle (mainly Ihle, 1913, figs. 19, 20, 21) for a "homolide" do not precisely correspond to any species or genera but are closer to the situation on *Homola* than on *Paromola,* two separated genera which are not distinguished by Ihle (1913).

The reference by Ihle (1913) in his key to the presence of a pair of accessory lateral spines on the rostrum to separate *Homologenus* from *Homola, Paramolopsis, Homolomannia* could create some confusion. Do those "lateraler Nebenstacheln" of the rostrum in his key correspond to the "lateraler rostralzahne" of his text (Ihle, 1913, p. 55)? Ihle, in one of his figures (Ihle, 1913, fig. 19), situated on the anterior border of the carapace between the median rostral spine and the supraorbital (and infraorbital) spines, a spine, for which he did not indicate any name. A spine situated in this place exists on *Homola* and *Paramolopsis* which in the key of Ihle (1913) are situated among the genera without lateral rostral spine. Is the true rostral lateral spine a different one, indicated as s.r.z. "seitlicher rostralzahu" in his figure (Ihle, 1913, fig. 21)?

To reduce further confusion, we designate the unmaned spine of fig. 19 as "intermediate spine", and in accordance with our interpretation we amend our reproduction of the diagammatic figure of Ihle (1913, fig. 19) on which the names of all the spines are indicated. Among the genera of the family, only *Homologenus* presents a lateral rostral spine and its rostrum can be indicated as trifid, but it has no intermediate spine. *Homola, Paramolopsis* and *Hypsophrys* have an intermediate spine which *Homolochunia, Homolomannia, Paramola, Latreillopsis, Latreillia* have not.

Our reproduction of the figure 20 of Ihle (1913) is also amended. As addition, the intermediate spine, the lateral epistomian spine, the carina joining the rostrum to the median epistomian spine (Ihle, 1913, fig. 21 "naht zwischen rostrum und epistom") are indicated. The antenna and ocular peduncle are in natural position; the arrival of the *linea homolica* between the supra and the infra orbital spines is also a rectification.

An accurate terminology for the spines of the carapace could facilitate the revision of the genera and species of the family. Rathbun (1923) named "supraocular horn" the supraorbital spine of Ihle (1913) without creating too much confusion. Sakai (1961) named respectively "hepatic and antero-lateral spine" the antero-lateral and dorso-lateral spines of Ihle (1913). Although the names of Sakai (1961) are perhaps more adequate, considering that the antero-lateral spine of Ihle (1913) without any doubt belongs to the hepatic region, the comparison between the descriptions is less easy. Obviously the revision could not be restricted to the use of the spines, and Griffin (1965) pointed out that some characters which "have not so far been used extensively" are probably more important than certain "somewhat trivial" characters which could "lead to confusion if emphasized".

Key to the Genera of Homolidae

A. Carapace quadrangular, urn-shaped or longitudinally oval without its anterior part conspicuously narrowed like a neck.
  a. Third maxilliped pediform with merus antero-laterally little expanded at most by a spinous hump.
    a1. Dactylus of pereiopod 5 at least as long as (or longer than) half length of propodus; a tubercle (spur) or spine situated on the proximal median, or distal part of posterior border of propodus opposed to dactylus.
      a2. Spur or spine of propodus of pereiopod 5 always shorter than propodus itself.
        a3. Rostrum without lateral spine.
          a4. Carapace dorsally convex with high lateral sides; antero-lateral spines, if present, situated at some distance behind the virtually transverse line joining the base of supraorbital spines.
            a5. Rostrum distally bifurcate on a short run. An intermediate spine on anterior border between rostrum and supraorbital spines. Supraorbital spine short and little acute ..... *Homola* Leach, 1815
            b5. Rostrum distally tapering and acute; no indication of intermediate spine; supraorbital spine always acute, generally long and sometimes with accessory spinules..... *Paromola* Wood-Mason and Alcock, 1891
          b4. Carapace depressed, flat, urn-shaped, without dorsal spines; antero-lateral spine approximately at the same level as the supraorbital spines.
            a5. Antennal flagellum much longer than carapace; terminal segment of eyestalk globular and strongly much broader than its proximal peduncle..... *Paramolopsis* Wood-Mason, 1891
            b5. Antennal flagellum much shorter than carapace; terminal segment eyestalk little broader than its proximal peduncle .... *Homolomannia* Ihle, 1913
        b3. Rostrum long with a pair of lateral spines; a long gastro-median spine and one pair of large dorso-lateral spines between cervical and branchial sulci ..... *Homologenus* Henderson, 1888
      b2. Spur (spine-shaped) of propodus of pereiopod 5 excessively large, much longer than propodus itself and constituting a forceps with dactylus; supraorbital spines longer with secondary spines ..... *Homolochunia* Doflein, 1904
    b1. Dactylus of pereiopod 5 much shorter than half length of propodus and closing against distal border of propodus; carapace deep with few small dorsal spines; terminal segment of eyestalk very much longer than the basal..... *Hypsophrys* Wood-Mason, 1891
  b. Third maxilliped operculiform with merus antero-laterally expanded by a large, flat

triangular wing; rostrum much shorter than supraorbital spine; ocular peduncles very long ..... *Latreillopsis* Henderson, 1888

B. Carapace pyriform with anterior part narrowed like a neck; ocular peduncles very long ..... *Latreillia* Roux, 1830

Genus *Homola* Leach, 1815

Thelxiope Rafinesque, 1814, p. 21. Rathbun, 1937, p. 62. Barnard, 1950, p. 338. Gordon, 1950, p. 221. Monod, 1956, p. 79. Sakai, 1965, p. 14.

Homola Leach, 1815, p. 324. Latreille, 1817, p. 266; 1829, p. 67. Desmarest, 1825, p. 133. H. Milne Edwards, 1837, p. 181. de Haan, 1835, p. 105. Dana, 1852, p. 403. Heller, 1865, p. 149. Henderson, 1888, p. 18. Ortmann, 1892, p. 540, Alcock, 1899a, p. 6; 1899b, p. 154; 1901, p. 60. Ihle, 1913, pp. 69, 88, 92. Balss, 1922, p. 111. Sakai, 1936, p. 46.

HISTORY:

The genus was established for a European species, *Cancer barbata* Fabricius, 1793. Henderson (1888) described *orientalis* and Alcock (1899) *andamanica,* which Ihle (1918) established as a synonym of *orientalis.* Kemp and Sewell (1912) did not maintain the subgenus *Homolax* Alcock for *megalops* Alcock, 1899. The genus contains *orientalis* Henderson, 1888, and *megalops* Alcock, 1899.

Referring to Alcock's descriptions and figures (1901), using mainly that of *andamanica (=orientalis)* (Alcock, 1901, pl. 4, fig. 20) and that of *megalops* (Alcock, 1901, pl. 4, fig. 21), the two species can be separated by:

1. The lateral extremity of the ocular peduncles extends a little over the external orbital angle; the first segment of the peduncle not very slender and the cornea subcyclindrical; posterior border of propodus and dactylus of ambulatory legs with "compressed articulated spines, which are distant and acicular on the propodite, but stout, very regular and close-set on the dactylus" ..... *orientalis.*

2. The lateral extremity of the ocular peduncles does not extend over the external orbital angle; the first segment of the peduncle slender and the cornea reniform and wider than on *orientalis;* the carapace more urn-shaped; the propodus and dactylus of the ambulatory legs unarmed except few small, joined spinules at the base of the posterior border of the dactylus ..... *megalops.*

Homola orientalis Henderson, 1888

Figs. 19-22, Pl. III, A-B

Homola orientalis Henderson, 1888, p. 19, pl. 2, fig. 1. Doflein, 1902, p. 651, pl. 4, figs. 4,5. Rathbun, 1923, p. 143, pl. 37, figs. 1,2. Sakai, 1936, p. 35, pl. 3, fig. 2; 1937, p. 46, pl. 9, fig. 1.

Homola andamanica Alcock, 1899, p. 7; 1899b, p. 156; 1901, p. 61, pl. 4, fig. 20. Ill. Invest., pl. 40, fig. 1.

Homola barbata var. *orientalis* Doflein, 1904, p. 14, pl. 5, figs. 4,5. Parisi, 1915, p. 109. Balss, 1922, p. 111. Yokoya, 1933, p. 99.

Thelxiope orientalis Gordon, 1950, p. 221. Barnard, 1950, p. 340, fig. 65f. Sakai, 1965, p. 15, pl. 16, figs. 3,4.

MATERIAL:

Ng. 695, male of 8.5 x 11 mm

Locality: NAGA S4, St. No. 60-212, South China Sea, 15° 40.0′ N 109° 45.5′ E, bottom; shell, detritus and sand, 10′ Beam Trawl, 60-108 fathoms, February 27, 1960.

HISTORY:

Henderson (1888) described the species for specimens from Philippine and Kei Islands, the largest of 13.5 x 17 mm. Alcock (1899, 1901) recorded specimens from Andamans Sea from 142 to 162 m, mentioning a female of 21 x 27 mm and being not sure of its identity with *orientalis*, he gave the new name *andamanica*, established further as a synonym. Doflien (1902, 1904) recorded the species in Sumatra, Rathbun (1923) in Australia; Gordon (1950) recorded one immature female of 16 mm from the Gulf of Aden from 73-320 m and another immature from Zanzibar area from 212 m. Barnard (1950) recorded specimens from Zululand coast and Portuguese East Africa. Parisi (1915), Balss (1922), Yokoya (1933), Sakai (1936, 1937, 1965) recorded the species in Japan. Sakai (1937) mentioned fourteen females and twelve males, largest male of 15 x 19 mm and (1965) three males and two females. The species lives on muddy bottom from 18 to 300 m.

OBSERVATIONS:

The NAGA specimen agrees generally with the descriptions and illustrations of the authors. The male pleopods 1 and 2 are very close to those of *barbata*, as figured by Gordon (1950, text-figs. 26, B, B′, C′, D) for a specimen of 14 mm. The record of the species in the South China Sea confirms its wide distribution from South Africa and Gulf of Aden to Japan and Australia.

Genus *Paromola* Wood-Mason and Alcock, 1891

Figs. 23-31

Paromola Wood-Mason and Alcock, 1891, p. 268. Bouvier, 1940, p. 191. Gordon, 1950, p. 191. Sakai, 1965, p. 14. Griffin, 1965, p. 86.

Parhomola Sakai, 1937, p. 47.

Homola (Paromola) Alcock, 1899a, pp. 7, 10; 1899b, p. 156; 1901, p. 61. Ihle, 1913, p. 69 (part).

Thelxiope (Moloha) Barnard, 1947, p. 372; 1950, p. 341.

HISTORY:

Wood-Mason and Alcock (1891) described the genus with type-species as *Homola cuvieri* Risso, 1816, from the Mediterranean-Atlantic areas but did not record any species from the Indo-Pacific area. Alcock (1899b, p. 156 and 1901, p. 61) made it a subgenus of *Homola* to include *Homola profundorum* Alcock and Anderson, 1899. The second Indo-Pacific species of the genus is *japonica* Parisi, 1915, of which the close relation and discrepancies with *cuvieri* were confirmed by Balss (1922). Gordon (1950) established *Moloha* Barnard, 1947, a genus established for *Latreillopsis alcocki* Stebbing, 1920, as a synonym of *Paromola*. She also established *Latreillopsis majora* Kubo, 1936, and the specimens identified as *Latreillopsis multispinosa* by Stebbing, 1923, as synonymous with *Paromola alcocki*, but took no decision regarding *Latreillopsis multispinosa* Ihle, 1913.

Since Gordon (1950), two other Indo-Pacific species, *macrochira* Sakai, 1961, and *spinimana* Griffin, 1965, have been described. *Moloha* being synonymous with *Paromola*, *Homola (Moloha) acutispina* Sakai, 1961, belongs also to the genus.

Without being strongly positive and with reference to the branchial formula, Gordon (1950) seemed to consider that probably only *bispinosa* Henderson and *laciniata* Sakai belong to *Latreillopsis*. We restrict the genus to those two species by referring to the shape of the third maxilliped, a character previously noted and used by Alcock (1899) in his key to separate the genera *Latreillopsis* from *Latreillia*. All other former species of *Latreillopsis* are moved into *Paromola*.

Barnard (1950) already suggested (with reserve) that *Latreillopsis hawaiiensis* Edmondosn, 1932, belongs to *Homola (Moloha=Paromola)*. Griffin (1965) did not follow the suggestion of Gordon (1950) to do the same for *Latreillopsis petterdi* Grant, 1950, but he remarked that *petterdi* differs from *Latreillopsis* and agrees with some *Paromola* species *(P. profundorum, P. spinimanus)* in having "the fourth ambulatory propodus expanded midway along and ventrally spinose distally". This character has full value to exclude *petterdi* from *Latreillopsis* s.r. nobis. Finally *Latreillopsis multispinosa* Ihle, 1913, is very close to *Paromola acutispina* (Sakai, 1961).

In its new wider definition *Paromola* includes in the order of our key the following nine Indo-Pacific species: *japonica* Parisi, 1915, *hawaiiensis* (Edmondson, 1932), *alcocki* (Stebbing, 1920), *acutispina* (Sakai, 1961), *multispinosa* (Ihle, 1913), *petterdi* (Grant, 1905), *macrochira* Saksi, 1961, *spinimana* Griffin, 1965, *profundorum* Alcock and Anderson, 1899.

Among them, species like *hawaiiensis* and *japonica* are perhaps synonyms; others like those of the group *profundorum, spinimana, petterdi* and the group, *multispinosa, acutispina* perhaps ought to be separated into new genera.

Our diagrammatic figures of the species show the heterogeneity of the genus, but to the characters of the carapace, others, like those of the appendages, obviously have to be associated in order to define precisely the discrepancies between the species. On *profundorum* for example the dactylus of the pereiopod 5 is less than half as long as the propodus; such as intermediate disposition between those generally existing on the other species of *Paromola* and that of *Hypsophrys* can be used. Griffin (1965) mentioned a similar condition on *spinimana* and emphasized at the same time the associated modification of the propodus.

Some of the characters of our key refer to the key of Griffin (1965), but as it has been already noted this author misnamed as lateral rostral spine the supraorbital spine of Ihle (1913) and other authors.

Key to the Species of *Paromola* found in the Indo-Pacific

A. Supraorbital spine with at least one lateral accessory spinule.
- a. Supraorbital spine with a single lateral accessory spinule. Chelipeds longer than ambulatory legs.
  - a1. Length of rostrum subequal to supraorbital spine. Spines of carapace strong and subequal.
    - a2. Carapace crowded with large spines. Merus of chelipeds with spiniform tubercles. Size: 85 x 112 mm ..... *japonica* Parisi, 1915
    - b2. Carapace with acute tubercles instead of spines. Merus of chelipeds with less sharp tubercles. Size: 110 x 125 mm ..... *hawaiiensis* (Edmondson, 1932)
  - b1. Length of rostrum clearly shorter than supraorbital spine. Some spines of carapace slimmer, longer, more acute than the others. Chelipeds shorter than ambulatory legs.
    - a2. Length of rostrum little less than supraorbital spines, which have less than one-third of length of carapace. Size: 33 x 45 mm ..... *alcocki* (Stebbing, 1920)
    - b2. Length of rostrum about half supraorbital spine, which has more than half length

of carapace; all spines longer than on *alcocki*. Size 26.5 x 33.5 mm ..... *acutispina* (Sakai, 1961)

b. Supraorbital spine with at least two accessory spinules, and always much longer than rostrum. Chelipeds shorter than ambulatory legs.

a1. Supraorbital spine with only two accessory spinules, one lateral and one ventral. Carapace with thirty-nine long, acute, slim spines covering all the carapace, the antero-lateral being the largest. The meri of pereiopods without spines, except 2 on anterior border of pereiopods 2 and 3. Size: 18 x 23 mm ..... *multispinosa* (Ihle, 1913)

b1. Supraorbital spine with more than two accessory spinules; at least two large lateral spinules, one inner subdistal tubercle and one outer subdistal small spinule. Carapace with short acute tubercles or spines. The meri of pereiopods 1-5 with spines on the posterior border. Size: 80 as length ..... *petterdi* (Grant, 1905)

B. Supraorbital spine without accessory spinules.

a. Postero-dorsal surface of carapace strongly tuberculated. On pereiopod 5, propodus expanded (with a spur) at base. Terminal segment of eyestalk diminishing towards extremity. Chelipeds on adult male shorter than ambulatories. Pereiopods 3, 4 weakly spinose basally, smooth distally. Latero-dorsal spine stouter and longer than rostrum. Size: 152 x 120 mm ..... *macrochira* Sakai, 1961

b. Postero-dorsal surface of carapace smooth, weakly tubercular or with scattered spines. Pereiopod 5 with propodus (subtriangular) widest midway along.

a1. Length of rostrum less than one-sixth postero-lateral length of carapace. Antero-lateral, dorso-lateral spines and some others well developed and acute. Postero-lateral surface of carapace with few spines. Chelipeds nearly as long as ambulatory legs. Size: 41 x 53 mm ..... *spinimana* Griffin, 1965

b1. Length of rostrum more than one fourth of postero-rostral length of carapace. Only antero-lateral spine developed; dorsal and postero-lateral surface of carapace smooth. Chelipeds smooth and much shorter than ambulatory legs. Size: 9 x 13 mm ..... *profundorum* Alcock and Anderson, 1899

Paromola alcocki (Stebbing, 1920) *faughni* new subspecies

Figs. 32-38; Pl. III, C

Latreillopsis alcocki Stebbing, 1920, p. 255, pl. 24; 1924, p. 4. Barnard, 1926, p. 120 (not seen).

Latreillopsis multispinosa Stebbing, 1923, p. 5. not Ihle, 1913, p. 78 (vide Gordon, 1950).

Thelxiope (Moloha) alcocki Barnard, 1947, p. 372 (not seen). Barnard, 1950, p. 341, Sakai, 1961, text-fig. 4b.

?*Latreillopsis major* Kubo, 1936, p. 63, pl. 17 (not seen).

?*Homola (Parhomola) majora* Sakai, 1937, p. 49, pl. 9, fig. 2. non *Homola (Parhomola) majora*? Edmondson, 1951, p. 202, fig. 102-f *(=?Latreillopsis bispinosa).*

Paromola alcocki Gordon, 1950, p. 222, pl. 1, fig. A.

MATERIAL:

Holotype, Ng. 723, male of 34 x 24 mm with rostrum of 5 mm, supra-orbital teeth of 8 mm, chelipeds of 50 mm and first ambulatory legs of 73 mm (deposited United States National Museum)

Locality: NAGA S4, St. No. 60-216, South China Sea, 15° 40′ N, 109° 45.5′ E, 10′ Beam Trawl, 479 m, February 28, 1960.

HISTORY:

The type, a female from South Africa, is maintained in the South Africian Museum. Gordon (1950) recorded a male of 52 mm length from the Maldives region from 229 m depth and referred to *alcocki,* a female, from Umvoti R., 130 fathoms depth, identified as *Latreillopsis multispinosa* by Stebbing (1923). Barnard (1926 and 1950) quoted the same specimen, a male of 45 x 33 mm from East Africa (25° 59′ S, 33° 6′ E) from 312 m depth. From Japan Kubo (1936) recorded as *major* a large male and Sakai (1936) a smaller of 36 x 26 mm and one female.

OBSERVATIONS:

The NAGA specimen differs by some characters from *alcocki* as well as from *major* and is described as a subspecies. Only its comparison with specimens of *alcocki* could refine the value of those discrepancies. The new subspecies differs from *alcocki* by: a. a more dense covering of long setae on the carapace and appendages, b. the longer ocular peduncles and supraorbital spines; the distal end of the eyes reaches the antero-lateral spine and in natural condition is fitted between the antero-lateral spine and the hepatic spine, c. the not spinulous posterior half of the carapace in addition to the mesobranchial spines.

In order to facilitate the comparison we quote in our description the number given by Gordon (1950) in her description of *alcocki.*

1. "Rostral spine" On *faughni* the rostral spine is: a. shorter than the supraorbital spine, instead of being nearly equal on Sakai's (1936) and Gordon's (1950) illustrations, b. directed forward and its tip directed upward, instead of being directed obliquely downward in *alcocki,* referring to Sakai (1961, p. 148).

2. "Supraorbital spines" On *faughni* they are comparatively longer than on *alcocki.* Starting from the base, they are directed upward then curved directed forward and then a little downwards at the tip. On lateral view (profile) the tips are in a plane much higher than the rostral spine.

3. "Prominent spine slightly ventral to the eyestalk and rostrum" On *faughni* the infraorbital spine is situated between the antennular and the antennal peduncles and shorter; it is not at all visible in dorsal view, much shorter than the rostrum, instead of being "equal in length" on *alcocki* referring to Gordon (1950).

4. "Much shorter spine external at the base of antenna" On *faughni* this preantennal spine is equal to the infraorbital.

5. "A transverse row of four spines and behind these a median gastric spine" We designate as "pregastric" the four spines which are more anterior than the median, and on *faughni* similar to those of *alcocki.*

6. "A group of one spine and four spinules on the hepatic region" We designate the spine as antero-lateral spine, with reference to Ihle (1913) and the four spinules as suprahepatic spines. Among these four spinules, three are dorsally situated in regard to the *linea homolica* and somewhat obliquely lined toward the direction of the tip of the antero-lateral spine. The others and more external suprahepatic spine are, like the antero-lateral spine, situated ventrally in regard to the *linea homolica.* On *faughni* the external suprahepatic spine is lower and more acute than on *alcocki.*

7. "Behind this group three spinules slightly more ventrally placed" We designate those spinules as posthepatic spines. The hepatic region of *faughni* (and a part from the antero-

lateral spine) has ventrally two rows of 3-4 spinules; the anterior and most ventral row is directed forward and not at all visible in dorsal view and we designate its spinules as infrahepatic. The posterior row is directed upwards and its distal spinules are visible in dorsal view; we designate those spinules as posthepatic spines. The infra-hepatic spines are not mentioned on *alcocki* and our post-hepatic spines correspond to the group of spinules of the item 7 of Gordon (1959). However the other spine "near the anterior angle of the buccal cavern" is the buccal spine of Ihle (1913).

8, 9, 10. The metagastric, urogastric and branchial spinules do not exist on *faughni.*

11. The "rather prominent epibranchial spine on a level with the metagastric row" corresponds to the dorso-lateral spine of Ihle (1913). The "rather shorter mesobranchial spine slightly below and in front of the urogastric pair" is the largest of the mesobranchial spines, which are smaller.

The comparison between the description and illustrations of *alcocki* by Gordon (1950) and *majora* by Sakai (1936) shows some discrepancies, but *faughni* differs from both. On *faughni* the third maxillipeds present on the merus at the distal third of its lateral border a subdistal hump with a stronger spine but is pediform. The chelipeds have no spine on the ischium, some rudimentary ones on the anterior border of the merus. On the ambulatory legs, the ischium is without the spines (2-3 indicated on *alcocki);* nor have the coxae any developed lamelliform projection, as indicated by Sakai (1936) on *majora.* The anterior border of the meri has seven spines on the first leg, four on the second and third, distributed in the proximal half and a little further on the first leg; these spines do not include the terminal, which is always prominent. The posterior border bears rudimentary spines. The fourth leg is as on *alcocki.* The male abdomen is seven segmented and with a short median spine only on the first segment. The male pleopod 2 is little different from that of *alcocki,* having on its tip numerous setae, which are not figured by Sakai (1961, fig. 4b).

Genus *Paromolopsis* Wood-Mason, 1891

Paramolopsis Wood-Mason, 1891, p. 268. Alcock, 1899, p. 160; 1901, p. 65.

The genus includes the sole species *Paromolopsis boasi* Wood-Mason, 1891.

Paromolopsis boasi Wood-Mason, 1891

Figs. 39-42; Pl. III, D

Paromolopsis boasi Wood-Mason, 1891, p. 268, fig. 5. Alcock, 1899a, p. 11; 1899b, p. 159; 1901, p. 65, p. 5, fig. 23. Ihle, 1913, p. 60, text-fig. 23B. Gordon, 1950, p. 244, text-fig. 16c.

MATERIAL:

Ng. 722, male of 34 x 30 mm

Locality: NAGA S4, St. No. 60-216, South China Sea, 15° 40′ N, 109° 45.5′ E, 10′ Beam Trawl, 479 m, February 28, 1960.

HISTORY:

Wood-Mason (1891) described the species for a single specimen from off North Sentinel Island in Andamans Sea from 768 m depth. Alcock (1901) recorded several specimens from Gulf of Manar, Bay of Bengal and Arabian Sea from 280 m to 960 m depth including one adult

female of 45 x 43.5 mm. Without recording new specimens and using Alcock's material, Ihle (1913) and Gordon (1950) figured the female genital sternites.

OBSERVATIONS:

Our specimen perfectly agrees with the authors' descriptions and illustrations. The male pleopods 1 and 2 have the *Homola* type. The collection of the present specimen in the South China Sea extends considerably its geographical distribution, the species having previously been recorded only from the Arabian Sea, Gulf of Manaar and Bay of Bengal.

Genus *Hypsophrys* Wood-Mason, 1891

Hypsophrys Wood-Mason, 1891, p. 260. Alcock, 1899a, p. 12; 1899b, p. 162; 1900, p. 66. Ihle, 1913, p. 93. Gordon, 1950, p. 224.

HISTORY:

Wood-Mason (1891) described the genus for *superciliosa,* and Alcock and Anderson (1899) added a second species *longipes.* Ihle (1913) only listed the two species in his table. Alcock (1899, 1901) gave the following key to separate the two species:

1. rostrum simple; gastric region verrucose . . . . . *superciliosa* Wood-Mason, 1891
2. rostrum bifid; gastric region spinose . . . . . *longipes* Alcock and Anderson, 1899

Hypsophrys superciliosa Wood-Mason, 1891

Figs. 43-46; Pl. IV, A

Hypsophrys superciliosa Wood-Mason, 1891, p. 269. Alcock, p. 14; 1899b, p. 162. Illus. Inv., pl. 14, fig. 4; 1901, p. 67, pl. 6, figs. 24, 24a. Ihle, 1918, fig. 34, no specimen. Gordon, 1950, p. 224.

MATERIAL:

Ng. 535, female of 25 x 22 mm

Locality: NAGA S4, St. No. 60-219, South China Sea, 15° 39′ N, 111° 51′ E, bottom; gray mud and fine sand, 1264 m, February 29, 1960.

HISTORY:

Wood-Mason (1891) described the species for specimens of the Arabian Sea, and Alcock (1901) recorded thirty adult specimens from the Arabian Sea and Bay of Bengal; all from 799 m to 1675 m depth. Gordon (1950) recorded fifteen males and twenty-three females (many ovigerous) from the Arabian Sea from 183 m and one immature (11.6 mm) from the Maldive area from 1829 m.

OBSERVATIONS:

The NAGA specimen agrees with the descriptions and illustrations of Wood-Mason (1891) and Alcock (1899, 1901). Its size seems to be larger than Alcock's specimen; Alcock (1901) mentioned only the size of a large egg-laden female 19 x 15 mm. The NAGA specimen extends to the South China Sea the geographical distribution of the species, which was previously recorded only from the Arabian Sea and Gulf of Bengal and the Maldive area.

Genus *Latreillopsis* Henderson, 1888

Latreillopsis Henderson, 1888, p. 21. Alcock, 1899, p. 165; 1901, p. 72. Ihle, 1913, p. 77.

Sakai, 1936, p. 53; 1965, p. 15. Barnard, 1950, p. 343. Balss, 1957, p. 1606. Bennett, 1964, p. 27.

HISTORY:

Henderson (1888) established the genus for *bispinosa* Henderson, 1888. It has been mentioned before that we maintain in the genus only *bispinosa* Henderson, 1888, and *laciniata* Sakai, 1936, which Sakai (1936) separated by:

a. Supraorbital spines simple, widely divergent at their tips. Hepatic spines very long and sharp. No other spines on the lateral border of the carapace, except the anterior branchial spine. Size: 13.5 x 12.2 mm ..... *bispinosa* Henderson, 1888

b. Supraorbital spines subparallel with each other, bearing one to three branches on the lateral border. There is a small spinule on the lateral border a little behind the anterior branchial spine, which is very sharp. Size: 13.4 x 10 mm ..... *laciniata* Sakai, 1936

Edmondson (1932) suggested that some species of *Latreillopsis* are perhaps only immature specimens. We think that those fragile and delicate forms are the only true *Latreillopsis.* The two juveniles from Hawai referred to as *Parhomola majora*? by Edmondson (1951) belong probably to *Latreillopsis* but to *laciniata* more than to *bispinosa.* However, the swollen and prominent hepatic region of the carapace links the genus more closely to *Paromola* than to *Latreillia.*

Henderson (1888) in the definition of the genus indicated "External maxillipeds similar to those of *Homola,* but the merus more regularly four-sided". On *L. bispinosa,* he described the merus as "somewhat rectangular". Alcock (1899) more accurately wrote that in the genus the external maxillipeds "are distinctly operculiform, owing to the expansion of their merus". On the third maxilliped of *bispinosa* this expansion is developed like a wing. The buccal cavern widens distally on the lateral border. We consider those characters as generic. Sakai (1936) described *laciniata* as similar to *bispinosa* without mentioning the third maxilliped as one of the differential characters, probably it also has an "operculiform" merus like that described on *bispinosa* by Sakai (1936).

Latreillopsis bispinosa Henderson, 1888

Figs. 47-50; Pl. IV, B

Latreillopsis bispinosa Henderson, 1888, p. 22, pl. 11, fig. 3. Alcock, 1899, p. 116; 1901, p. 73, pl. 7, fig. 26. Doflein, 1902, p. 650, pl. 4, figs. 3-4. Ihle, 1913, p. 77. Balss, 1922, p. 115. Sakai, 1934, p. 282; 1936, p. 36, pl. 3; 1937, p. 53, pl. 2, fig. 2; 1965, pl. 16, pl. 7, fig. 1. Barnard, 1950, p. 343.

MATERIAL:

Ng. 638, female of 10 x 7 mm

Locality: NAGA S4, St. No. 60-237, South China Sea, 5-7½ mi. off E. Honlon, outside Nhatrang, Vietnam, 12° 09.7′ N, 109° 24.7′ E, bottom; mud, shell detritus and fine sand, 10′ Beam Trawl, 91-101 m, March 4, 1960.

Ng. 1023, female of 8 x 6 mm

Locality: NAGA S8, St. No. 60-777, South China Sea, off Nhatrang, 12° 09′ 40″ N, 109° 24′ 00″ E, 6′ Beam Trawl, 93 m, September 20, 1960.

HISTORY:

Henderson (1888) described the species for specimens from the Philippines. Alcock (1899,

1901) recorded specimens from Andamans from 84 m and gave 8 mm as the size of an egg-laden female. Doflein (1902) recorded the species from Japan (Sagami Bay) and Ihle (1913) one female from Kei Island. Balss (1922) recorded specimens from Japan, Stebbing (1924) and Barnard (1950) from South Africa, Yokoya (1933), Sakai (1936, 1965) from Japan; Sakai (1937) gave 13.5 x 12.2 mm as the size of a male.

OBSERVATIONS:

The two NAGA specimens agree with the authors'. Regarding our descriptions of *Paromola alcocki faughni,* the spine situated between the eye and the antennal peduncle, which we designate as infraorbital, does not exist; the spine near the outer base of the antenna is well developed and could be considered as the infraorbital spine. The pair of lateral epistomial spines exists but not the buccal spine. The hepatic region has four spines, two somehwat dorsal, the anterior corresponding to the antero-lateral of Ihle (1913), the posterior to our supra-orbital; of the two other central, the anterior corresponds to our infra-hepatic and the posterior to our post-hepatic.

Genus *Latreillia* Roux, 1828

Latreillia Roux, 1828, p. (1). de Haan, 1839, p. 135. Henderson, 1888, p. 23. Alcock, 1899, p. 167; 1901, p. 70. Ihle, 1913, p. 81. Sakai, 1936a, p. 55; 1965, p. 16. Rathbun, 1937, p. 73. Barnard, 1950, p. 344. Gordon, 1950, p. 73. Dell, 1963, p. 245.

HISTORY AND DISCUSSION:

Roux (1828) established the genus for *elegans* Roux, 1928, a Mediterranean species. Four Indo-Pacific species have been described; *phalangium* de Haan, 1839, *valida* de Haan, 1839, *australiensis* Henderson, 1888, and *pennifera* Alcock, 1899. The last is considered as a synonym of *valida.* The three other species can be separated as follows:

1. Supra-orbital spines simple; the pereiopod 5 not chelate with propodus as long as carpus and plumed on both sides, the dactylus straight and very short. Size: 16 x 11.5 mm .... *valida* de Haan, 1839

2. Supra-orbital spines usually with three accessory spinules; the pereiopod 5 subchelate.
   a. Carapace with prominent hepatic spine; one gastric and one cardiac, one pair of dorso-lateral spines; propodus of pereiopod 5 much shorter than carpus. Size: 12 x 8 mm ..... *phalangium* de Haan, 1839
   b. Carapace without prominent hepatic spine or dorsal spines; propodus of pereiopod 5 as long as carpus. Size: 10 mm length ..... *australiensis* Henderson, 1888

Latreillia valida de Haan, 1839

Figs. 51-55

Latreillia valida de Haan, 1839, p. 107, pl. 30, fig. 1. Doflein, 1902, p. 649. Rathbun, 1902, p. 32. Ihle, 1913, p. 81. Balss, 1922, p. 114. Yokoya, 1933, p. 102. Sakai, 1934, p. 282; 1936, p. 37, pl. 5; 1936a, p. 57, pl. 4, fig. 2. Gordon, 1950, p. 243, text-fig. 22B. Sakai, 1965, p. 17, pl. 9, text-fig. 1C.

Latreillia pennifera Alcock, 1899, p. 168; 1901, p. 71, pl. 7, figs. 27a, b. Rathbun, 1911, p. 196. Ihle, 1913, p. 82. Barnard, 1950, p. 344, figs. 65h, i. Gordon, 1950, p. 229.

Latreillia elegans Stebbing, 1910, p. 347. Barnard, 1926, p. 120. not Roux, 1828.

MATERIAL:

NMS. 1968. 2.14.4, male of 12 x 9 mm
female of 16 x 12 mm
Coll. Cr. 4/64, St. 26, Fisheries Research Station of Hongkong.

OBSERVATIONS:

On the dorsal surface of the carapace only the gastric spine exists. There is no antero-lateral or hepatic spine. The infra-orbital spine is well developed and situated between the ocular peduncle and external to the base of the antennula; there is no spine near the base of the antenna, as on *Latreillopsis,* nor an epistomian nor buccal spine. The abdomen has the seven segments separated on the male, the segments 4-5-6 united on the female, but the separation between the segments is still visible. The male pleopods have a homolid type.

Subsection OXYSTOMATA H. Milne Edwards, 1834
Family DORIPPIDAE Dana, 1852
Subfamily Dorippinae Alcock, 1896

Genus *Ethusa* Roux, 1828

Ethusa, Roux, 1828, pl. 28 (not seen). H. Milne Edwards, 1837, p. 161. Miers, 1886, pp. 328, 331. Alcock, 1896, p. 281. Doflein, 1904, (not seen). Ihle, 1916, p. 137. Balss, 1922, p. 119. Rathbun, 1937, p. 77. Sakai, 1937, p. 75; 1965, p. 22.

HISTORY:

Roux (1828) established the genus for *Ethusa mascarone,* a Mediterranean species. Stimpson (1858) described *sexdentata* from Japan as the first Indo-Pacific species of the genus. Miers (1886) described *orientalis* from the Fiji Islands, Alcock (1896) *indica, pygmea, andamanica* from the Indian Sea, Doflein (1904, not seen) *somalica* and *zurstrasseni,* Ihle (1916) *granulosa.* Sakai (1937) put *andamanica* into synonym with *sexdentata* and described three new species from Japan: *quadrata, izuensis* and *minuta.*

The following Indo-Pacific species have been described in the subgenus *Ethusina* Smith, 1882: *E. gracilipes* Miers, 1886, *gracilipes* var. *robusta* Miers, 1886, *abyssicola challengeri* Miers, 1886, *investigatoris* Alcock, 1896, *desciscens* Alcock, 1896, *latydactyla* Parisi, 1915. The subgenus *Ethusina* is separated from *Ethusa,* referring to Alcock (1896) and Sakai (1937) by:

1. Basal antennular segment not abnormally enlarged and swollen; eyestalks freely movable ..... *Ethusa* Roux, 1828
2. Basal antennular segment enormously enlarged and swollen, globular in shape pushing the eyes permanently outwards ..... *Ethusina* Smith, 1882

These differential characters are not easy to evaluate in some species. The swelling of the basal article of antennules is indicated in some species of *Ethusa,* and some species of *Ethusina* have movable eyestalks. Ihle (1916) moved *latydactyla* Parisi into *Ethusa;* in the present paper, referring to a specimen of the NAGA Expedition, we also move in *gracilipes* Miers, 1886, but not its variety *gracilipes* var. *robusta* Miers, 1886, which seems to us a separate species, nor all the specimens identified as *gracilipes* by the authors. Alcock (1896) gave a key for the three Indian species and Sakai (1937) for the five Japanese species. Tentatively we establish a key for all the Indo-Pacific species, which are, in the order of our key: *indica* Alcock, 1894, *pygmea* Alcock, 1894, *latydactyla* (Parisi, 1915), *sexdentata* Stimpson, 1858, *orientalis* Miers, 1886, *granulosa*

Ihle, 1913, *hawaiiensis* Rathbun, 1906, *quadrata* Sakai, 1937, *izuensis* Sakai, 1937, *gracilipes* (Miers, 1886), *minuta* Sakai, 1937, *hirsuta* McArdle, 1900, *zurstrasseni* Doflein, 1904, *somalica* Doflein, 1904.

Our key is established by reference to the descriptions and illustrations of the authors, only one species being at our disposal. It needs to be improved by observations on more specimens. Some characters, like the development of the spout formed by the efferent branchial channels, need to be checked on species like *granulosa, orientalis* and, of course, *somalica* and *zurstrasseni.* These last two species are not included in our key, as we were unable to consult the publication of Doflein (1904).

Key to the Species of *Ethusa* found in the Indo-Pacific

A. Anterior extremity of the spout formed by the efferent branchial channels not extending beyond the level of the basal article of the antennules, thus a triangular-shaped epistome is detected in front of it.
  a. Carapace with lateral borders strongly convex; branchial regions swollen, causing a strong bulge of the lateral border of carapace posteriorly.
    a1. External orbital spines projecting beyond frontal spines; external orbital spines slender, acute, directed obliquely outward ..... *indica* Alcock, 1894
    b1. External orbital spines not projecting to the level of frontal spines.
      a2. Carapace little longer than broad; external orbital spines directed obliquely outward ..... *pygmea* Alcock, 1894
      b2. Carapace broader than long; orbital and frontal sinuses very shallow with their floors rounded; external orbital spines directed forward ..... *latydactyla* Parisi, 1915
  b. Carapace urn-shaped, trapeziform, or quadrangular, with lateral border more or less strongly converging or very little anteriorly.
    a1. Carapace trapezoid; its lateral border almost straight; orbital and median frontal sinus V-shaped; external orbital spines projecting approximately to the level of frontal spines and directed forward or rather inward.
      a2. Median and lateral frontal sinus subequal in width measured at the tip of the teeth; external orbital spine broad.
        a3. Lateral border of carapace strongly divergent posteriorly; the greatest breadth (posteriorly) being approximately twice the breadth between the tip of the external orbital spines; carapace smooth; external orbital spine broad, flat, triangular with a mucronate tip ..... *sexdentata* Stimpson, 1858
        b3. Lateral border of carapace less divergent posteriorly; the greatest breadth (posteriorly) being approximately one and a half times the breadth between the tip of the external orbital spines; carapace granular ..... .*orientalis* Miers, 1886
      b2. Frontal median sinus clearly wider than the frontal lateral sinuses measured at the tip of the teeth; carapace granular; external orbital spine slender and acute ..... *granulosa* Ihle, 1916
    b1. Carapace subquadrate; lateral borders almost parallel; external orbital angles projecting far behind the level of frontal spines.
      a2. Median frontal sinus V-shaped and much deeper than the lateral frontal sinuses, which are shallow and with rounded floor; lateral border of carapace without concavity behind the external orbital angle ..... *hawaiiensis* Rathbun, 1906
      b2. Median and lateral frontal sinuses all deep and V-shaped, external orbital angles as

well as ocular peduncles almost lateral in position; lateral border of carapace with a concavity behind the external orbital angles ..... *quadrata* Sakai, 1936

B. Anterior extremity of the spout formed by the efferent branchial channels extending beyond the level of the basal article of the antennule.
   a. Anterior extremity of the spout extending beyond the level of basal article of the antennules, but not touching the ventral surface of the front.
      a1. Body and appendages tomentose; frontal and orbital sinuses all subequal in width measured at the tips of the teeth; meri of pereiopods 2 and 3 shorter than the length of carapace ..... *izuensis* Sakai, 1937
      b1. Body and appendages naked; lateral frontal sinuses much narrower than median frontal sinus, which is also much narrower than orbital sinuses, measured at the tips of the teeth; meri of pereiopods 2 longer and of 3 much longer than the length of carapace ..... *gracilipes* (Miers, 1886)
   b. Anterior extremity of the spout extending far beyond the level of the antennules, touching the ventral surface of the front, thus entirely concealing epistome. Lateral frontal sinuses much narrower than median frontal sinus, which is also much narrower than orbital sinuses, measured at the tips of the teeth.
      a1. Lateral border of carapace with a marked sulcus in the middle; body and appendages almost naked; the extra orbital and frontal spines acute and long .. *minuta* Sakai, 1937
      b1. Lateral border of carapace without marked sulcus in the middle; body and appendages tomentose ..... *hirsuta* McArdle, 1900

Ethusa gracilipes (Miers, 1886)

Figs. 56-59; Pl. IV, C-D

Ethusa (Ethusina) gracilipes Miers, 1886, p. 332, pl. 29, figs. 1, 1a, 1b, 1c. Alcock, 1899, p. 34, ? Rathbun, 1906, p. 891.

Not *Ethusa (Ethusina) gracilipes* var. *robusta* Miers, 1886, p. 333, pl. 29, figs. 2, a, b *(=Ethusina robusta).*

Not *Ethusina gracilipes* Ihle, 1916, p. 147, fig. 77 *(?=Ethusina desciscens).*

Not *Ethusina gracilipes* Rathbun, 1937, p. 94, pl. 30, fig. 4; pl. 31, fig. 3 *(=Ethusina robusta).*

Not *Aethusina gracilipes* Faxon, 1895, p. 36 *(=Ethusina robusta).*

MATERIAL:

Ng. 743, male of 5.5 x 5 mm

Locality: NAGA S4, St. No. 60-216, South China Sea, 15° 40′ N, 109° 45.5′ E, bottom; soft mud and bryozoan rocks, 10′ Beam Trawl, 479 m, February 28, 1960.

HISTORY:

Miers (1886) described the species for a male of 9 mm from near the Philippines from 1260 m depth; by mistake his text gives reference to Pl. 28, fig. 3; there is no figure 3 in Plate 28. Faxon (1895) recorded the species on the Pacific coast of America. Alcock (1899) recorded one specimen from near Maldives from 1505 m depth, Rathbun (1906) from the Hawaii region. Ihle (1916) recorded three males and two females, the largest of 8 x 8 mm from the Indonesian seas from 900 to 2000 m. Rathbun (1937) recorded sixteen specimens of the United States National Museum from various localities of the Pacific coast of American and Hawaiian regions.

OBSERVATIONS:

The NAGA specimen agrees with the descriptions and illustrations of Miers (1886) for *gracilipes,* which we move into *Ethusa.* The swelling of the basal article of the antennules exists but is not so developed as on *Ethusa;* the ocular peduncles are circular, tapering and movable on the NAGA specimen as on Miers' (1886) illustration. On *Ethusina,* Rathbun (1937) described: "Eyestalks very small and immovable embedded in the orbits, which closely surround them to near the tips, except for a narrow space beneath". We consider *Ethusina gracilipes* var. *robusta* Miers, 1886, as a different species and a true *Ethusina,* perfectly defined by the observations and illustrations of Miers (1886). The specimens of Faxon (1895) and Rathbun (1937) belong to *Ethusina robusta.*

Rathbun (1937, p. 39) recalled Faxon's remarks that the American specimens have the external orbital angle "bent outward at a sharper angle, as in var. *robusta.* The outer spine of front is longer in proportion to inner spine and the carapace rather narrower. Legs shorter . . ." The illustrations of Rathbun (1937, pl. 30, fig. 4; pl. 31, fig. 4) are still more demonstrative of the difference from, for example, the orbital frontal border as described and illustrated for *gracilipes typica* by Miers (1886). Ihle's (1916) specimens belong probably also to *robusta* or to *descicens* Alcock, 1899.

E. gracilipes typica is, by the outline of its frontal orbital border, close to *E. minuta* described by Sakai (1937, p. 81, pl. 11, fig. 2) for one male and two females from Japan; the holotype being a male of 6.5 x 5.2 mm. But on *gracilipes* the anterior extremity of the spout formed by the efferent branchial channels is a little shorter, as on *izuensis* Sakai, 1937. Miers (1886) did not mention this spout, but it is very clearly illustrated on his figure (1886, pl. 29, fig. 1, b). *E. gracilipes* differs from *izuensis* by the disposition of the frontal orbital border. *E. hirsuta* also is a relatively close species. But *gracilipes* differs from all those species by the shape of the carapace without marked identification at the junction of the hepatic and branchial regions and more bulged posteriorly; it differs still more by its much longer ambulatory legs. On all these species the merus of pereiopod 2 is clearly shorter and pereiopod 3 at most is as long as the length of carapace; on *gracilipes* these meri are clearly much longer than the length of carapace. The male abdomen of the NAGA specimen is like that illustrated by Miers (1886, pl. 29, fig. 1b). The male pleopod 2 is a little longer than pleopod 1. On the NAGA specimen the little spine indicated by Miers (1886) on the distal part of the basal article of antennules exists; it exists also on *robusta,* but it seems to be a character that could exist on many species and has been neglected by authors.

Family LEUCOSIIDAE Dana, 1852
Subfamily Philyrinae Rathbun, 1937

Genus *Pariphiculus* Alcock, 1896

Pariphiculus Alcock, 1896, p. 257; 1889, p. 30. Nobili, 1906, p. 165. Ihle, 1918, p. 248. Sakai, 1937, p. 129; 1965, p. 43.

HISTORY:

Alcock (1896) established the genus for *Randallia coronata* Alcock and Anderson, 1894, and *rostratus* Alcock, 1896, two species from Indian Seas. Nobili (1906) included in the genus *Ilia mariannae* Herklots, 1852, with which *rostratus* becomes synonymous. Ihle (1918) described *agariciferus* from near Timor. The three species of the genus, *coronatus* (Alcock and Anderson,

1894), *mariannae* (Herklots, 1852) and *agariciferus* Ihle, 1918, can be separated by:

Key to the Species of *Pariphiculus*

A. Carapace minutely granular.

1. Carapace a little broader than long, front not at all prominent; one cardiac and two branchial tubercles; chelipeds about one and two-thirds times length of carapace ..... *coronatus* (Alcock and Anderson, 1894)
2. Carapace longer than broad; front markedly prominent; cardiac and branchial regions unarmed; chelipeds about one and one-fourth times length of carapace .... *mariannae* (Herklots, 1852)

B. Carapace covered by mushroom-like granules; its upper surface together with the spines on the margins also covered with the same granules ..... *agariciferus* Ihle, 1918

The NAGA collection contains two of the three species. To complete the information on the genus, the examination of the type specimen of the third species is also included in the present work.

Pariphiculus coronatus (Alcock and Anderson, 1894)

Pl. V, A

Randallia coronata, Alcock and Anderson, 1894, p. 177.

Pariphiculus coronatus, Alcock, 1896, p. 258; 1899, p. 30. Illus, Invest., 1896, pl. 24, fig. 2. Doflein, 1904, p. 41, pl. 14, fig. 7. Balss, 1915, p. 14; 1922, p. 131. Ihle, 1918, p. 249. Yokoya, 1933, p. 129, text fig. 17. Sakai, 1936, p. 56, text fig. 17; 1937, p. 129, pl. 24, fig. 6; 1965, p. 43, pl. 17, fig. 5.

HISTORY:

Alcock and Anderson (1894) and Alcock (1896, 1899) refer to the single type specimen, female of 16 x 17 mm from the coast of Coromandel in the Gulf of Bengal from 131 m depth. Doflein (1904) recorded one male from near Nicobar Island from 296 m, Ihle (1918) one male of 13.5 mm length from near Sumbawa from 274 m. Balss,(1915, 1922), Yokoya (1933) and Sakai (1936, 1937, 1965) recorded specimens from various localities of Japan, Sakai (1937) mentioning a male of 20.5 x 19 mm.

OBSERVATIONS:

Our photograph is that of the type specimen maintained in the Zoological Survey of India at Calcutta.

Pariphiculus mariannae (Herklots, 1852)

Figs. 60-63; Pl. V, B

Ilia mariannae Herklots, 1852, p. 36, fig. 2 (not seen).

Pariphiculus rostratus Alcock, 1896, p. 259, pl. 8, fig. 2. Illus. Invest. (Alcock and Anderson), 1897, pl. 30, fig. 7.

Pariphiculus mariannae Nobili, 1906, p. 165 (Note). Ihle, 1918, p. 249.

MATERIAL:

Ng. 155, female of 21 x 19 mm

Locality: NAGA S3, St. No. 60-127, Gulf of Thailand, 08° 37.0′ N, 102° 21.5′ E, bottom; mud, 40′ Otter Trawl, 73 m, January 24, 1960.

Ng. 858, 4 females 22 x 19.5 mm, 22.5 x 20 mm, 14.5 x 13 mm, 16.5 x 15 mm, one (damaged) male of 16 x 15 mm.

Locality: NAGA S4, St. No. 60-211, South China Sea, 15° 41′ N, 108° 41′ E, bottom; fine sand and greenish mud, 10′ Beam Trawl, 37 m, February 27, 1960.

HISTORY:

Herkots (1852) described *mariannae* for specimens from China, Alcock (1896) *rostratus* for specimens from Malabar Coast and Coromandel coast of India from 45-81 m, the largest being a female of 32 x 37 mm. Nobili (1906) established Alcock's species as identical with that of Herklots. Ihle (1918) recorded one male from the Northeast coast of Madura from 82 m.

OBSERVATIONS:

The NAGA specimens agree with the descriptions and illustrations of Alcock (1896) for *rostratus*. The species is close to *coronatus* by having also twelve tubercles on the border of the carapace but differs by: 1. the carapace longer than wide, 2. the front prominent like a snout, 3. the absence of cardiac and branchial tubercles, but the two intestinal tubercles present.

The pleopod 2 is as long as pleopod 1 and at the apex has a long distal process; on our figure the pleopod 2 is shorter, because its proximal part was broken and not drawn. The male abdomen has the segments 1 and 2 separated and articulated, the segments 3-4-5-6 fused and the segment 7 separated and movable; on dorsal view the lines of separation of the four fused segments are visible, but on ventral view the four appear to constitute a single piece without any trace of articulation. Doflein (1904) in *coronatus* gave an abdominal segment formula 1+2+R+6+T, but Ihle (1918) for the same species gave R+T; he mentioned that the limit between segments 1, 2, 3 is similar to that between 5 and 6 and not articulated; he described a similar disposition on *agariciferus*. On our specimen of *agariciferus*, studied further, a mobile articulation exists between segments 5 and 6 and the abdominal segment formula agrees with Doflein (1904) for *coronatus*. These characters perhaps present some individual variations related to the age of the specimens.

Pariphiculus agariciferus Ihle, 1918

Figs. 64-66; Pl. V, C

Pariphiculus agariciferus Ihle, 1918, p. 250, text-fig. 136. Balss, 1922, p. 131. Yokoya, 1933, p. 129. Sakai, 1937, p. 131; 1965, p. 43, pl. 17, fig. 4.

MATERIAL:

Ng. 700, male of 14.5 x 14.5 mm

Locality: NAGA S4, St. No. 60-212, South China Sea, 15° 40.0′ N, 109° 22.9′ E, bottom; shell, detritus and sand, 10′ Beam Trawl, 60-108 fathoms, February 27, 1960.

HISTORY:

Ihle (1918) described the species for a male of 9 x 9.25 mm from between Timor and Rotti Islands from 216 m depth. Balss (1922) recorded the species from Japan, Yokoya (1933) one male and one female from Japan from 165 m. Sakai (1937) quoted only Yokoya's specimen. Sakai (1965) recorded two males and one female from Sagami Bay from 65-85 m.

OBSERVATIONS:

The NAGA specimen agrees with the descriptions and illustrations of the authors and the species is so distinctive that its identification cannot create any difficulty. Our specimen is larger than the type specimen of Ihle (1918) and seems to be adult. The pleopod 2 is as long as pleopod 1 and has a distal long process at the apex. The abdominal segment formula is 1+2+R+6+T and differs from that given by Ihle (1916) for his specimen as we mentioned before; on our drawing the abdominal segment 1 is missing.

Genus *Ixoides* MacGilchrist, 1905

Ixoides MacGilchrist, 1905, p. 225. Chopra, 1933, p. 69. Sakai, 1937, pp. 104, 173; 1965, p. 44.

HISTORY:

The sole species of the genus is *I. cornutus* MacGilchrist, 1905. Chopra (1933) suggested that *Ixoides* be considered only as a subgenus of *Ixa;* it seems that the difference of the shape of the merus of the third maxilliped on *Ixoides* justifies the separation at the generic level.

Ixoides cornutus MacGilchrist, 1905

Pl. V, D

Ixoides cornutus MacGilchrist, 1905, p. 255. Illus. Invest., pl. 73, figs. 2, 2b. Ihle, 1918, p. 314. Andre, 1931, p. 644. Gordon, 1930, p. 530, text-fig. 7. Sakai, 1937, p. 137, pl. 19, figs. 1-4; 1965, p. 44, pl. 18, fig. 3. Shen, 1940, p. 215. Stephensen, 1945, p. 74.

MATERIAL:

Ng. 861, female of 20 x 38.5 mm

Locality: NAGA S4, St. No. 60-211, South China Sea, 15° 41.0′ N, 108° 41.0′ E, bottom; fine sand and greenish mud, 10′ Beam Trawl, 37 m, February 27, 1960.

HISTORY:

MacGilchrist (1905) described the species for 3 males from the Persian Gulf from 96 m depth, the largest of 29 x 62.5 mm, the smaller of 10 mm length. Ihle (1918) only recorded the species in his list, without referring any specimen. Andre (1931) recorded one male of 27 x 54 mm from Vietnam from 145 m. Gordon (1931) recorded two males of 30 x 53 mm and 26.4 x 52.8 mm and a female with eggs from Hongkong, all kept in the British Museum collection. Shen (1940) recorded the same specimens from Hongkong of the British Museum collection. Sakai (1937) recorded three males and two females from Japan from 90-180 m, one male of 28.5 x 58 mm; Sakai (1965) one male. Stephensen (1945) mentioned only the species by reference to MacGilchrist (1905) but without examining any specimen.

REMARKS:

Gordon (1931) discussed the shape of the lateral spines but gave no comment on the process of the posterior border of the carapace. Sakai (1937) illustrating (photographs) four specimens described the individual variations of the lateral processes (spines); he distinguished: 1. a typical form with "processes very long (being about half the length of the carapace) and quite straight; tapering from the base and accuminate at the tip" (Sakai, 1937, pl. 19, figs. 1,2), 2. a modified form, with "lateral processes varying in length but equally rounded and truncated at the tip, not tapering at all from the base" (Sakai, 1937, pl. 19, figs. 3, 4). He also mentioned the variations

of the pair of papilliform tubercles of the posterior border of the carapace, probably connected with the variations of the length and shape of the lateral processes. He described: 1. on the typical form the posterior processes as constricted at the base and with the tip obtusely pointed, 2. on the modified form the posterior processes are "short and rounded". But the illustrations of Sakai (1937) do not demonstrate clearly the difference in the posterior processes. MacGilchrist (1905) described these posterior processes as "large, stout, papilliform". The typical form of Sakai (1937) corresponds to the illustration of MacGilchrist's specimen (Illus. Invest., pl. 73, fig. 2).

OBSERVATIONS:

The NAGA specimen agrees generally with the typical form of Sakai's (1937) and MacGilchrist's type but the posterior processes are comparatively more acute. Considering the actual state of our knowledge of these variations and that some similar individual variations exist on *Ixa cyclindra,* it seems difficult to refer to this sole character of one specimen to define a new variety. On the right cheliped of the NAGA specimen the finger and palm measure 6.0 mm and 12.5 mm respectively. Sakai (1937) indicated "the fingers are half as long as the palm in juvenile specimen, but two-thirds as long as the palm in the full grown specimen". The NAGA specimen with a carapace of 20 mm length can be considered as a juvenile. However, MacGilchrist (1905) gave 3.8 and 5.6 mm for the dactylus and palm of a specimen of 10 mm length.

Our specimen was compared with a male of 22 x 36 mm from Hongkong belonging to the "modified form" and which has in agreement with Sakai's (1937) observations the finger of the cheliped two-thirds as long as the palm. The male pleopod of this specimen is identical with the figure of Gordon (1931).

Genus *Ixa* Leach, 1815

Ixa Leach, 1815, p. 334. H. Milne Edwards, 1837, p. 134. Dana, 1852, p. 392. Bell, 1855, p. 311. Lucas, 1858, p. 184. Haswell, 1882, p. 132. Miers, 1886, p. 300. Alcock, 1896, p. 270. Ihle, 1918, p. 267. Chopra, 1933, p. 69. Sakai, 1937, p. 137. Holthuis and Gottlieb, 1956, p. 298. Tyndale-Biscoe and George, 1962, p. 72.

REMARKS:

Miers (1886) suggested and Ortmann (1894) considered that all the described species of *Ixa* are probably synonyms of *cylindra* (Fabricius, 1777). Ihle (1918), like Alcock (1896) and further Chopra (1933), considered that at least *inermis* and *cylindra* are distinct species. Holthuis and Gottlieb (1956) separated the following species of *Ixa: cylindra* (Fabricius, 1777), *cylindra megaspis* Adams and White, 1848, *inermis* Leach, 1817, *monodi* Holthuis and Gottlieb, 1956, *edwardsi* Lucas, 1858. To these four species, *Ixa acuta* Tyndale-Biscoe and George (1962) and *Ixa holthuisi* Tirmizi, 1970, have to be added.

Holthuis and Gottlieb (1956) expressed a doubt that *investigatoris* Chopra, 1933, belongs to the genus. We establish *investigatoris* as a synonym of *Arcania pulcherrima* Haswell, 1880, but maintain the species in *Ixa.* Two species of *Ixa* are illustrated as comparative material. The specimen of *Ixa cylindra* (Pl. VI, B), a female of 57 x 27 mm, belongs to the collection of the Institut Océanographique de Nhatrang, Vietnam, and was collected in Nhatrang Bay at 12-20 m. The specimen of *Ixa edwardsi* (Pl. VI, C-D), a female of 37 x 17 mm, was collected by the Djalanidhi in the Indonesian waters, C. 1314, 32 m, April 28, 1963.

? *Ixa pulcherrima* (Haswell, 1880)

Pl. VI, A

Arcania septemspinosa Bell, 1855, p. 310, pl. 34, fig. 7. Not *A. septemspinosa* (Fabricius, 1787).

Arcania pulcherrima Haswell, 1880, p. 58, pl. 6, fig. 4; 1882, p. 121. Miers, 1884, p. 253. Laurie, 1906, p. 366.

Ixa investigatoris Chopra, 1933, p. 78, pl. 3, fig. 4.

MATERIAL:

NMCR 1186 (418), female of 14.5 x 8 mm

NMCR 787, two smaller specimens

All from the National Museum of Philippines, Manila.

HISTORY:

Haswell, (1880, 1882) described the species for specimens from Darnley Island, Australia. Miers (1884) recorded an adult female from Prince of Wales Channel from 9 fathoms and a smaller male from Arafura Sea from 32-36 fathoms. He examined in the British Musuem the type-specimen of *Arcania septimspinosa* Bell, 1855, and established its identity with the species of Haswell. He gave good reasons to maintain the name of Haswell and stipulated that the specimen from Bell (1855) is from Borneo and not of unknown locality, as Bell states. Laurie (1906) recorded one male of 8 mm and one ovigerous female of 10.75 mm from Ceylon.

OBSERVATIONS:

During a check-up of the collection of Brachyura of the National Museum of Manila, the senior author had the opportunity to examine specimens identified as *Arcania heptacantha.* The identification is obviously wrong. At least the largest specimen agrees perfectly with *Ixa investigatoris* Chopra, 1933, described for a single female of 8 x 14.8 mm (lateral process included), collected by "Investigator" in Mergui Archipelago (12° 14′ 30″ N, 98° 15′ 30″ E) from a depth of 24 fathoms on a bottom of mud, sand and broken shells.

The reference to *Arcania* leads to a check on the relation of *investigatoris* with *Arcania.* A comparison of the illustrations of Bell (1855) and Haswell (1880) with those of Chopra (1933) shows that *investigatoris* is a synonym of *pulcherrima.* Provisionally and using the name of Haswell we maintain the species in *Ixa,* but further observation could lead to the removal of the species into *Arcania.*

The species is recorded from Australia, Borneo, the Indian Ocean and the Philippines.

Subsection BRACHYGNATHA Borradaile, 1907

Superfamily OXYRHYNCHA Latreille, 1803

Family MAJIDAE Samouelle, 1819

Subfamily Inachinae Alcock, 1895

Alliance Macrocheiroidea

Inachinae Alcock, 1895, pp. 160, 168. Rathbun, 1925, p. 11. Balss, 1929, p. 3. Sakai, 1939, p. 205; 1965, p. 65.

HISTORY:

Alcock (1895) divided the subfamily into two alliances, Leptopodioida and Inachoida, by

referring to the characters of the basal article of antennae and the third maxilliped. Balss (1929) considered as inaccurate Alcock's classification and divided the subfamily into two alliances, Macrocheiroidea and Camposcioidea, by referring to the presence or absence of an intercalated spine. Sakai (1939) considered Balss's division as artificial and non-natural. With reference to the development of component parts of the orbit, the shape of the antennulary septum and the number of abdominal segments, he proposed a phylogenetic arrangement of the Japanese genera of the subfamily. Neither the classification of Alcock nor of Balss is satisfactory, and Sakai's observations are valuable, but still the subfamily needs to be revised. As mentioned by Sakai (1937), *Cyrtomaja* and *Platymaja* seem to belong to a distinct branch. Can those genera be kept in the same taxon at the subfamily level with genera as different as *Paratymolus, Achaeus, Camposcia*? Garth (1958) has already excluded *Oregonia* from the subfamily and used it as a type for a new subfamily Oregoniinae.

Genus *Pleistacantha* Miers, 1879

Pleistacantha Miers, 1879, p. 24, Doflein, 1904, p. 76. Balss, 1924, p. 21. Ihle and Ihle-Landerberg, 1931, p. 162, Sakai. 1938, p. 232; 1965, p. 65.

Echinoplax Miers, 1886, p. 31. Alcock, 1895, p. 178.

Pleistacanthoides Yokoya, 1933, p. 139.

HISTORY:

Miers (1879) established *Pleistacantha* for *P. sancti-johannis* from the Japanese Sea, Miers (1886) *Echinoplax* for *E. moseleyi* from the Philippines. The two genera have been further considered as identical. Wood-Mason (1891) described *E. pungens,* which is synonymous with *moseleyi* and Alcock (1895) *rubida,* the two from the Indian Sea. Ortmann (1893) described *oryx,* Rathbun (1932) *simplex* and *terribilis,* the three from Japan.

Yokoya (1933) described *Pleistacanthoides* for *nipponensis,* but Sakai (1938) put the genus in synonym with *Pleistacantha.* With the exception of *rubida* and *moseleyi* all species are considered as endemic to Japan. *P. rubida* is only known by the specimens of Alcock, 1895, from Andaman Sea from 150-318 m depth, the largest of 35 x 21 mm. Sakai (1938) gave a key to separate five of the six Japanese species. Our key completes that of Sakai (1938) and includes all the species. They are in the order of our key: *sancti-johannis* Miers, 1889, *moseleyi* Miers, 1886, *oryx* Ortmann, 1893, *rubida* (Alcock, 1895), *simplex* Rathbun, 1932, *nipponensis* Yokoya, 1933, *terribilis* Rathbun, 1932.

Key to the Species of *Pleistacantha*

A. True rostral spine bifurcated.

a. Carapace with accuminate spinules among which are interspersed a number of large spines. The pseudorostral spines very long and slender.

a1. Pseudorostral spines very slender and contiguous, the tip only being divergent; a series of accessory spinules on their ventral surface ..... *sancti-johannis* Miers, 1879

b1. Pseudorostral spines divergent from the base, their accessory spinules occurring on upper, outer and lower surfaces.

a2. Pseudorostral spines clearly more than half the length of carapace.

a2. True rostral spine (antennular septum) as a pair of spines, widely separated from each other near the base ..... *moseleyi* (Miers, 1886)

b2. True rostral spine (antennular septum) as a long single stem bifid near the

apex ..... *oryx* Ortmann, 1893

b2. Pseudorostral spines considerably less than half the length of carapace; carapace finely granular with certain definitively placed, distant, thorn-like spines of conspicuous magnitude..... *rubida* (Alcock, 1895)

b. Carapace covered with lacinated spinules and setae. Pseudorostral spines very short and widerly divergent from the base.

a1. Supraocular eave and hepatic margin armed with a series of parallel spines .....
..... *simplex* Rathbun, 1932

a2. Supraocular eave and hepatic margin less markedly spinulated.....
..... *nipponensis* (Yokoya, 1933)

B. True rostral spine simple.

a. Carapace covered with long spines mixed with short spinules. Two supraocular spines and two intercalated spines, and also three hepatic spines behind the postocular spine. Pseudorostral spines short and widerly divergent, armed on all sides .....
.....*terribilis* Rathbun, 1932

? *Pleistacantha oryx* Ortmann, 1893

Pl. VII, A

Pleistacantha oryx Ortmann, 1893, p. 39. Sakai, 1963, p. 16; 1965, p. 69, pl. 30, fig. 2, text-figs. 10a, b, d.

Pleistacantha moseleyi Balss, 1924, p. 21. Yokoya, 1933, p. 38. Sakai, 1938, p. 234, pl. 34, figs. 2, 3, text-figs. 20a, b. not *moseleyi,* Miers, 1886.

MATERIAL:

Ng. 600, female of 11.5 x 7 mm

Locality: NAGA S4, St. No. 60-212, South China Sea, 15° 40.0′ N, 109° 22.9′ E, bottom; shell detritus and sand, 10′ Beam Trawl, 60-108 fathoms, February 27, 1960.

HISTORY:

Ortmann (1893) described the species from Sagami Bay (Japan). Doflein (1904) and Balss (1924) considered it as a synonym of *moseleyi.* Sakai (1963), comparing Japanese specimens with the type specimen of *moseleyi* in the British Museum, found that the two species are distinct and corrected as *oryx* the specimens identified as *moseleyi* by Balss (1924), Yokoya (1933) and Sakai (1938). Sakai (1965) recorded two males and two females from Amadaiba and Enoshima (Japan) from 82 m depth as well as a lot of specimens from Tosa Bay. After the examination of its type specimen, he suggested also that *rubida* is perhaps a synonym of *oryx.*

OBSERVATIONS:

On the NAGA specimen the true rostral spine (intra-antennular septum) is bent downwards and bifid, but the branches are broken. The stem before the bifurcation is relatively long and agrees more with the disposition of *oryx* than that on *moseleyi* as they are illustrated by Sakai (1965, figs. 10b, c). The pseudorostral spines are also diverging from the base as on *oryx,* illustrated by Sakai (1965, fig. 10a) for a much larger specimen of 54 x 28 mm.

Sakai (1965) indicates that *oryx* differs from *moseleyi* by: a. the intra-antennular process (true rostral spine), b. the pseudorostral spine, c. the symmetrical disposition of the longer and stronger gastric, cardiac, branchial spines. The NAGA specimen differs from all the specimens illustrated by Sakai (1938, 1965) at least by the pseudorostral spines, but it is a juvenile female

and probably those spines are not yet fully developed. By this character it agrees more with *rubida,* which is described for a specimen of 35 x 21 mm, much larger than the NAGA specimens. *P. oryx* is recorded only from Japan and *rubida* only from Indian Ocean.

Pleistacantha sancti-johannis Miers, 1879

Figs. 67-72; Pl. VII, B

Pleistacantha sancti-johannis Miers, 1879, p. 24, pl. 1, fig. 1. Ortmann, 1893, p. 39. Doflein, 1902, p. 655; 1906, p. 256. Parisi, 1915, p. 283 (partim). Balss, 1924, p. 22, text-fig. 1. Yokoya, 1933, p. 138. Sakai, 1934, p. 293; 1936, p. 78, pl. 15, fig. 1; 1938, p. 233, pl. 23, fig. 1; 1965, p. 70, pl. 30, fig. 3.

MATERIAL:

N.M.S. 1968, 2.14.7, male of 20 x 12 mm
ovigerous female of 25 x 18 mm
Cr. 4/64, St. 26, Trawl 6, 4/8/64,
mud, 97-104 fathoms, O.T. Chan coll.
Coll. Fisheries Research Station of Hongkong

HISTORY:

Miers (1879) described the species for a single male from Japan from 110 m depth. Balss (1924), reexamining the specimens from Doflein (all from Japan from a depth of 14-350 m), considering that some of the Parisi specimens (1915) belong to *moseleyi.* Yokoya (1933) recorded one male, Sakai (1938, 1965) a series of specimens all from Japan, among them one male of 15 x 25.9 mm.

OBSERVATIONS:

Our two specimens have the pseudorostral spines contiguous throughout and diverging only near the tip, which characterizes the species. The male pleopod is close to that of *oryx* illustrated by Sakai (1965, text fig. 10d); it is bifurcated distally, the longer branch ornamented with small spinules. Until the present record *P. sancti-johannis,* like *oryx,* was endemic of Japan.

Genus *Cyrtomaja* Miers, 1886

Cyrtomaja Miers, 1886, p. 14. Alcock, 1899, p. 44. Rathbun, 1893, p. 228; 1916, p. 532; 1918, p. 4. Doflein, 1904, p. 63. Balss, 1924, p. 23; 1929, p. 3. Sakai, 1938, p. 239. Barnard, 1950, p. 32. Bennett, 1964, p. 29.

Echinomaja Borradaile, 1916, p. 102 (not seen).

HISTORY:

Miers (1886) established the genus for *murrayi* from Ki Island from 262 m depth and for *suhmi* from Tulu Island (Northeast of the Celebes). McArdle (1900) described *goodridgeri* for a specimen of 28 x 32 mm from the West coast of Ceylon from 900 m. Terazaki (1903) established *owstoni* for a specimen from Japan, but the species, described in Japanese, was forgotten until Sakai (1938) who reexamined the type and established *horrida japonica* Balss, 1924, and *septemspinosa* Rathbun, 1932, two Japanese forms as synonyms of *owstoni.* Rathbun (1906) described *smithi* and *lamellata* from Hawaii. Borradaile (1916) described a new genus *Echinomaia* for *hispida* Borradaile, 1916; the genus was further put in synonymy with *Crytomaja* by Balss (1929). Rathbun (1916) described *horrida* for a male of 59 x 53 mm from near the

Philippines from 461 m depth and *echinata* for a female of 63.3 x 60.7 mm from near Mindanao from 138 m. Rathbun (1918) described *maccullochi* from Australia, Yokoya (1933) *platypes* and Sakai (1939) *intermedia*, the two species from Japan. Ihle and Ihle-Landerberg (1931) described *bicornis, balssi* and two new varieties *smithi tenuipedunculata* and *horrida pilosa*.

Bennett (1964) stated: "the lack of uniformity in description leaves the validity of some species an open question. There are prominent differences in the number and distribution of the dorsal spines, in the size of the ocular peduncles, and in the shape of the basal and peduncular joints of the antennae". In the description of the authors, the same spines are sometimes called different names. We call "intermediate spine" the spine designated as "intercalated spine" by Sakai (1938) and "supraorbital spine" by Rathbun (1916). On *Cyrtomaja*, there is no supraorbital spine and we call "intermediate" the spine situated in the middle of the virtual line joining the pseudorostral to the antero-lateral spine. This spine does not exist on some species; on other species sometimes it is beyond (on *owstoni)*, or behind (on *murrayi)* that line. On some species *(goodridgeri)* an inner supraorbital spine exists near the pseudorostral. The positions of all those spines owing to the shape of the carapace are sometimes difficult to interpret on the figures of the authors. Some illustrations of the authors are obviously inaccurate; *C. suhmi*, for example, as illustrated by Miers (1886, pl. 3, fig. 3) with only one cardiac spine, has not at all the same aspect as that illustrated by Doflein (1904, pl. 9, fig. 1) with two cardiac spines. Some species, such as *echinata* have never been figured.

Bouvier (1918) gave a key to separate the following species: *lamellata, murrayi, smithi, goodridgeri, suhmi, platyceros, suhmi typica, suhmi curvicornis.* Sakai (1938) gave a key to separate: *owstoni, intermedia, horrida, platypes.* Comparison between specimens of the different species would probably establish some species as synonyms with others; some differential characters considered with specific value seem to be related perhaps to the size and sex of the specimens; *maccullochi*, e.g., is very close if not similar to *suhmi curvicornis.* Our key refers only to the authors' descriptions and illustrations. It includes all the species of the genus, which in the order of our key are: *owstoni* Terazaki, 1903, *bicornis*, Ihle and Ihle-Landerberg, 1931, *murrayi* Miers, 1886, *intermedia* Sakai, 1939, *horrida* Rathbun, 1916, *smithi* Rathbun, 1906, *smithi tenuipedunculata* Ihle and Ihle-Landerberg, 1931, *goodridgeri* McArdle, 1900, *suhmi platyceros* Doflein, 1904, *suhmi typica* Miers, 1886, *suhmi curvicornis* Bouvier, 1915, *maccullochi* Rathbun, 1918, *lamellata* Rathbun, 1906, *hispida* Borradaile, 1916, *platypes* Yokoya, 1933, *balssi* Ihle and Ihle-Landerberg, 1931. Only the last species is not situated in the key.

Key to the Species of *Cyrtomaja*

A. An intermediate spine is present.
- a. At least some of the spines are much longer than the others.
  - a1. Branchial spines much longer than any other spine; pseudorostral spines relatively short, clearly shorter than rostrum; no inner supra-orbital spine . . . . . *owstoni* Terazaki, 1903
  - b1. Epigastric spines much longer than any other spine; pseudorostral spines long, slender, clearly longer than rostrum.
    - a2. Carapace and appendages with the interspace between the normal spines smooth or with minute granules.
      - a3. Epigastric spines projecting on a plane parallel to that of pseudorostral spines . . . . . *bicornis* Ihle and Ihle-Landerberg, 1931
      - b3. Epigastric spines projecting on a plane not parallel to that of pseudorostral spines.

a4. A short inner supraorbital spine; pereiopods 4 and 5 with some spines on the anterior border ..... *murrayi* Miers, 1886

b4. No inner supraorbital spine; pereiopods 4 and 5 unarmed .... *intermedia* Sakai, 1939

b2. Carapace and appendages with the interspace between the normal spines covered by numerous spines, spinules or sharp granules.

a3. Interspace between normal spines covered with sharp granules concealed beneath tomentum.....*horrida* Rathbun, 1916 ..... *horrida pilosa* Ihle and Ihle-Landerberg, 1931

b3. Interspace between normal spines covered by spines and spinules; pereiopods 4 and 5 with few small scattered spines .....*echinata* Rathbun, 1916

b. No spine very much larger than any other ..... *smithi* Rathbun, 1893 ..... *smithi tenuipedunculata* Ihle and Ihle-Landerberg, 1931

a. Lateral gastric spines much longer than any other spines.

a1. Pseudorostral spines subparallel on each side of anterior part of carapace; three ridges joining base of lateral gastric spine respectively with the bases of (1) pseudorostral, (2) antero-lateral spines and (3) the (middle of) concavity between the pseudorostral and antero-lateral spines; segments 2 and 3 of antennal peduncle flattened .... *goodridgeri* McArdle, 1900

b1. Pseudorostral spines divergent. No ridge similar to those of *goodridgeri* on anterior part of carapace; segments 2 and 3 of antennal peduncle slender.

a2. Pseudorostral spines short; epigastric spines not very long but strongly divergent .....*suhmi platyceros* Doflein, 1904

b2. Pseudorostral spines long; epigastric spines very long and subparallel or very few divergent.

a3. Hepatic and epibranchial spines well developed; pseudorostral and epigastric spines straight..... *suhmi typica* (Miers, 1886) Doflein, 1904

b3. Hepatic spine less developed and epibranchial obsolete; pseudorostral and epigastric spines strongly bent forward..... *suhmi curvicornis* Bouvier, 1915 .....*maccullochi* Rathbun, 1918

b. Epigastric, hepatic and epibranchial spines are the longest and of approximately the same size.

a1. Meri of cheliped and pereiopod 2 not swollen in the middle; segments 2 and 3 of antennal peduncle flattened, pseudorostral spines well developed.

a2. All spines relatively short; lateral gastric a little longer; rostrum lamellar .... *lamellata* Rathbun, 1906

b2. All spines relatively longer than on *lamellata;* epibranchial spine obviously longer than the others; segments 2 and 3 of antennal peduncle produced in a papery lamella ..... *hispida* Borradaile, 1916

b1. Merus of cheliped and pereiopod 2 swollen in the middle; epibranchial spine followed behind by two or three much smaller ones..... *platypes* Yokoya, 1933 ..... *balssi* Ihle and Ihle-Landerberg, 1931

Cyrtomaja owstoni Terazaki, 1903

Figs. 73-78; Pl. VII, C-D

Cyrtomaja owstoni Terazaki, 1903, p. 239, text-fig. . Sakai, 1938, p. 240, pl. 34, fig. 1; 1965, p. 71, pl. 31, fig. 2.

Cyrtomaja horrida japonica Balss, 1924, p. 23.

Cyrtomaja septemspinosa Rathbun, 1932, p. 30. Yokoya, 1933, p. 144.

MATERIAL:

Ng. 724, ovigerous female of 18.5 x 19 mm

Locality: NAGA S4, St. No. 60-216, South China Sea, 15° 40.0′ N, 109° 45.5′ E, bottom; soft mud and bryozoan rocks, 10′ Beam Trawl, 479 m, February 28, 1960.

HISTORY:

Sakai (1938), who examined the type, established the identity of Balss's (1924) and Rathbun's (1932) species with *owstoni* and considered (also Sakai, 1965) the species as endemic to Japan.

OBSERVATIONS:

The NAGA specimen agrees with the observations and illustrations of Sakai (1938, 1965) and has been compared with two specimens from Japan kindly provided by Dr. Sakai, one male of 31 x 31 mm and one female of 28 x 28 mm.

In the species, as in all *Cyrtomaja,* the orbit is very short and practically has no clearly defined border. It seems to be confusing to designate any spine as supra or infraorbital spine. The spine situated external to and near the base of the insertion of the antenna could be wrongly designated as infraorbital or the intermediate and antero-lateral as supra and external orbital spine. At least the last (antero-lateral) belongs to the hepatic region as well as that situated behind and which is designated by us as hepatic. There is a long median gastric spine and a pair of less long epigastric spines; a pair of epibranchial spines which are the longest. Along the pterygostomian sulcus there is a line of acute granules with two or three developed as long spines, at least one at the antero-lateral angle of the buccal cavern.

Sakai (1938) wrote: "Supra-ocular eaves are thick and unarmed; a slender intercalated spine, which is well isolated from both the supraocular eave and the postocular spine, the latter being as long as the median gastric spine and projecting forwards but somewhat deflexed". As mentioned before, we call "intermediate" the "intercalated spine" of Sakai, and antero-lateral the "postocular spine" of Sakai. This last spine is accompanied more ventrally by a similar one of approximately the same size, which is the first of the series of the pterygostomial line well described by Sakai (1938); the hepatic spine is on a bulb.

Sakai (1938) did not mention the granular ridges marking the anterior part of the carapace; these ridges are associated with a pubescence relatively similar to those described by McArdle (1905) on *C. goodridgeri,* and Bennett (1964) on *hispida;* this author mentions: "The obscure pubescence on the anterior part of the dorsum in *C. hispida* and evidently several other species is easily overlooked and may occur in all". On *owstoni* there is on each side three prominent ridges starting from the basis of the epigastric spine; the first runs low and toward the pseudorostral spine; the second (intermediate) is granular, the third is smooth. The two innermost ridges "are thickly coated with long peg-shaped hairs" as mentioned on *goodridgeri* by McArdle (1905).

Genus *Platymaja* Miers, 1886

Platymaja Miers, 1886, p. 12. Alcock, 1895, p. 180. Ihle and Ihle-Landerberg, 1931, p. 148. Miyake, 1936, p. 416. Sakai, 1938, p. 238. Dell, 1963, p. 247.

HISTORY:

Miers (1886) described *Platymaja* for a single female of *wyville-thompsoni* from Admiralty Island kept in the British Museum. Further *turbynei* (Stebbing, 1902) was described from South Africa; *bartschi, remifera, fimbriata* were described by Rathbun (1916) from the Philippines and *maoria* by Dell (1963) from New Zealand. Rathbun (1918) defined *alcocki* for specimens identified as *wyville-thompsoni* by Wood-Mason, Alcock, Chun, Doflein, but Barnard (1950) was inclined to consider that some of those specimens belong to *turbynei.* Our key, being established only by reference to the descriptions and illustrations of the authors, needs to be revised by examining specimens of the various species.

Key to the Species of *Platymaja*

A. An intermediate spine just behind pseudorostral spine on superior orbital border. Branchial regions widely separated from each other in median line. Size: 37.3 x 35.2 mm ..... *wyville-thompsoni* Miers, 1886

B. No such an intermediate spine.

a. Pseudorostral spines subequal to rostrum. Branchial regions relatively close to each other in median line. Palm of cheliped three times as long as high and widening distally. Dactyli of pereiopods 3-5 a little narrower in distal half. Size: 32.5 x 32.2 mm ..... *alcocki* Rathbun, 1918

b. Pseudorostral spine much shorter than rostrum.

a1. Carapace on adult specimen nearly smooth or granular with reduced spines.

a2. Palm of cheliped with "nearly parallel-sides". Size: 45 x 45 mm ..... *turbynei* Stebbing, 1902

b2. Palm of cheliped with convex side; hand of cheliped nearly twice as long as broad; dactyli of pereiopods 3-5 strongly narrowed near distal half.

a3. Carapace less broad than long; cardiac spine relatively far behind the posterior median gastric spine. Two pairs of epigastric spines, the anterior pair relatively close to the supraorbital border.

a4. Anterior epigastric spine single; carapace more or less smooth between the spines. Size: 74 x 69.7 mm..... *bartschi* Rathbun, 1916

b4. Anterior epigastric spine replaced by a transverse row of 4-5 spinules; carapace with low granules and spines more developed. Size: 57.6 x 51 mm ..... *maoria* Dell, 1963

b3. Carapace little broader or as broad as long; only one pair of epigastric spines. Regarding *bartschi,* eyes smaller; pereiopods 3-5 longer and narrower with dactyli broader in distal part and horny tip shorter; epimeral spines between pereiopods 4-5 larger. Size: 5.51 x 52 mm ..... *remifera* Rathbun, 1916

b1. Carapace covered with spines and spinules in all ages. Size: 51 x 37 mm ..... *fimbriata* Rathbun, 1916

Platymaja remifera Rathbun, 1916

Figs. 79-92; Pl. VIII, A-C

Platymaja remifera Rathbun, 1916, p. 530.

MATERIAL:

NMS. 1968, 2.1.37, male of 40 x 40.5 mm

male of 33 x 34 mm
Cr. 4/64, St. 59, Trawl 174,
Coll. Fisheries Research Station of Hongkong

NMS. 1968, 2.1.38, 2 females of 31 x 30 mm
Cr. 4/65, St. 12, Trawl 330,
Coll. Fisheries Research Station of Hongkong

HISTORY:

Rathbun (1916) described the species for one male of 51 x 52 mm from the Philippines between Cebu and Bohol from 175 fathoms (Albatross). The type is in the United States National Museum, Cat. No. 47156, U.S.N.M.

OBSERVATIONS:

The present specimens are closer to *remifera* than to any other species; their identity needs to be checked by a comparison with the type specimen of *remifera.* The pseudorostral spines are "strongly ascending", nearly vertical, and the rostrum is "curved, concave above" as described by Rathbun (1916). The epimeral spines between the pereiopods 3-4 and 4-5 are strongly developed.

The distribution of the dorsal spines is given on our figure. The median intestinal region is obsolete, like a blunt small elevation; a pair of postero-lateral similar elevations are clearer. On the female the spines are stronger, more acute and the carapace less smooth. The first segment of the abdomen has a transverse line of three acute spines on the male and on the female, but the condition of the median varies on some specimens; on one female this median spine is very feeble; on another it is bifid and on another a smaller accessory spine exists on one side. Similarly noticeable variations of the condition of epimeral spines, emphasized by Rathbun (1916), exist among our specimens. The epimeral wing between pereiopod 3 and 4 has generally on the female two spines, that between pereiopod 4-5 generally four, but only one between 2-3 on the male. The external lateral border of the pseudorostral spine stands at a level a little above the orbital margin, which in its internal side is expanded below by a process joining the distal margin of the basal segment of the antenna and forming a part of the antennular fossae.

Regarding the figure of Sakai (1963, frontispiece 3) for *bartschi,* the rostrum and pseudorostral spine of *remifera* are comparatively much shorter. Rathbun (1916) mentioned only that they are "broader" on *remifera.* In regard to the same figure of Sakai, the spines of the dorsal surface of the carapace on our specimen of *remifera* are less numerous and all more acute at least on the female. On our figure the antero-lateral and hepatic spines correspond to the two suprahepatic spines of Rathbun (1916) in her description of *bartschi.*

Subfamily Majinae Alcock, 1895 (Balss, 1929)

Genus *Maja* Lamarck, 1801

Maia Lamarck, 1801, p. 154. H. Milne Edwards, 1834, p. 325. Miers, 1879, p. 655. Alcock, 1895, p. 238. Rathbun, 1904, p. 172; 1905, p. 73.

Maja Balss, 1924, p. 34. Sakai, 1938, pp. 296, 297; 1965, p. 83. Monod, 1956, p. 473.

Paramaja Kubo, 1936

Mamaja Stebbing, 1905, p. 22. Barnard, 1950, p. 58.

HISTORY:

Lamarck (1801) established the genus for *eriocheles* and *longimera*, European species, and further observations could demonstrate that the Indo-Pacific species of *Maja* belong to a different new genus to be established. Presently, the ten following Indo-Pacific species are included in *Maja: spinigera* de Haan, 1839, *gibba* Alcock, 1895, *nagashimaensis* Sakai, 1969, *miersi* Walker, 1887, *sakaii* Takeda and Miyake, 1969, *japonica* Rathbun, 1932, *kominatoensis* (Kubo, 1936), *suluensis* Rathbun, 1916, *linapacanensis* Rathbun, 1916, *bisarmata* Rathbun, 1916. The species *suluensis*, *linapacanensis* and *bisarmata* have never been illustrated and are not included in our key. The male pleopods 1 when they are known provide an accurate means for identification.

Key to the Species of *Maja* (thus far illustrated) found in the Indo-Pacific

A. Carapace with spine on dorsal median line.
   a. Basal segment of antenna with a proximal tooth on outer border. Carapace with five median, five marginal and two (branchial) dorsal spines. Pseudorostral spines projecting upward. Male pleopod 1 unknown. Size: 92 x 75 mm ..... *spinigera* de Haan, 1839
   b. Basal segment of antenna without proximal tooth on outer border.
      a1. Only two median spines, one gastric and one cardiac. Pseudorostral spine horizontal.
         i. Behind the small hepatic spines no marginal or dorsal branchial spines. Carapace densely covered by crisp setae surrounding the tubercles. Male pleopod 1 unknown. Size: 41 x 35 mm ..... *gibba* Alcock, 1895
         ii. Behind the small hepatic spine four marginal and one dorsal branchial spine. Male pleopod 1 with preapical curved hooklet (Sakai, 1969, figs. 5b, b'). Size: 33.5 x 28.3 mm ..... *nagashimaensis* Sakai, 1969
      b1. More than two median spines.
         a2. On median line: one gastric, one cardiac and two smaller intestinal spines; behind the short hepatic spine, four relatively long marginal and one dorsal branchial spines. Pseudorostral spines projecting upward. Male pleopod unknown. Size: 32 x 25 mm ..... *miersi* Walker, 1887
         b2. On median line: two gastric, one cardiac and one intestinal spine. Behind the hepatic two marginal and one dorsal branchial spines. Pseudorostral spines horizontal.
            i. Carapace elognate pyriform. Carpi of pereiopods 2-5 cyclindrical. Tip of male pleopod 1 ovate and fringed with hairs (Sakai, 1934, fig. 11a). Size: 13.2 x 9 mm ..... *sakaii* Takeda and Mijake, 1969
            ii. Carapace broader; cheliped stouter; carpus of pereiopods 2-5 depressed and canaliculated on upper surface. Tip of male pleopod pointed with some plumose setae (Sakai, 1934, text-fig. 11b). Size: 20 x 17 mm ..... *japonica* Rathbun, 1932

B. Carapace without spines on dorsal median line; entirely hariless and covered with large wart-like tubercules. Basal segment of antenna with no basal tooth on the outer border. Male pleopod in Kubo (1936, fig. 1B). Size: 44 x 40 mm ..... *kominatoensis* (Kubo, 1936)

Maja japonica Rathbun, 1932

Figs. 93-97; Pl. IX, A

Maja japonica Rathbun, 1932, p. 33. Sakai, 1965, p. 83, pl. 37, fig. 1.

Maja japonica Yokoya, 1933, p. 157, text-fig. 56.

Maja sp. Sakai 1932, p. 50, pl. 2, fig. 5.

Maja nipponensis Sakai, 1934, p. 297, text-fig. 11b; 1936, p. 100, text-fig. 46. Sakai 1938, p. 299, pl. 38, fig. 1, text-fig. 41.

Not *Maja japonica* Sakai, 1934, p. 294, text-figs. 10, 11a; Sakai, 1936, p. 99, pl. 25, fig. 2, text-fig. 45; 1938, p. 299, p. 30, fig. 2 (=*sakaii*).

MATERIAL:

Ng. 1024, male of 16 x 11.5 mm

Locality: NAGA S8, St. No. 60-777, South China Sea, off Nhatrang, 12° 09′ 40″ N, 109° 24′ 00″ E, 6′ Beam Trawl, 93 m, September 20, 1960.

HISTORY:

Rathbun (1932) described the species from Seno Umi, Japan. Yokoya (1933) recorded six males and five females from various localities of Japan, the largest female of 20.8 x 17.7 mm. Sakai (1934) recorded a male from Nagasaki and reported to the species his specimen from Nanazuru (Sakai, 1932). Sakai (1938) quoted his specimen of 1934 and one new female of 13 x 10 mm also from Japan, Sakai (1965) two males, and two females from Sagami Bay.

OBSERVATIONS:

The NAGA specimen agrees with the species as it is illustrated by Sakai (1938, pl. 38, fig. 1 and 1965, pl. 37, fig. 1). It has three median spines, one gastric, one cardiac, one intestinal; one marginal hepatic, three marginal and one dorsal branchial, the two anterior of the marginal branchial being much smaller. Its male pleopod is similar to that illustrated by Sakai (1934, text-fig. 11b) under the name of *nipponensis* and well characterized by the large plumose setae associated with some others at the apex which is tapering. On the NAGA specimen the palm of the cheliped is comparatively less swollen than on the figure of Sakai (1938, text-fig. 41) which probably illustrates a larger specimen of which the size is not given. The species until now was only recorded from Japan.

As comparative material, a specimen of *gibba* was examined; it is an ovigerous female of 52 x 38 mm collected in the Indonesia waters (Kasijan Coll.) which is illustrated (Pl. IX, B).

Subfamily Pisinae Alcock, 1895

Genus *Naxioides* A. Milne Edwards, 1865

Naxioides A. Milne Edwards, 1865, p. 142. Borradaile, 1903, p. 687, Balss. 1929, p. 14. Sakai, 1938, p. 267; 1965, p. 77. Barnard, 1950, p. 52.

Naxia H. Milne Edwards, 1834, p. 313. Miers, 1879a, p. 658. Miers, 1886, p. 59. Ortmann, 1894, p. 42. Alcock, 1895, p. 216. Balss, 1924, p. 32. Sakai, 1934, p. 267.

Not *Naxia* Latreille, 1825. Rathbun, 1897, p. 157.

HISTORY:

A. Milne Edwards (1865) established the genus for *hirta* from Zanzibar. Rathbun (1897, p. 157) was the first to indicate that *Naxia* H. Milne Edwards, 1834, is distinct from *Naxia* Latreille, 1825, and a synonym of *Naxioides* A. Milne Edwards, 1865, but many authors have continued to refer to *Naxia* H. Milne Edwards, 1834. The genus is at least characterized by an accessory spinule on the pseudorostral spines. Balss (1957) indicated nine as the number of Indo-Pacific species. Alcock (1895) gave a key for four Indian species and Sakai (1938) for three

Japanese. To our knowledge the species of the genus are *hystrix* (Miers, 1886), *mamillata* (Ortmann, 1893), *spinigera* (Borradaile, 1903), *spinigera inermis* Bouvier, 1915, *hirta* A. Milne Edwards, 1865, *cerastes* (Ortmann, 1893), *taurus* Pocock, 1890, *robillardi* Miers, 1882, *investigatoris* Alcock, 1896, *rombloni* Rathbun, 1916.

Naxioides mamillata (Ortmann, 1893)

Figs. 98-103; Pl. IX, C-D

Naxia mamillata Ortmann, 1893, p. 56, pl. 3, fig. 7.

Naxioides mamillata Rathbun, 1911, p. 253. Balss, 1929, p. 14. Sakai, 1938, p. 268, pl. 27, fig. 1; 1965, p. 76, pl. 35, fig. 1.

?*Hyastenus elegans* Miers, 1886, p. 58, pl. 6, fig. 3.

MATERIAL:

Ng. 599, male of 23 x 10 mm

Locality: NAGA S4, St. No. 60-212, South China Sea, 15° 40.0′ N, 109° 22.9′ E, bottom; shell, detritus and sand, 10′ Beam Trawl, 60-108 fathoms, February 27, 1960.

N.M.S. 1968, 2.14.14, male of 50 x 24 mm
female of 33 x 16 mm
Cr. 2/63, St. 24, Trawl 10.
Fisheries Research Station of Hongkong

HISTORY:

Ortmann (1893) described the species from Japan. Rathbun (1911) recorded one specimen of 14.7 x 9 mm from Salomon Bank from 60-120 fathoms. Balss (1929) quoted the species without mentioning any new specimens. Sakai (1938) recorded six males and five females; Sakai (1965) nine males and nine females, all from Japan, the largest a male of 96 x 47 mm.

OBSERVATIONS:

The NAGA specimen (probably due to its size) differs slightly from the description of Sakai (1938). The spines on the dorsal surface of the carapace are less numerous. Sakai (1938) counted twenty-three spines instead of nineteen as on the NAGA specimen. The NAGA specimen is very close to *Hyastenus elegans* Miers, 1886, described for a single female of 32.5 x 11 mm from 262 m near the Kei Island; the species since have never been recorded. It seems possible that Miers (1886) has not noticed the accessory spinules on the pseudorostral spine and a new examination of the type specimen will be useful. If the species are identical, the name of Miers (1886) will have the priority.

The NAGA specimen being young and its pleopod being little characterized, the pleopods of our large male of 50 x 24 mm are illustrated. As supplementary information on the genus, the pleopods of a male of 21 x 13 mm of *Naxioides hystrix* are also illustrated (Figures 104-108). Those two specimens from the South China Sea are maintained in the National Museum of Singapore.

Genus *Hyastenus* White, 1847

Pisa Adams and White, 1848, p. 9.

Hyastenus White, 1847, p. 56. A. Milne Edwards, 1873, p. 249. Miers, 1879, p. 658; 1886, p. 55. Alcock, 1895, p. 206. Ortmann, 1894, p. 41. Calman, 1913, p. 313. Stebbing, 1917, p. 25.

Balss, 1934, p. 122. Sakai, 1937, p. 279; 1965, p. 80. Monod, 1938, p. 103. Barnard, 1950, p. 53. Balss, 1957, p. 162.

Halimus Latreille, 1829, o. 60. not Latreille, 1825; not H. Milne Edwards, 1834, p. 341. Rathbun, 1897, p. 157. Borradaile, 1903, p. 687. Laurie, 1906, p. 370. Parisis, 1915, p. 290. Balss, 1924, p. 32. Stebbing, 1908, p. 5.

Chorinus (part) H. Milne Edwards, 1834, p. 315. Adams and White, 1848, p. 313.

Naxia (part) de Haan, 1835, p. 96.

Lahaina Dana, 1852, p. 92.

?*Lepidonaxia* Targioni-Tozzetti, 1877.

HISTORY:

Hyastenus was described by White (1947) for *H. sebae.* A. Milne Edwards (1873) gave an account of the genus in which he included: *sebae* White, 1847, *pleione* (Herbst, 1803), *diacanthus* (de Haan, 1835), *aries* (Latreille, 1825), *verrucosipes* (Adams and White, 1848), *planasius* (Adams and White, 1848), *verreauxi* A. Milne Edwards, 1872, *spinosus* A. Milne Edwards, 1872, and *oryx* A. Milne Edwards, 1873. The proposal of Rathbun (1897) to change the name *Hyastenus* to *Halimus* Latreille, 1829, has not been generally accepted and few authors use Latreille's name.

Balss (1935) quoted the following thrity-eight species: *agasizii* (Rathbun, 1902), *aries* (Latreille, 1825), *auctus* Rathbun, 1916, *biformis* Rathbun, 1916, *borradailei* (Rathbun, 1907), *branchichirus* Nobili, 1900, *brevicornis* Ortmann, 1894, *brockii* de Man, 1871, *calvarius* Alcock, 1895, *consobrinus* A. Milne Edwards, 1895, *convexus* Miers, 1884, *cristimanus* (A. Milne Edwards, 1865), ?*dumerillii* (H. Milne Edwards), *elegans* Miers, 1886, *elongatus* Ortmann, 1893, *espinosus* (Borradaile, 1903), *fraterculus* Rathbun, 1916, *gracilirostris* Miers, 1879, *hilgendorfi* de Man, 1887, *inermis* (Rathbun, 1911), *irami* (Laurie, 1906), *longipes* Dana, 1852, *minimus* Rathbun, 1924, *orbis* Rathbun, 1916, *oryx* A. Milne Edwards, 1872, *ovatus* Dana, 1852, *pehlevi* (Laurie, 1906), *planasius* (Adams and White, 1847), *pleione* (Herbst, 1803), *scrabiculatus* Rathbun, 1916, *sebae* (White, 1847), *sphenocarcinoides* (Rathbun, 1916), *spinosus* A. Milne Edwards, 1872, *tenuicornis* Pocock, 1890, *tinaktensis* Rathbun, 1916, *trispinosus* Rathbun, 1916, *uncifer* Calman, 1909, *verrucosipes* (Adams and White, 1848).

The following species are not quoted by Balss (1935): *andrewsi* Calman, 1909, *bispinosus* Buitendijk, 1939, *convexus hendersoni* Laurie, 1906, *cornigerus* Sakai, 1938, *diacanthus* (de Haan, 1839), *kyusyuensis* (Yokoya, 1933), *macrospinosus* Ward, 1934, *minutus* Buitendijk, 1939, *ternatensis* Buitendijk, 1939.

The following species are synonyms: *H. subinermis* Zehnter, 1894, and *tuberculosus* Rathbun, 1916 =*convexus; verreauxi* A. Milne Edwards, 1872 =*diacanthus.* The situation of *H. hectori* Miers, 1876, *ovatus* (Dana, 1876) is doubtful. Several species need to be reexamined; perhaps some would be removed to other genera as we suggested before for *elegans* Miers, 1886.

Hyastenus aries (Latreille, 1825)

Figs. 109-113; Pl. X, A-B

Pisa aries Latreille, 1825, p. 140.

not *Halimus aries* Latreille, 1829, pl. 9, fig. 2 (no description). H. Milne Edwards, 1834, p. 341. *Naxia aries* Guerin (Latreille, 1824).

Chorinus aries H. Milne Edwards, 1834, p. 315. Hilgendorf, 1878, p. 78 (not seen). Nauck, 1880, p. 41 (not seen).

Hyastenus aries A. Milne Edwards, 1872, p. 250 (not seen). Miers, 1886, p. 56. Alcock, 1895, p. 211. McCulloch, 1913, p. 328, fig. 44. Buitendijk, 1939, p. 239, figs. 1-2; 1949, p. 64.

Hyastenus diacanthus bituberculatus Lanchester, 1900, p. 723.

MATERIAL:

Ng. 136, female of 36 x 18.5 mm
male of 24.5 x 14.5 mm
male of 30.9 x 19.5 mm

Locality: NAGA S3, St. No. 60-102, Gulf of Thailand, off Ko Kram Yoi 12° 33′ 00″ N, 100° 44′ 00″E, bottom; coarse loose green sand, 6′ Beam Trawl, 27 m, January 19, 1960.

HISTORY:

Latreille (1825) described the species as *Pisa*. H. Milne Edwards (1834) recorded the species as a *Chorinus* from the Coromandel coast (India). Miers (1886) mentioned only the species without recording any specimen. Alcock (1895) recorded the species from the Orissa coast, Gulf of Martaban and Malacca Strait. McCulloch (1913) figured one specimen from India identified by Alcock (1895), but recorded no new specimen. Buitendijk (1939) recorded one male and one female from Padang (Sumatra) and figured the male pleopod. Buitendijk (1949) recorded five females and two males from the National Museum of Singapore.

OBSERVATIONS:

The NAGA specimens agree with the remarks of Buitendijk (1939, 1949) on the differential characters that separate *aries* from the closely related species *diacanthus*. They have been compared with specimens identified by Buitendijk and maintained in the National Museum of Singapore. No mention of the size of the species exists in the literature. The NAGA specimens are not as large as those of the N.M.S., where one male measures 48 x 27 mm. The main discrepancy referring to Buitendijk (1949) is the presence on *aries* of two gastric tubercles in line, the anterior being larger and more acute instead of only one as on *diacanthus*. Lanchester (1900) established a new variety: *H. diacanthus bituberculatus* for specimens from Singapore and Malacca "in which the gastric prominence, besides being much elevated bears two pointed tubercles, one in front of the other, the anterior being the more prominent, a small tubercle on the middle of the posterior border". Those two characters correspond exactly to those separating *aries* from *diacanthus*. Two large specimens from the National Museum of Singapore have been added to our study of those of the NAGA Expedition and used for our illustrations; they are for *aries*, a male of 47 x 26.5 mm; for *diacanthus*, a male of 36 x 21 mm (Figures 114-118; Pl. X, C). *H. spinosus*, like *aries*, has two gastric spines, but it differs from it by the presence of a cardiac spine and a stronger and larger intestinal and epibranchial spines.

Genus *Rochinia* A. Milne Edwards, 1875

Amathia Roux, 1828, p. 8. H. Milne Edwards, 1834, p. 285.

Anamathia Smith, 1885, p. 493. Miers, 1886, (Part) p. 25.

Pisa (Amathia) de Haan, 1839, pp. 78, 84.

Rochinia A. Milne Edwards, 1875, p. 86. Alcock, 1895, p. 65. Rathbun, 1925, p. 204. Sakai, 1938, p. 278; 1965, p. 80. Garth, 1958, p. 282.

Scyramathia A. Milne Edwards, 1881, p. 356 (not seen). Alcock, 1895, p. 201. Stebbing, 1910, p. 289. A. Milne Edwards and Bouvier, 1923, p. 379. Barnard, 1950, p. 49.

HISTORY:

Rochinia was established by A. Milne Edwards (1875) for *A. gracilipes,* a species from South Atlantic. *Anamathia* Roux, 1828, was established for *rissoana,* a Mediterranean species; the name of Roux being preocc., Smith (1885) substituted for it *Anamathia,* which is a synonym of *Rochinia. Scyramathia* A. Milne Edwards, 1880, is considered generally as a synonym, but Barnard (1950), for example maintained *Scyramathia* as valid. Garth (1958) mentioned that in the American species of *Rochinia,* the shapes of the first male pleopod demonstrate that "the genus formed by uniting *Anamathia, Rochinia* and *Scyramathia"* may be diphyletic. Some species having a "pisiform type" (like *Rochinia gracilis),* others a "scyriform type" (like *Rochinia carapenteri* and *Rochinia vesicularis).* He thinks that those last forms should be united in an independent genus "characterized by a scyriform pleopod". "Thus, in due time," wrote Garth, "the superficial resemblance of *Scyramathia* to *Hyastenus* noted by Sars (1885, p. 6) and of *Pugettia,* which has a scyriform pleopod although belonging to another subfamily, noted by Alcock (1895, p. 202), will have received structural confirmation."

Among the Indo-Pacific species of *Rochinia* the male pleopod of *hertwigi* illustrated by Barnard (1950, fig. 11e) is the only one known. The male pleopods of the four species of *pulchra, rivers-andersoni, strangeri, velutina* illustrated in the present paper have, like *hertwigi,* a "pisiform type" similar to that given by Garth (1958).

In the order of our key, the Indo-Pacific species of *Rochinia* are: *pulchra* (Miers, 1886), *strangeri* new species, *rivers-andersoni* (Alcock, 1895), *fultoni* (Grant, 1905), *debilis* Rathbun, 1932, *globulifera* (Wood-Mason, 1891), *velutina* (Miers, 1886), *beauchampi* (Alcock and Anderson, 1894), *hertwigi* (Doflein, 1904).

Key to the Species of *Rochinia* found in the Indo-Pacific

A. Pseudorostral spines nearly as long or longer than half length of carapace.

a. On dorsal median longitudinal line of carapace four spines; 2 gastric, one cardiac, one intestinal. On each side 2 epigastric, 4 branchial spines, the epibranchial being the largest; a small spine at some distance behind hepatic spine; preocular spine and hepatic spine long and acute ..... *pulchra* (Miers, 1886)

b. On dorsal median longitudinal line of carapace three spines: 1 gastric, 1 cardiac, 1 intestinal; hepatic and epibranchial spines always the largest.

a1. Three or four branchial spines.

a2. Four pairs of branchial spines dorsally and one pair laterally; two pairs of gastric spines anterior to the median one; all acute and relatively slim; preocular spine blunted on tip..... *strangeri* new species

b2. Three pairs of branchial spines dorsally and one pair of tubercules laterally; one pair of gastric spines anteriorly to the median ones; all stout with indication of flattening on the sides; preocular spine acute and blade-like shaped .... *rivers-andersoni* (Alcock, 1895)

b1. No branchial spine other than the epibranchial; feeble gastric spine like a tubercle..... *fultoni* (Grant, 1905)

B. Pseudorostral spines clearly less than half length of carapace.

a1. Carapace, at level of epibranchial spines, nearly as wide as long; all regions (intestinal, cardiac, gastric and epibranchial hepatic, branchial) of carapace swollen.... *debilis* Rathbun, 1932

b1. Carapace clearly longer than wide.

a2. Dorsal spines of carapace acute or rounded, sometimes only the intestinal and epibranchial slightly distally flattened. Hepatic spine generally vertically erected and laterally flattened as an ear-like formation.
  a3. Cardiac region broad and prominent; on vertical side of branchial region a sinuous human ear-shaped plate instead of spine.
    a4. Pterygostomian region with a great polished bulla on either side of buccal frame ..... *globulifera* (Wood-Mason, 1891)
    b4. Pterygostomian region with a flattened oval tubercle on either side of buccal frame ..... *velutina* (Miers, 1886)
  b3. Cardiac region narrower, sunken; epibranchial spine strongly up-turned..... ..... *beauchampi* (Alcock and Anderson, 1894)
b2. Dorsal spines of carapace truncated at the tip. at least postocular, hepatic, cardiac, gastric, epibranchial spines truncated ..... *hertwigi* (Doflein, 1904)

On several species of the genus some dorsal spines present a tendency to be distally flattened. The distal part of the spine is somewhat truncated and presents a polished flat plate; *hertwigi* provides the most typical example. A relatively similar modification exists on the hepatic spine of species like *pulchra, strangeri, rivers-andersoni, velutina.* Alcock (1895) mentioned on *globulifera* and *beauchampi,* an "ear-like hepatic spine" which corresponds to a somewhat identical disposition. Similar modification sometimes is indicated on some other dorsal spines like the preorbital one *pulchra* and *strangeri* and even the epibranchial on *rivers-andersoni.*

Such modifications are more conspicuous for the spines (or tubercles) of the pterygostomian region and of the ventral side of the branchial region. Those spines generally are short and blunted *(pulchra, rivers-andersoni)* or long and acute *(strangeri).* On some species (at least *velutina)* those spines or tubercles are replaced by a large flat plate, one on the pterygostomian region and one ventral to the branchial region. Such morphological features of *velutina* are close to the condition existing on *Sphenocarcinus (stimpsoni).* Miers (1886), who described *Pugettia velutina* and *Oxypleurodon (=Sphenocarcinus) stimpsoni,* illustrated the two new species in close approximation in the same plate (Miers, 1886, pl. 6). Nevertheless by the disposition of its dorsal spines *velutina* is difficult to include in *Sphenocarcinus.* For our key the distribution of the spines in the four species are established by reference to our specimen. Some slight individual variations exist among our specimens of the same species and obviously more observations are needed.

Among the eight already described species, *hertwigi* is only known from South Africa, having been recorded as far as 23° E in the Indian Ocean; *fultoni* is only recorded from Australia, *debilis* from Japan; *pulchra* and *velutina* are recorded from South China Sea, Japan and Indian Ocean. The three others: *beauchampi, globulifera* and *rivers-andersoni* were only known by the original specimen from the Indian Ocean, but the last is now recorded from the China Sea.

Rochinia pulchra **(Miers, 1886)**

Figs. 119-122; Pl. XI, A

Anamathia pulchra Miers, 1886, p. 26, pl. 4, fig. 1.

Anamathia livermori Wood-Mason, 1891, p. 260. Illus. Invest., pl. 14, fig. 3.

Scyramathia pulchra Alcock, 1895, p. 202. Doflein, 1904, p. , pl. 27, fig. 12. Rathbun, 1911, p. 250.

Rochinia pulchra Sakai, 1938, p. 278, text-fig. 35, pl. 37, fig. 4.

MATERIAL:

NMS. 1968, 2.13.4, male of 30 x 17 mm
Cr. 4/1964, St . 36, Trawl (247).

NMS. 1968, 2.15.3, male of 31 x 20 mm
Cr. 4/1964, Coll. O.T. Chan, 22/8/1964, St. 121, Trawl (219), 394 fathoms.

NMS. 1968, 2.15.4, male of 23 x 15 mm
Cr. 4/1964, Coll. O.T. Chan, 2/8/1964, St. 119, Trawl (218), 300 fathoms.

NMS. 1968, 2.15.5, female of 32 x 20 mm
Cr. 4/1964.
All collected by the Fisheries Research Station of Hongkong.

HISTORY:

Miers (1886) described *pulchra* for an adult male of 18 x 13.5 mm from the Philippines collected from 375 fathoms. Wood-Mason (1891) described *livermori* for one young male and one adult female from the Andamans Sea from 130-561 fathoms. Alcock (1895) only quoted the specimens of Wood-Mason (1891). Rathbun (1911) recorded two ovigerous females and one male from Seychelles, respectively from 125 and 34 fathoms. Sakai (1938) recorded one female from Kii Peninsula and one male and one female from Mimase, Tosa Bay, Japan.

OBSERVATIONS:

The present specimens differ slightly one from the other as well as from the description and illustrations of the authors, but their identity as *pulchra* does not leave any doubt, referring to the number and the acute shape of the dorsal spines, as well as the long pseudorostral horns. The postorbital lobe as well as the hepatic spine are flattened on the lateral side. This character is not yet mentioned in the species; the pterygostomian region has a line of 3-4 tubercles as indicated by Sakai (1938).

Rochinia strangeri new species

Figs. 123-128; Pl. XI, B-C

MATERIAL:

Type, Ng. 744, male of 15 x 9.5 mm (deposited United States National Museum)

Paratype, Ng. 742, female of 18 x 13 mm

Locality: NAGA S4, St. No. 60-216, South China Sea, 15° 40.0′ N, 109° 45.5′ E, bottom; soft mud and bryozoan rocks, 10′ Beam Trawl, 479 m, February 28, 1960.

OBSERVATIONS:

The species differs from *pulchra* by having only three spines on the median longitudinal line; the gastric spine is near the posterior edge of the gastric region; *pulchra* has two gastric spines, one anterior and one posterior. However, on *strangeri,* the spine behind the hepatic and situated on the lateral (nearly vertical) side of the branchial region is well developed and acute instead of being short and like a tubercle on *pulchra* as well as on *rivers-andersoni.* The pseudorostral horns and the preorbital lobe are shorter, less slender, less acute on *strangeri* than on *pulchra.* The two species have four pairs of branchial spines and a line of three subacute tubercles on the pterygostomian region.

R. strangeri at least differs from *rivers-andersoni* by having all its dorsal spines comparatively slender and more acute and four branchial spines instead of three. On *strangeri* also the preorbital (supraocular) lobe is comparatively more prominent but less acute; the postocular lobe and the hepatic spine are distally truncated in a flattened plate; on *rivers-andersoni* the two are much longer and blade-like.

In natural condition the carapace and appendages are entirely covered by a long velvet as habitual in the genus. The male pleopod 1 is of similar type to that of *pulchra, rivers-andersoni, velutina.*

Rochinia rivers-andersoni (Alcock, 1895) aff.

Figs. 129-132; Pl. XII, A

Scyramathia rivers-andersoni Alcock, 1895, p. 203. Illus. Invest., pl. 22, figs. 2, 4, 4a. Doflein, 1904, p. , pl. 27, figs. 8-11 (not seen).

MATERIAL:

NMS. 1968, 2.15.2, male of 30 x 23 mm
Coll. Cr. 4/64, Coll. O.T. Chan, 22/8/1964, St. 121, Trawl (219), 394 fathoms, Fisheries Research Station of Hongkong.

HISTORY:

Alcock (1895) described the species for specimens from off the coast of Malabar from 700 m; he quoted one male of 21 mm and a female of 16.5 mm as length of carapace.

OBSERVATIONS:

The present specimens differ slightly from the descriptions and illustrations of Alcock mainly by the tendency of all the dorsal spines to be flattened on their sides and somewhat blade-like. It is particularly clear for the preocular spine, the hepatic and the branchial spines, a little less for the epibranchial spine itself. A new examination of the material of Alcock (1895) and Doflein (1904) would be useful.

Rochinia velutina (Miers, 1886)

Figs. 133-137; Pl. XII, B-C

Pugettia velutina Miers, 1886, p. 41, pl. 6, fig. 2. Yokoya, 1933, p. 153 *(veltima* for *velutina).*
Scyramathia velutina Alcock, 1895, p. 206 (no specimen).
Rochinia veltima (=velutina) Sakai, 1938, pp. 253, 378 (no specimen).

MATERIAL:

NMS. 1968, 2.13.2, male of 17 x 12.5 mm
Cr. 3/1964, St. 13, Trawl 149.

NMS. 1968, 2.13.3, feminized male with sacculina 15 x 12 mm
Cr. 4/1964, St . 59, Trawl 174.
Both from Fisheries Research Station of Hongkong.

HISTORY:

Miers (1886) described *velutina* for a single female of 13.5 x 10 mm (the rostrum of 6.5 mm) from the Kii Islands from 140 fathoms. Yokoya (1933) recorded one ovigerous female from

Japan (south of Omae-zaki) from 187 m. Alcock (1895) mentioned only that the species belongs instead of to *Pugettia* to *Scyramathia* which Sakai (1938) corrected as *Rochinia.*

OBSERVATIONS:

Our specimens slightly differ from the description and illustrations of Miers (1886) by their pseudorostral horns are dorsal tubercles. On our larger male the pseudorostarl horns are clearly less than one-third of the total length of the carapace instead of being a little more referring to the measurements and figures of Miers (1886). In regards to the illustrations of Miers (1886) the pair of submedian gastric tubercles situated antero-laterally to the median gastric and of the submedian postero-branchial are less marked; on the contrary the cardiac and intestinal are more prominent on our specimens. These slight discrepancies agree with the remarks of Yokoya (1933).

Referring to our specimens, the species can be described as follows: the carapace is subpyriform with its dorsal surface convex and ornamented by several spines and prominences. Three prominences (one gastric, one cardiac, one intestinal) are situated on the median longitudinal line; the cardiac is swollen much the largest and rounded on the summit, the gastric very feeble, the intestinal well developed and thickly rounded and partly flattened on the tip. The hepatic and epibranchial spines are large and respectively flattened on the tip and on the lateral sides. The branchial region has two other pairs of submedian conical tubercles, one pair situated posteriorly to the gastric and the other posteriorly to the cardiac. At a small distance from the true posterior border of the carapace and on each side runs a rim, marked by a submedian small tubercle and outside by a small wing. In lateral or ventral view the lateral side of the carapace is ornamented in the branchial region by a sinuous ear-like plate and in the pterygostomain region (below the hepatic spine) by a smaller but similar structure. The hepatic spine, the postocular and preocular lobe have their lateral face flattened. In natural condition the carapace and appendages are entirely covered by a dense and long velvet with clusters of some longer setae on the summit of each prominence; a pair of small clusters indicates a pair of feeble submedian gastric tubercles situated anteriorly to the median and not mentioned in the description given above.

The identity of our specimens as *velutina* does not leave any doubt; the situation of the species in the genus could perhaps be reconsidered, but the male pleopod 1 is of similar type to the other species of *Rochinia.*

Superfamily BRACHYRHYNCHA Borradaile, 1907
Family PORTUNIDAE Rafinesque, 1815
Subfamily Polybiinae Ortmann, 1893

Genus *Parathranites* Miers, 1886

?*Lupocyclus (Parathranites)* Miers, 1886, p. 186.

Parathranites Alcock, 1899, p. 16. Rathbun, 1906, p. 867. Sakai, 1939, p. 376. Barnard, 1950, p. 148. Stephenson and Campbell, 1960, p. 88. Stephenson, 1961, p. 97. Crosnier, 1962, p. 22.

HISTORY:

Miers (1886) established the genus for *P. orientalis.* Rathbun (1906) described two other species: *hexagonum* and *latibranchium* from Hawaii. Alcock (1899), who moved Mier's subgenus at the generic level, placed its position as "nearer to *Bathynectes* than to *Lupocyclus*". The first genus belongs to the Macropipinae and the second to the Portuninae.

Parathranites orientalis Miers, 1886

Pl. XIII, A

Lupocyclus (Parathranites) orientalis Miers, 1886, p. 186, pl. 17, figs. 1a-c.

Parathranites orientalis Alcock, 1899, p. 17. Rathbun, 1911, p. 204. Yokoya, 1933, p. 178. Sakai, 1936, p. 119, pl. 32, fig. 2; 1939, p. 376, fig. 2. Barnard, 1950, p. 148, figs. 29i-1. Stephenson, 1961, p. 97, figs. 1B, 2H, pl. 1, fig. 2, pl. 4B. Crosnier, 1962, p. 22, fig. 24.

MATERIAL:

Ng. 696, male of 14.5 x 18.5 mm

Locality: NAGA S4, St. No. 60-212, South China Sea, 15° 40.0′ N, 109° 22.9′ E, bottom; shell, detritus and sand, 10′ Beam Trawl, 60-108 fathoms, February 27, 1960.

HISTORY:

Miers (1886) described *orientalis* for numerous males and females from Kii Islands from 262 m, the largest 15 x 18 mm. Alcock (1899) recorded fifty-four specimens from off Malabar coast, Coromandel coast and Andamans from 122 m, the largest 12 x 17 mm. Rathbun (1911) recorded the species from Solomon Bank. Yokoya (1933), Sakai (1936, 1939) recorded the species from Japan; Sakai (1939) gave the size of a male of 20.5 x 27 mm. Barnard (1950) recorded specimens from South Africa. Stephenson (1961) recorded two males of 24 mm and 25 mm from Australia. The species lives on sand bottom from 60 to 230 m and is recorded from South Africa to Japan.

OBSERVATIONS:

The NAGA specimen agrees generally with the authors' observations and illustrations. Stephenson (1961) mentioned on his specimen some slight differences in regard to the observation and illustrations of Miers (1886), Alcock (1899) and Sakai (1939). The NAGA specimen like that of Stephenson has a sharp spine on the external face of the carpus and in all detail confirms the value of the remarks of Stephenson (1961).

Family XANTHIDAE Alcock, 1898

Subfamily Xanthinae Ortmann, 1898

Demania rotundata (Serène, 1969)

Figs. 141-142, Pl. XIII, D

Xantho rotundatus Serène, 1969, in Guinot, 1969, p. 235.

Xantho reynaudi cultripes Sakai, 1939, text-fig. 29, pl. 90, fig. 2. Not *Xantho (Lophoxanthus) scaberrimus* var. *cultripes* Alcock, 1898.

Demania rotundata Guinot, 1970, p. 1074.

MATERIAL:

Ng. 690B, male of 20.5 x 30.5 mm

Locality: NAGA S4, St. No. 60-212, South China Sea, 15° 40.0′ N, 109° 22.9′ E, bottom; shell, detritus and sand, 10′ Beam Trawl, 60-108 fathoms, February 27, 1960.

HISTORY AND OBSERVATIONS:

Serène (1969) described the species for two males and one female from Taiwan. The NAGA specimen was compared with the type specimen maintained in the National Museum of Natural History in Paris.

Guinot (1969, 1970) included in *Demania* Laurie, 1906, the following species: *splendida* Laurie, 1906, *reynaudi* (H. Milne Edwards, 1834), *scaberrima* (Walker, 1887), *scaberrima baccalipes* (Alcock, 1898), *rotundata* (Serène, 1969), *intermedia* Guinot, 1969, *aff. intermedia* Guinot, 1969. A new species, *D. toxica* Garth, 1971, has recently been described.

Genus *Ralumia* Balss, 1933

Ralumia Balss, 1933, p. 91; 1957, p. 653. Sakai, 1935, p. 79; 1939, p. 550; 1965, p. 161.

HISTORY:

The genus includes only two species, *R. dahli* Balss, 1933, and *R. balssi* Sakai, 1935. The two species are mainly separated by the ornamentation of the palm of the cheliped.

Ralumia balssi Sakai, 1935

Figs. 138-140; Pl. XIII, B-C

Ralumia balssi Sakai, 1935, p. 79, text-fig. 13, pl. 7, fig. 4; 1936, p. 173, pl. 52, fig. 4; 1965, p. 161, pl. 80, fig. 2.

MATERIAL:

Ng. 699, female of 5 x 6 mm

Locality: NAGA S4, St. No. 60-212, South China Sea, 15° 40.0′ N, 109° 22.9′E, bottom; shell detritus and sand, 10′ Beam Trawl, 60-108 fathoms, February 27, 1960.

HISTORY:

Sakai (1935, 1936) described *balssi* for two females, one 7 x 7 mm. Sakai (1939) recorded one more female and one male, Sakai (1965) four males and five females from Sagami Bay on sand and muddy bottom from 30-50 m.

OBSERVATIONS:

The NAGA specimen agrees with Sakai's observation and illustrations. The external face of the cheliped has the three rows of largest tubercles which separate *balssi* from *dahli;* the upper and lower borders of the palm are also covered by large granules. On the NAGA specimen the granules in line are not rounded as illustrated by Sakai (1935, text-fig. 13 and 1938, text-fig. 62), but somewhat acute with the tips pointing forwards. Also the three antero-lateral teeth (tubercles) are ornamented by two or three small granules at the tips, not mentioned by Sakai, and some setae as illustrated by Balss (1933) on *R. dahli.* The main characteristic of *dahli* which is known only by the type specimen, a female of 7 x 7 mm, is provided by the ornamentation of the external face of the palm of the cheliped where the tubercles are very much smaller but numerous and not in regular line. On the female abdomen the telson is wider at the base than the abdominal segment 6. With the present record *balssi* is no more endemic to Japan.

Family GONEPLACIDAE Dana, 1851 s.l.

Guinot (1969) published three preliminary papers revising the Goneplacidae Dana, 1851, as they are generally accepted following Balss (1957). The NAGA material is placed in subfamilies following the tentative classification given by Guinot (1971).

Subfamily Carcinoplacinae H. Milne Edwards, 1852

Carcinoplacinae H. Milne Edwards, 1852, p. 164. Guinot, 1971, p. 1081.

Guinot (1971) classified in the Carcinoplacinae *Carcinoplax* H. Milne Edwards, 1852, and *Psopheticus* Alcock, 1894, and in the Goneplacidae *Goneplax* Leach, 1814, *Ommatocarcinus* White, 1852, and *Neomatocarcinus* Takeda and Miyake, 1969. She indicated that further the two subfamilies would probably have to be merged into a single taxon and that *Neopilumnoplax* Serène, 1969, belongs to the same taxon Carcinoplacinae-Goneplacidae.

Guinot (1971) stated that her lists of genera included in the subfamilies were not exhaustive. Males of the Indo-Pacific genera possess filiform pleopod 2 longer than pleopod 1. We therefore believe that they also belong in the same taxon: *Notonyx* A. Milne Edwards, 1873, *Typlocarcinodes* Alcock, 1900, and *Xenophthalmodes* Richters, 1881.

Genus *Carcinoplax* H. Milne Edwards, 1852

Curtonotus de Haan, 1835, p. 21.

Carcinoplax H. Milne Edwards, 1852, p. 164, Stimpson, 1858, p. 94; 1907, p. 93. Ortmann, 1894, p. 685. Alcock, 1900, p. 301. Tesch, 1918, p. 154. Shen, 1932, p. 110. Sakai, 1939, p. 555; 1965, p. 166. Barnard, 1950, pp. 282, 286. Monod, 1956, pp. 340, 351. Balss, 1957, p. 1656. Sakai, 1969, p. 269. Guinot, 1969, p. 524; 1971, p. 1081.

HISTORY:

De Haan (1935) established *Curtonotus* for *longimanus* and *vestitus* from Japan. H. Milne Edwards (1852) changed *Curtonotus,* which was preoccupied, to *Carcinpolax.* The two species, *setosus* A. Milne Edwards, 1873, and *integra* Miers, 1886, were moved into the genus *Heteropilumnus* by Balss (1933). Stimpson (1858) described *eburnea* from Bonin Island; the species probably belongs to another genus and is perhaps a synonym of *Libystes nitidus.* The type of *eburnea* is lost and the species has never been figured.

Alcock (1900) gave a key for the two Indian species: *longimanus* and *longipes* (Wood-Mason, 1899). Rathbun (1914) described seven species: *purpurea, bispinosa, spinosissima, confragosa, angusta, specularis* and *verdensis* from the Philippines region. Tesch (1918) who found no species in Siboga's collection gave a list of ten Indo-Pacific species. Rathbun (1923) established two new species from Australia and Rathbun (1932) and from Japan. Balss (1957) quoted fourteen species, of which thriteen are Indo-Pacific.

Sakai (1969) describing a new species from Japan, listed seventeen Indo-Pacific species in the genus to which have to be added two other species removed by Guinot (1969) from *Pilummoplax.* But *Carcinoplax tomentosa* Sakai, 1969, does not belong to the genus, having the male pleopod 2 short. Also, as stated above, *C. eburneus* Stimpson, 1858, probably does not belong to the genus. The genus includes the following seventeen species in the order of our key: *vestita* (de Haan, 1835), *longimana* (de Haan, 1835), *indica* Doflein, 1904, *purpurea* Rathbun, 1914, *inaequalis* (Yokoya, 1933), *meridionalis* Rathbun, 1923, *surugensis* Rathbun, 1932, *victoriensis* Rathbun, 1923, *bispinosa* Rathbun, 1914, *spinosissima* Rathbun, 1914, *confragosa* Rathbun, 1914, *angusta* Rathbun, 1914, *cooki* (Rathbun, 1906), *specularis* Rathbun, 1932, *verdensis* Rathbun, 1914, *longipes* (Wood-Mason, 1899), *abyssicola* Miers, 1886.

Guinot (1969) remarked on the heterogeneity of the genus and suggested that the species seem to belong to three different groups: one with *longimanus, indica, vestitus,* a second with *meridionalis* and a third with *cooki.* She also suggested that *Pilumnoplax abyssicola* and *Pilumnoplax inaequalis* belong to *Carcinoplax s. largo* and noticed that *surugensis* is somewhat aberrant in the genus, having pleopod 2 nearly as long as pleopod 1 and not much longer as habitual in the other species. She concluded that more information on several species is necessary before new categories such as subgenera are to be established. The relationship of *Carcinoplax* with *Homoioplax* Rathbun, 1914, has to be reexamined.

Sakai (1969) also separated the species into three groups: Group 1 with *longimanus, vestitus, eburnea, indica, purpurea, spinosa, angusta, meridionalis, victoriensis, surugensis, inaequalis;* Group 2 with *longipes, verdensis, specularis, tomentosa;* Group 3 with *confragosa, spinosissima.*

We have already mentioned that *eburnea* probably does not belong to *Carcinoplax,* and *tomentosa* surely does not. Our key is only indicative; its groupings generally reflect the groupings of Sakai (1969), but it is obvious that *surugensis,* as Guinot (1969) noted, is aberrant in the taxon.

Key to the Species of *Carcinoplax*

A. Carapace vaulted fore and aft.
  A1. Carpus of cheliped with a tubercle or spine on the outer border.
    a. External faces of carpus and propodus of cheliped covered by a dense fur of long setae. Male pleopods in Takeda and Miyake (1968, figs. 5f-g). Size: 20 x 29 mm . . . . . *vestita* (de Haan, 1833)
    b. Propodus of cheliped bare or with some sparse fine setae.
      a1. Superior outer face of carpus and propodus of cheliped smooth or lightly granular.
        a2. Spine of outer border of carpus of cheliped smaller than that of inner angle.
          a3. First antero-lateral teeth feeble. Inner face of palm of cheliped with a tubercle or a prominent keel; inner spine of carpus large and thick; the carpus much wider than long.
            a4. On cheliped, superior border of merus with a spine; a rounded tubercle on inner face of palm. Postero-lateral border of carapace convex; extraorbital tooth blunt.
              a5. Male abdomen with segment 2 as broad as 3 (see Guinot, 1969, fig. 61). Male pleopods in Takeda and Miyake (1968, figs. 5a-e). Size: 49 x 64 mm. . . . . *longimana* (de Haan, 1835)
              b5. Male abdomen with segment 2 much less broad than segment 3 (see Guinot, 1969, fig. 65) and telson longer than broad at base (see Guinot 1969, fig. 67). Male pleopods in Guinot (1969, figs. 75-76). Size: 22 x 31 mm. . . . . *indica* Doflein, 1904
            b4. On cheliped, superior border of merus with a blunt tubercle, a prominent keel on inner face of palm. Postero-lateral border of carapace nearly straight (slightly concave); extraorbital tooth lacking; inner angle of carpus more blunt and flattened, first antero-lateral teeth much less marked than on *longimana* of the same size. Male pleopod in Stephensen (1945, figs. 44A-B). Size: 29 x 38 mm. . . . . *purpurea* Rathbun, 1914
          b3. The first antero-lateral teeth of carapace large and acute. Inner face of palm

of cheliped without prominent tubercle or keel, superior border of merus with a tubercle; carpus as long as broad.

a4. Extraorbital tooth at a level clearly far beyond the first antero-lateral tooth, which is rather large.

a5. First antero-lateral tooth clearly shorter than second tooth.

a6. Outer border of carpus of cheliped with an acute spine. Male abdominal segment 3 as long as segment 2 and distally truncate (see Guinot, 1969, fig. 62). Male pleopods in Guinot (1969, figs. 79, 80). Size: 13.8 x 19 mm.... *?inaequalis* Yokoya, 1933

b6. Outer border of carpus of cheliped with a blunt tubercle. On male, black-brown color entirely covering dactylus and fixed finger and extending a little onto lower border of palm. Male pleopod unknown. Size: 27 x 30 mm .... *meridionalis* Rathbun, 1923

b5. First antero-lateral tooth subequal to second tooth; supraorbital sinus well marked; on male, black-brown color limited to distal part on the two fingers. Male abdomen with telson shorter than broad at base (see Takeda and Miyake, 1969, fig. 2a). Male pleopod in Guinot (1969, figs. 73-74). Size: 12.5 x 15 mm. . .*surugensis* Rathbun, 1932

b4. Extraorbital tooth nearly at the same level as the first antero-lateral tooth, the two being less large (a tubercle on inner face of palm of cheliped?). Male abdomen and pleopods unknown. Size: 27 x 37 mm..... *victoriensis* Rathbun, 1923

b2. Spine of outer border of carpus of cheliped larger than that of the inner angle; a subdistal spine on the superior border of merus of cheliped. Male abdomen and pleopod unknown. Size: 13.3 x 15.3 mm ..... *bispinosa* Rathbun, 1914

b1. Superior and outer faces of carpus and propodus of chelipeds ornamented by distinct granules; three antero-lateral teeth on the carapace.

a2. Supero-external face of propodus of cheliped with spinulous granules irregularly aligned; the three antero-lateral teeth of carapace tipped by acute spine. Male abdomen and pleopods unknown. Size: 28 x 32 mm..... ..... .*spinosissima* Rathbun, 1914

b2. Supero-external face of propodus of cheliped coarsely granular; the first antero-lateral teeth not acute. Male abdomen and pleopod unknown. Size: 38 x 45 mm ..... .*confragosa* Rathbun, 1914

B1. Carpus of cheliped without spine or tubercle on its outer border; only two clear teeth short and blunt on antero-lateral border of carapace; the anterior tooth very small and not distinct from external orbital angle.

a. External orbital angle blunt. Male abdomen and pleopod unknown. Size: 23.8 x 27.6 mm..... *angusta* Rathbun, 1914

b. External orbital angle marked. Male pleopod in Guinot (1969, figs. 77, 78). Size: 12.7 x 15 mm ..... .*cŏoki* (Rathbun, 1906)

B. Carapace rather depressed; three antero-lateral dentiform teeth; the first obtuse and transverse in form clearly separated from external orbital by a connecting ridge.

a. Anterior tooth elongated and directed froward beyond the level of external orbital angle. Male abdomen and pleopod unknown. Size: 16.9 x 21 mm ..... *specularis* Rathbun, 1914

b. Anterior tooth shorter and not extending beyond the level of external orbital angle.

a1. Tip of antero-lateral tooth 2 not reaching level of antero-lateral tooth 1. Male abdomen and pleopods unknown. Size: 10.6 x 12.7 mm. . . . . *verdensis* Rathbun, 1914

b1. Tip of antero-lateral tooth reaching beyond level of antero-lateral tooth 1. Male abdomen and pleopods unknown. Size: 14 x 17 mm. . . . . *longipes* (Wood-Mason, 1899)
Size: 9 x 10 mm . . . . . *abyssicola* Miers, 1886 = ? longipes

The holotype of *abyssicola* was examined by one of us (R.S.) in the British Museum. It is a male of 9 x 10 mm with a partly damaged abdomen; only segments 1 and 2 remain; the two pairs of pleopods are broken, but the remaining part shows clearly that the pleopod 2 is as long (probably longer) than pleopod 1. The species is very close (probably identical) to *C. longipes.* The type specimen of *abyssicola* is from Fiji Islands from 567 m depth near Batjan Island. Another smaller specimen is from 595 m and the other much smaller (5 x 4.5 mm) from 984 m near Kei Island. The specimens recorded from Australia by Whitelegge (1900) have been corrected as *Carcinoplax meridionalis* by McNeill (1929). By the shape of the carapace and the disposition of the first antero-lateral tooth the four species of the Group B of our key are close to *Neopilumnoplax.* Further observations on their male abdomen and pleopods could lead to moving these species into *Neopilumnoplax.*

Carcinoplax longimana (de Haan, 1835)

Figs. 143-147; Pls. XIV, A and XV, A

Cancer (Curtonotus) longimanus de Haan, 1835, p. 50, pl. 6, fig. 1.

Carcinoplax longimanus H. Milne Edwards, 1852, p. 164. Ortmann, 1894, p. 688. Alcock, p. 303. Bouvier, 1899, p. 176. Doflein, 1902, p. 664. Stebbing, 1910, p. 313; 1915, p. 37; 1923, p. 3. Parisi, 1918, p. 90. Balss, 1922, p. 135. Urita, 1926, p. 17. Yokoya, 1933, p. 190. de Man, 1929, p. 109. Sakai, 1934, p. 311; 1936, p. 181, pl. 53, fig. 3; 1939, p. 555, pl. 101, figs. 1-4; 1965, p. 81. Barnard, 1950, p. 287, figs. 53g, h. Takeda and Miyake, 1968, p. 562, figs. 5a-3. Guinot, 1969, fig. 61.

Pilumnoplax glaberrima Ortmann, 1894, p. 687, pl. 23, fig. 2. Yokoya, 1933, p. 192.

Carcinoplax longimanus japonicus Doflien, 1904, p. 115, pl. 36.

MATERIAL:

Ng. 577, male of 18.5 x 25 mm
females of 20 x 26 mm and 46 x 59 mm

Locality: NAGA S4, St. No. 60-212, South China Sea, 15° 40.0′ N, 109° 22.9′ E, bottom; shell detritus and sand, 10′ Beam Trawl, 60-108 fathoms, February 27, 1960.

HISTORY:

The species described from Japan by de Haan (1835) has been recorded from the Indian Ocean as far West as South Africa and reaches a size of 50 x 65 mm. Sakai (1939) illustrated the variations of the shape of the carapace in relation with the size of the specimens.

OBSERVATIONS:

The antero-lateral teeth are well marked on our two smaller specimens but not at all on our large female. The male pleopod 1 of our specimen of 18.5 x 25 mm is slightly different from that illustrated by Takeda and Miyake (1968) for a specimen of 42.4 x 55.2 mm. The male abdominal segments 2 and 3 are like those illustrated by Guinot (1969, fig. 61); the subtriangular telson is remarkably short and broad and clearly different from that of *indica* illustrated by Guinot (1969).

Carcinoplax purpurea Rathbun, 1914

Figs. 148-155, Pls. XIV, B-C and XV, B

Carcinoplax purpurea Rathbun, 1914, p. 140. Balss, 1929, p. 24 (not seen). ?Stephensen, 1945, p. 166, fig. 44. Sakai, 1963, p. 45, pl. 6, fig. 5.

MATERIAL:

Ng. 644, female of 14 x 18.5 mm
male of 10.5 x 13.5 mm

Locality: NAGA S4, St. No. 60-237, South China Sea, 5-7½ mi. off S. Hon Lon, outside Nhatrang, 12° 09.7′ N, 109° 24.7′ E, bottom; mud, shell detritus and fine sand, 10′ Beam Trawl, 91-101 m, March 4, 1960.

Ng. 152, female of 21.5 x 31.5 mm
male of 15 x 28 mm

Locality: NAGA S3, St. No. 60-127, Gulf of Thailand, 08° 37.0′ N, 102° 21.5′ E, bottom; mud, 40′ Otter Trawl, 73 m, January 24, 1960.

Ng. 863, male of 11.5 x 16 mm and of 10 x 13 mm

Locality: NAGA S4, St. No. 60-211, South China Sea, 15° 41.0′ N, 108° 41.0′ E, bottom fine sand and greenish mud, 10′ Beam Trawl, 37 m, February 27, 1960.

NMS. 1968, 3.29.1, male of 22 x 33 mm
Fisheries Research Station of Hongkong

ION 15931, female of 28 x 45 mm (39 mm lateral spines excluded) Nhatrang, Vietnam.

HISTORY:

Rathbun (1914) described *purpurea* for an ovigerous female of 29.5 x 38.2 mm from a depth of 90 fathoms near Marinduque Island, Philippines; the type is in the United States National Museum, Cat. No. 46147. Balss (1929) recorded one female of 15.5 x 11.2 mm from 562 m in the Red Sea. Stephensen (1945) identified with a reservation two males of 29 mm and 15 mm from 49 m in the Gulf of Iran. Sakai (1963) recorded four males and three females from Japan.

OBSERVATIONS:

Our specimens confirm the close relation of the species with *longimana* as indicated by Rathbun (1914). The comparison between male specimens of the two species, (Ng. 152) of 19 x 28 mm for *purpurea* and (Ng. 577) of 18.5 x 25 mm for *longimana,* confirms the value of the differential characters mentioned by Rathbun (1914). Other differences between the two species can also be defined; some are quoted in our key. Others may be seen in our illustrations. As on *longimana,* the largest specimen of *purpurea* differs from the smaller; generally the differential characters are more marked on the largest specimen. It is particularly significant in the case of the proportion of the carapace. On our larger specimens, the female of *longimana* (46 x 59 mm) has a carapace nearly 1.3 times as broad as long, the female of *purpurea* (28 x 45 mm) a carapace 1.6 times as broad as long.

Carcinoplax bispinosa Rathbun, 1914

Figs. 156-165; Pl. XV, C

Carcinoplax bispinosa Rathbun, 1914, p. 137. Sakai, 1969, text-fig. 15a.

MATERIAL:

NMS. 1968, 3.29.2, male of 13 x 14 mm

Locality: "Cap Ste. Marie" cruise, 19° 12′ N, 112° 05″ E, bottom; muddy sand, Trawl, 89 fathoms, A.J. Bruce coll., 4/5/1963. Fisheries Research Station of Hongkong.

HISTORY:

Rathbun (1914) described *bispinosa* for a male of 13.3 x 15.3 mm collected by the "Albatross" (St. 5376) from 90 fathoms. Sakai (1939) illustrated the type maintained in the United States National Museum.

OBSERVATIONS:

Our specimen agrees generally with the description of Rathbun (1914) and particularly in regard to the two acute spines of the antero-lateral border of the carapace. The anterior frontal margin is straight, continuing laterally along the orbital border without the antennal notch indicated by Rathbun. There is no trace of sulcus on the orbital border. The acute outer carpal spine indicated by Rathbun is clearly marked. There is no trace of the contraction between the abdominal segments 5 and 6 indicated by Rathbun, and our identification is made with reserve.

Carcinoplax meridionalis Rathbun, 1923

Figs. 166-173; Pl. XV, D

Carcinoplax meridionalis Rathbun, 1923, p. 99, pl. 18. McNeill, 1929, p. 150.

Pilumnoplax abyssicola Whitelegge, 1900, p. 158 (not *P. abyssicola* Miers, 1886).

MATERIAL:

NMS. 1965, 11.24.4, male of 19 x 25 mm
loc. off Newcastle, New South Wales, Australia, don. 11/1931.

HISTORY:

Rathbun (1924) described *meriodionalis* for one male of 21.7 x 30.2 mm (Type) and more than twenty-five other specimens from the Australian coast from 70-80 fathoms, the largest female of 22.3 x 30.4 mm and the smallest ovigerous female of 5.8 mm length. McNeill (1929) recorded, also from Australia, thirty-one specimens from a depth of 25-90 fathoms; he examined and corrected as *meridionalis* the specimens of *P. abyssicola* of Whitelegge (1900) which are females of 5-7.5 mm.

OBSERVATIONS:

The present specimen is studied as comparative material for the identification of our specimen of *angusta*. The two species are relatively close by having some common characters like the stout and smooth cheliped, a male abdomen and a pleopod 1 short and stout.

Carcinoplax confragosa Rathbun, 1914

Figs. 174-175; Pl. XVI, A

Carcinoplax confragosa Rathbun, 1914, p. 140.

MATERIAL:

Ng. 711, female of 10 x 9 mm

Locality: NAGA S4, St. No. 60-264, South China Sea, 10° 31′ 30″ N, 109° 25′ 00″ E, bottom; hard (sand or sand gravel) 10′ Beam Trawl, 128-183 m, March 9, 1960.

HISTORY:

Rathbun (1914) described *confragosa* for a female of 38.7 x 45 mm collected by "Albatross" from 127 fathoms between Ceba and Bohol Island; the type is in the United States National Museum, Cat. No. 46153.

OBSERVATIONS:

The NAGA specimen is closer to *confragosa* than to any other species of *Carcinoplax* but differs from it by several characters. Our specimen differs mainly from the description of Rathbun (1914) by: a. the carapace with four lateral teeth instead of only three, b. the front not bilobated, c. the absence of outer carpal spine and the presence of a second small inner carpal spine below the strong ones. In spite of the importance of some of those differences it would be hazardous to establish a new species for a single young female without a comparison with the type specimen which has never been illustrated. Our specimen perhaps belongs to another genus; the disposition of the (four) antero-lateral teeth and some other characters recall, for example, *Nanocassiope* Guinot, 1967, family Xanthidae, but it differs from this genus by several characters.

Carcinoplax longipes (Wood-Mason, 1891)

Pl. XIV, D

Nectopanope longipes Wood-Mason, 1891, p. 262. Illus. Invest. pl. 14, fig. 7.

Carcinoplax longipes Alcock, 1900a, p. 71; 1900b, p. 303.

HISTORY AND REMARKS:

The species is recorded only from the Indian Ocean. Alcock (1900) quoted in the collection of the Z.S.I. (Calcutta) twenty specimens from Andamans and off Travancore from 290 and 430 fathoms, the largest 17 x 14 mm. The Z.S.I. kindly lent us a cotype (male of 12 x 10 mm) which was examined for the preparation of our key and is photographed.

Genus *Neopilumnoplax* Serène, 1969

Neopilumnoplax Serène (in Guinot, 1969*, p. 689). Guinot, 1971, p. 1082.

Not *Pilumnoplax* Stimpson, 1858, p. 93; 1907, p. 89.

Pilumnoplax Miers, 1886, p. 225. Alcock, 1900, p. 311. Tesch, 1918, p. 156 (part). Sakai, 1939, p. 559. Barnard, 1950, p. 288. Monod, 1956, p. 341.

HISTORY AND DISCUSSION:

Stimpson (1858, 1907) established the genus *Pilumnoplax* for four species: *sulcatifrons, longipes, sculpta, ciliata,* which has been moved into other genera as follows:

*The Editors wish to clarify possible confusion to readers caused by the unusual and unexpected delay in our publication: Mme. Guinot's paper (1969) quotes (p. 689, footnote, under "*Neopilumnoplax* Serène gen. nov.") Dr. Serène's description and in the text (p. 690) refers to its publication in press in the NAGA Series. The reference is to this paper; no preceding paper is intended.

sulcatifrons = Eucrate sulcatifrons (fide Tesch, 1918)
longipes = Heteropilumnus longipes (fide Balss, 1933)
sculpta = Lophoplax sculpta (fide Tesch, 1918)
ciliata = Heteropilumnus ciliata (fide Balss, 1933)

As indicated by Tesch (1918) *Pilumnoplax* becomes a synonym partly of *Eucrate, Heteropilumnus* and *Lophoplax*. Serène (1969) established *Neopilumnoplax* to include the species described after Stimpson (1858), referring mainly to a definition used by Miers (1886) for *heterochir:*

"Carapace depressed, flat, a little broader than long more or less hexagonal, regions faintly indicated. Front straight, antero-lateral margin oblique, toothed. Supraorbital margin with 1 or 2 furrows. Antennal flagellum loosely standing in orbital hiatus without or with a small distal lateral lobule on basal joint, only partly filling the orbital hiatus. Chelipeds more or less unequal. Abdomen with 7 segments, 1-3 of male covering whole sternal width between 5th coxae. Male pleopod 2 filiform longer than pleopod 1. Type species: *Pilumnus heterochir* Studer, 1882."

The genus contains *heterochir* (Studer, 1882), *sinclairi* Alcock and Anderson, 1899, as Indo-Pacific species. The identity of *Pilumnoplax sinclairi* Alcock and Anderson, 1899, with *P. americana* established by Alcock (1900, p. 311) seem doubtful, the first being from the Indian Ocean and the second from Florida. We maintain the name proposed by Alcock and Anderson for the Indo-Pacific species.

Guinot (1971) removed into *Carcinoplax, Pilumnoplax abyssicola* Miers, 1886, *Pilumnoplax cooki* Rathbun, 1906, and *Pilumnoplax inaequalis* Yokoya, 1933, as we have noted. *Pilumnoplax acanthomerus* Rathbun belongs to a new genus which is presently under description by the senior author. The male abdomen of *acanthomerus* is close to that of *Neopilumnoplax*, but the male pleopod 2 is clearly much shorter than pleopod 1 instead of being much longer as in *Neopilumnoplax*. By this latter character *acanthomerus* does not belong to the taxon Goneplacidae-Carcinoplacinae with *Neopilumnoplax*.

Neopilumnoplax heterochir (Studer, 1882)

Figs. 176-177, Pl. XVI, D

Pilumnus heterochir Studer, 1882, p. 11, pl. 1, figs. 3a-d (not seen).

Pilumnoplax heterochir Miers, 1886, p. 227, pl. 19, figs. 1-1d. Doflein, 1904, p. 119 (not seen). Stebbing, 1910, p. 314; 1914, p. 265. Tesch, 1918, p. 156. Rathbun, 1923, p. 99, pl. 17, figs. 1-2. Barnard, 1950, p. 289, figs. 54a-c.

Pseudorhombila (Pilumnoplax) normani Miers, 1885, p. 587.

Neopilumnoplax heterochir Serène (in Guinot, 1969, p. 689). Guinot, 1969, p. 689, figs. 85-89, pl. 3, fig. 4.

MATERIAL:

Ng. 694, female of 9 x 11 mm

Locality: NAGA S4, St. No. 60-212, South China Sea, 15° 40.0′ N, 109° 22.9′ E, bottom; shell, detritus and sand, 10′ Beam Trawl, 60-108 fathoms, February 27, 1960.

HISTORY:

Miers (1886) recorded several specimens from Agulhas Bank off Cape Agulhas in South

Africa at a depth of 270 m and corrected his previous identifications as *Pseudorhombila (Pilumnoplax) normani.* Stebbing (1910, 1914) and Barnard (1950) recorded the species from South Africa, the largest specimen being a male of 14 x 20 mm, the smallest ovigerous female being of 6.5 x 8.5 mm. Tesch (1918) did not mention any specimens. Rathbun (1923) recorded five males and six females from South Australia and Tasmania from 228-486. Serène (1969) established *heterochir* as the type species of *Neopilumnoplax.* Guinot (1969) illustrated the male abdomen and pleopods for a specimen of 13 x 17.2 mm from South Africa.

OBSERVATIONS:

The NAGA specimen agrees with the observation and illustrations of the authors, those of Rathbun (1923) and Barnard (1950) being the most accurate. The carpus of the cheliped has two acute teeth on the internal border as mentioned by Barnard (1950); the black color on the fixed finger of the cheliped runs obliquely on the inferior border as corrected by Rathbun (1923) and is not straight-ended as figured by Miers (1886, pl. 19, fig. 1b). The only slight difference on the NAGA specimen is in the more acute shape of the antero-lateral teeth 2 and 3. The first male pleopod is illustrated by Barnard (1950, fig. 54c). The dactylus of the ambulatory legs is not really "compressed" as indicated by Alcock (1900).

The record of the species by Doflein (1904) in the Atlantic Ocean seems abnormal. The species is always recorded in the very southerly latitude. It is the first record in the Northern Hemisphere and at so short a distance comparatively from the Equator.

Subfamily ? Euryplacinae Stimpson, 1871

Guinot, 1969, p. 507; 1971, p. 1080.

Guinot (1969) gave the following characters for the subfamily: fronto-orbital antennal region with an outer frontal lobe. Sternum very broad. Male opening coxal or sternal. Male abdomen with seven segments, the segments 4-7 very narrow and tapering. Male pleopod 1 elongate and slim, distally accuminate with small acute tubercles on the shaft; male pleopod 2 short.

Guinot (1971) classified in Euryplacinae two Indo-Pacific genera: *Eucrate* de Haan, 1835, and *Heteroplax* Stimpson, 1858. She indicated that *Goneplax maldivensis* Rathbun, 1902, probably belongs also to the Euryplacinae with three Atlantic species of *Pilumnoplax.* We think that *Psopheticus* Sakai, 1969, also belongs to the same subfamily.

Genus *Eucrate* de Haan, 1835

Eucrate de Haan, 1835, p. 36. de Man, 1888, p. 88. Ortmann, 1894, p. 685. Alcock, 1900 (part) p. 298. Tesch, 1918 (part), p. 157. Stebbing, 1920, p. 238. Sakai, 1939, p. 561; 1965, p. 168. Barnard, 1950, p. 295. Campbell, 1969 (part), p. 117. Guinot, 1969, p. 508.

?*Platyozius* Borradaile, 1902, p. 243.

Type species: *Cancer (Eucrate) crenata* de Haan, 1835.

REMARKS:

Guinot (1969) removed the genus from the Carcinoplacinae to the Euryplacinae Stimpson, 1871. Serène (1971) gave the name *alcocki* to the species described as *crenata* var. *dentata* Stimpson, 1858, by Alcock (1896) considering *Heteroplax* Stimpson, 1858, as a valid genus distinct from *Eucrate.*

Campbell (1969) revised the species of *Eucrate*, and Guinot (1971) quoted the following species: *crenata* de Haan, 1835, *dorsalis* (White, 1848), *sulcatifrons* (Stimpson, 1858), *sexdentata* Haswell, 1881, *affinis* Haswell, 1881, *tripunctata* Campbell, 1969, *haswelli* Campbell, 1969. Serène (1971) subsequently described *alcocki* which is recorded in the present paper.

Eucrate alcocki Serène, 1971

Pl. XVI, B-C

Eucrate crenata var. *dentata* Alcock, 1900, p. 301. Chhapgar, 1957, p. 39, pl. 11, figs. j, k, l.
Not *Heteroplax dentatus* Stimpson, 1858, p. 94.
Eucrate alcocki Serène, 1971, p. 916.

MATERIAL:

ION. 9688, Type, male of 25 x 20 mm
Nhatrang, Vietnam (deposited Musée Nationale d'Histoire Naturelle de Paris).

OBSERVATIONS:

The new species differs from *E. crenata* by having the front entirely without, or with an inconspicuous, median notch, the antero-lateral teeth 2 acute and large, the teeth 1 and 2 very feeble. The specimen of *crenata dentata* recorded by Chhapgar (1957), and probably those of Alcock (1900), belongs to the new species. Alcock (1900) referred his specimens with uncertainty to *Heteroplax dentatus* Stimpson, 1858. The description of the antero-lateral teeth as well as the proportion of the length of the breadth of the carapace given by Stimpson (1858) for *H. dentatus* corresponds to the condition of *E. alcocki.* But *alcocki* has short ocular peduncles, a xanthid carapace with antero-lateral border obliquely converging towards the extraorbital angle, and nothing which recalls the *"Goneplax"* aspect given by Stimpson (1858) in his diagnosis of *Heteroplax.* On *alcocki,* the antero-lateral distal lobe of the basal antennal segment entirely fills the orbital hiatus as on *crenata;* the flagellum stands out of the orbital hiatus and is fitted into a small notch of the frontal border. The male abdomen is similar to that of *crenata,* illustrated by Shen (1932, fig. 67) and of *sulcatifrons* by Edmondson (1962, fig. 2). The very long and slim male pleopod 1 is like that figured by Chhapgar (1959, pl. 11, figs. k, l) with fine spinules directed backwards. On *sulcatifrons* (see Stephensen, 1945, fig. 45a) the pleopod 1 seems comparatively a little wider, and the spinules are replaced by larger spines. As on *crenata* and *sulcatifrons,* the living specimens of *alcocki* have generally very bright colors, the pattern distribution of the color being variable; generally there is a larger median gastric red-brown spot and a pair of smaller but similar epigastric spots; nothing which could recall the coloration indicated on *dentata* by Stimpson (1858, 1907).

Genus *Heteroplax* Stimpson, 1858

Heteroplax Stimpson, 1858, p. 94; 1907, p. 94. Balss, 1922, p. 136. Sakai, 1934, p. 312; 1939, p. 560; 1965, p. 169. Guinot, 1969, p. 511; 1971, p. 1080.

HISTORY AND DISCUSSION:

Stimpson (1858) in establishing *Heteroplax* indicated that its sternum and abdomen are like those of *Pilumnoplax,* but as indicated before in our history of *Pilumnoplax,* all the species included in that genus by Stimpson have been removed to other genera. Stimpson (1858) established the genus for *dentatus* and *transversus,* two species from Hongkong. He used the

masculine gender for *Heteroplax*. Stimpson (1907, in the text established by Rathbun) indicated that the genus is "allied to *Carcinoplax* in the characters of the male organ and to *Goneplax* in the shape of the carapace and the form of the orbit". He described: "Abdomen of the male very narrow but expanded at base so as to cover the posterior segment of the sternum and reach the coxae of the posterior feet. The virgulae of male organs arise from these coxal joints, but reach the abdominal appendages through shallow grooves on the sternum."

Miers (1879) described *nitidus* and Sakai (1934) *nagasakiensis*. In a footnote, Miers (1886, p. 227) wrote that *Heteroplax* "is according to Stimpson's diagnosis, separated from *Pilumnoplax* by characters of scarcely more than subgeneric value". De Man (1888), Alcock (1900) and Tesch (1918) considered *Heteroplax* a synonym of *Eucrate*. Balss (1922) and Sakai (1934, 1939) maintained the genera distinct.

Sakai (1939, p. 555) in his key separated *Heteroplax* from *Eucrate* on the basis of the antennal flagellum standing loosely in orbital hiatus and "without distal external lobule". This position corresponds approximately to the position of Stimpson (1858) who described the genus with "antennae long and slender, the basal joint movable, narrow, elongated, its outer apex filling the hiatus of the orbit and nearly excluding the flagellum therefrom". The word "nearly" seems to have been neglected.

In *Eucrate*, according to Alcock (1900) "a process of the basal antenna joint completely fills and closes the orbital hiatus, including entirely the antennal flagellum". The condition of the process of the basal segment of the antennae on *Eucrate* is well illustrated by Campbell (1969), for example in *Eucrate haswelli* (Campbell, 1969, fig. 5D).

Heteroplax differs from *Eucrate* by a broader carapace, closer to that of *Goneplax;* in particular the orbits of *Heteroplax* are broader, the eyes longer than on *Eucrate;* the orbit breadth is as long or longer than the frontal breadth. These characteristics of the carapace clearly separate the two genera. *Heteroplax* has the male abdomen and pleopod (pleopod 2 short) of the Euryplacinae; *Goneplax* has those (pleopod 2 filliform and long) of the Goneplacidae.

Guinot (1969) commenting on the genus mentioned its transverse carapace and elongate ocular peduncles and suggested that *Goneplax maldivensis* Rathbun, 1902, could perhaps belong to the genus.

Guinot (1971) classified in *Heteroplax: transversus* Stimpson, 1858, *dentatus* Stimpson, 1858, *nagasakiensis* Sakai, 1934, and ?*nitidus* Miers, 1879.

Key to the Species of *Heteroplax*

1. Carapace with three antero-lateral teeth.
   a. Three antero-lateral teeth well marked. Tooth 2 and external orbital angle approximately of same size; tooth 1 and 3 smaller. Size: 7.62 x 9.65 mm ..... *dentatus* Stimpson, 1858
   b. Carapace broader with ocular peduncles longer; external orbital angle more acute, antero-lateral tooth 2 smaller but more acute than in *dentatus*. Size: 6.6 x 9.65 mm..... ..... *transversus* Stimpson, 1858
2. Carapace with almost two antero-lateral teeth, the anterior obsolete, the posterior very small.
   a. Only one antero-lateral tooth subequal to extraorbital angle. Ratio: length to breadth of carapace: 1.54. Size: 5.5 x 8.5 mm..... *nitidus* Miers, 1879
   b. Two antero-lateral teeth; antero separated from extraorbital angle by a wide interval; posterior very feeble. Ratio: length to breadth of carapace: 1.56. Size: 8 x 12.5 mm..... ..... *nagasakiensis* Sakai, 1934

The present key is established only using reference to the authors, the identifications of our specimens being made with reserve. It must be kept in mind that the genus was established for *dentatus* as type species and *transversus* defined only by its differences from *dentatus*. The type materials of the two species are lost and *dentatus* has never been illustrated. Guinot (1969) suggested that in order to revise the genus it will be necessary to give an accurate description and illustration for a designated type species.

?*Heteroplax dentatus* Stimpson, 1858

Figs. 178-182; Pl. XVII, A-D

Heteroplax dentatus Stimpson, 1858, p. 94.
Heteroplax dentata Stimpson, 1907, p. 94. Rathbun, 1910, p. 342.

MATERIAL:

R.S. 842, male of 11.5 x 7.5 mm
R.S. 843, female of 12.5 x 9 mm
Locality: Manilla Bay, Ordonnex coll., 1958.

HISTORY:

Stimpson (1858) described *dentatus* for specimens from Hongkong. Stimpson (1907) specified the size as 7.62 x 9.65 mm and that considerable number of specimens were living on a bottom of broken shells at 10-15 fathoms on the China coast near Hongkong. Walker (1890) only quoted the species in a list of Brachyura from Singapore. Rathbun (1910) recorded one male and three females from the Gulf of Thailand. Her specimens maintained in the Copenhagen Museum would be interesting to reexamine.

OBSERVATIONS:

Our specimen differs from the description of Stimpson by the presence of a clear median frontal sinus and the palm of cheliped granular instead of smooth. On our specimens the superior face of the carpus, propodus and dactylus is covered by coarse granules on the two chelipeds; those granules extend to the external face of the palm, leaving a smooth area in the middle near the articulation of the finger. These granules are less numerous and more worn out in the male than in the female. Also the carapace is broader, being approximately 1.5 times broader than long instead of 1.26 as given in the measurements of Stimpson. The present specimens have no trace of the patch of fur indicated by Stimpson (1907) but being specimens kept for several years in formaldehyde, it is possible that the setae have disappeared.

The male abdomen is close to that of *Eucrate* and the male pleopods are of the same type. The present specimens have lost their coloration. Stimpson (1907) described *dentatus* with a transverse white stripe behind the eyes, a coloration close to that of *nitidus* given by Sakai (1965, pl. 84, fig. 1).

Heteroplax transversus Stimpson, 1858

Figs. 183-184; Pl. XVIII, A

Heteroplax transversus Stimpson, 1858, p. 94.
Eucrate transversa Stimpson, 1907, p. 95. Rathbun, 1910, p. 342. Balss, 1922, p. 173, fig. 2.
Eucrate transversa Tesch, 1918, p. 158.

MATERIAL:

R. S. 111, female of 9 x 6.5 mm

Locality: Gulf of Thailand, Trawl net, 15 m, bottom; sandy and shelly, Lohavanijaya and Serène, November, 1965, coll.

HISTORY:

Stimpson (1858, 1907) described *transversus* for specimens of 6.5 x 9.65 mm from Hongkong Harbour. Rathbun (1910) recorded two males and two females from the Gulf of Thailand on sandy muddy bottom at 6-10 fathoms. Balss (1922) recorded one male of 9 x 6 mm from Hongkong and illustrated the carapace.

OBSERVATIONS:

Our specimen has the carapace broader with the external orbital angle and second antero-lateral tooth acute. These are characters used by Stimpson (1907) to separate *transversus* from *dentatus*. Its carapace is 1.38 times broader than long instead of 1.46 according to the measurements given by Stimpson. It agrees generally with the figure of Balss (1922), but the frontal margin has the median projection figured by Balss. On the outer border of the carpus of the cheliped the patch of fur indicated by Stimpson (1858) on *dentatus* exists. The character is probably common to the two species.

Heteroplax nitidus Miers, 1879

Pl. XVIII, B-D

Heteroplax ? *nitidus* Miers, 1879, p. 39, pl. 2, fig. 2.

Heteroplax nitidus Henderson, 1893, p. 397.

Heteroplax nitidus Sakai, 1936, p. 184, pl. 54, fig. 2; 1939, p. 360, pl. 67, fig. 8; 1965, p. 169, pl. 84, fig. 1.

MATERIAL:

Male of 7.5 x 5 mm

Locality: St. 1001-9, Andamans Sea, Thai Danish Expedition, 1966.

HISTORY:

Miers (1879) described *nitidus* for a single female from the Corean Straits from 40 fathoms depth. Henderson (1893) recorded one male from Martaban and several specimens, including ovigerous females, from Madras coast; he compared them with the type maintained in the British Museum. Sakai (1934, 1939) recorded one male and one female from Sagami Bay, Japan, from 30-60 m, the male of 5.5 x 8.5 mm. Sakai (1965) recorded two males and two females from Simoda and Sagami Bay.

OBSERVATIONS:

The present specimen belongs to a collection already studied (in press) by the senior author. It is used as comparative material for the identification of *dentatus* and *transversus*. It confirms that in this genus the pleopod 2 is short and the pleopod 1 somewhat similar to those of *Eucrate*. On *H. nitidus* the basal antennal segment is cyclindrical without any distal lateral lobe and loosely fills the orbital hiatus. The flagellum stands in the orbit close to the frontal lateral angle on which the antennal notch is hardly visible. Such a condition confirms the accuracy of the illustrations of Miers (1879). On *dentatus* and *transversus* the antennal notch is much more closely defined;

the flagellum is more towards the frontal border but the antennal basal segment is similar and has nothing which could be compared with the distal lobe existing on *Eucrate*. The chelipeds of *nitidus*, like those of *dentatus* and *transversus*, are slightly unequal with the finger crossing distally but without the patch of fur at the outer border of carpus which exists on *transversus* and *dentatus*.

H. nagasakiensis is very close to *nitidus* and was established by Sakai (1934) mainly for its difference in regard to *transversus*. It is known only from the original specimens, three males, the largest of 8 x 12 mm, all from Nagasaki Bay from 30-50 m. It is possible that the two species are identical and also identical with *Goneplax maldivensis* Rathbun, 1902. Guinot (1969) mentioned that she identified as *nagasakiensis* a specimen from Japan, in the United States National Museum, which originally was identified as *Goneplax maldivensis*.

Goneplacidae pilumnien s. str. Guinot, 1969

Guinot (1969, p. 697) established the category for the genera of Goneplacidae with pilumnian characters which generally were previously classified in the Rhizopinae. Guinot (1971, p. 1078) included in the group *Ceratoplax* Stimpson, 1858, *Typhlocarcinus* Stimpson, 1858, *Typhlocarcinops* Rathbun, 1909, *Mertonia* Laurie, 1906, *Lophoplax* Tesch, 1918. She also remarked that at least the species removed by Balss (1933) *Litocheira* to *Heteropilumnus* probably belong to the same category. This is also the case for species described under *Rhizopa* Stimpson, 1858, and which clearly differ from the type species *Rhizopa gracilipes* Stimpson, 1858. Without giving the name of a subfamily to the category *Typhlocarcinus* Stimpson, 1858, could be considered as its typical genus.

Genus *Lophoplax* Tesch, 1918

Lophoplax Tesch, 1918, p. 196. Sakai, 1939, p. 567.

HISTORY:

Tesch (1918) established the genus for *L. bicristata* Tesch, 1918, for two males of 4.75 x 6 mm, one from the Kei Island from 90 m and the other from Makassar Strait from 59 m. He classified the genus in the Prionoplacinae referring to the disposition of the abdominal segment and moved into the genus *Pilumnoplax sculpta* Stimpson, 1858, described for one female specimen of 5.56 x 7.08 mm. Sakai (1935) described *L. takakurai* from Japan for a single female of 9 x 11.5 mm. All of these species are known only from the type specimen. Serène (1971) described *L. teschi* for material obtained by the NAGA Expedition. The four species of genus are: *bicristata* Tesch, 1918, *sculpta* (Stimpson, 1856), *takakurai* Sakai, 1935, and *teschi* Serène, 1971.

Key to the Species of *Lophoplax*

A. Dorsal surface of the carapace with some prominent elevations on the regions.
  a. Epigastric lobes well developed as a prominent elevation; the antero-lateral teeth flat and paxilliform.
    a1. Epigastric lobes like an oblique crest oriented towards the external orbital angle; no protogastric lobe; no elevation on the branchial region. Size: 4.75 x 6 mm .... *bicristata* Tesch, 1918
    b1. Epigastric lobes oval and transverse with transverse sulcus on the middle; protogastric

lobes oblong and longitudinal; transverse elevation on the branchial region. Size: 5.56 x 7.08 mm ..... *sculpta* (Stimpson, 1858)

b. Neither protogastric nor epigastric lobes developed like lobe; antero-lateral teeth denticulated and scarcely separated; transverse branchial lobes strongly developed. Size: 11.5 x 14 mm ..... *teschi* Serène, 1971

B. Dorsal surface of the carapace without any marked or prominent lobe. Size: 9 x 11.5 mm ..... *takakurai* Sakai, 1935

Lophoplax teschi Serène, 1971

Figs. 185-186; Pl. XIX, A-C

Lophoplax teschi Serène, 1971, p. 916, pl. V.B.

MATERIAL:

Holotype, Ng. 862, female of 11.5 x 14 mm

Locality: NAGA S4, St. No. 60-211, South China Sea, 15° 41.0′ N, 108° 41.0′ E, bottom; fine sand and greenish mud, 10′ Beam Trawl, 37 m, February 27, 1960.

Paratype, (CN 8229, collection number only given) male of 11 x 15 mm (deposited United States National Museum).

Locality: NAGA S10, St. No. 61-76, South China Sea, 13° 27′ N, 109° 20′ E, bottom; mud, Petersen grab, 64 m, January 28, 1961.

OBSERVATIONS:

In his original description of the type specimen, Serène (1971) mentioned the existence of a male in the collection at Scripps Institution of Oceanography. This has since been dispatched to us and is here recorded. The species belongs to the genera of Goneplacidae with the first segment of the abdomen covering all the space between the last pair of legs. The male pleopods are pilumnien, the pleopod 1 distally curved and the pleopod 1 short; these characters confirm the view of Guinot (1971). The species at first view is closer to *Lophoplax* than to any other genus and is so situated in relation to the other species of that genus. It differs from them by the following main characters: 1. the carapace comparatively wider than in the other species, 2. the outline of the carapace transversely oval instead of subquadrangular as in *biscristata* and *sculpta;* by this character *teschi* is closer to *takakurai,* 3. the antero-lateral teeth hardly separated; only the two posterior can be distinguished; the three anterior are fused on a continuous curved row of short spines towards the external orbital angle which is not conspicuous; the postero-lateral border is ornamented with some similar short spines, 4. the absence of elevations on the anterior part of the carapace and the strong development of the elevations of the posterior part.

A character of *teschi* is particularly conspicuous; it is the presence on the posterior border of the ambulatory legs of a denticulated wing-like plate covering the ischium. Such a structure does not exist on any other species of *Lophoplax,* but exists on the two species of *Ceratoplax* Stimpson, 1858: *Ceratoplax granulosa* MacGilchrist, 1905, and *Ceratoplax sagamiensis* Sakai, 1935.

MacGilchrist (1950) described this structure on *granulosa:* "Projecting distally from the postero-superior margins of the coxopodites of the ambulatory legs are peculiar tortoise-foot-like processes, the distal free margins of each process being toothed or pectinate and reaching a fair distance along the ischipodite". There is little doubt that the two species are congeneric with *teschi* which however clearly differs from them.

In spite of the name *Ceratoplax,* no mention of such a structure on the pereiopods 2-5 is made in the definition of the genus by Stimpson (1858), nor in his description of its type species, *Ceratoplax ciliatus* Stimpson, 1858. It is possible that the three species *granulosa, sagamiensis* and *teschi* correspond to a new genus distinct from both *Ceratoplax* and *Lophoplax.*

The illustrated specimen is, like the others, entirely covered by a hard dark crust which is partly "cleared" to show the regions of the carapace. It was also densely covered with hair which was eliminated from the carapace during the preparation.

Family ? PARTHENOPIDAE – XANTHIDAE
Subfamily Zalasiinae Serène, 1968

Trichiidae de Haan, 1841, p. 109. Balss, 1922, p. 100. Zalasiinae Serène, 1968, p. 62. Takeda and Miyake, 1969, p. 470.

Type genus: *Zalasius* Rathbun, 1897.

Genus *Zalasius* Rathbun, 1897

Trichia de Haan, 1841, p. 109. Ortmann, 1893, p. 419. Alcock, 1899, p. 96. Balss, 1922, p. 100.

Zalasius Rathbun, 1897, p. 166. Hale, 1927, p. 142. McNeill and Ward, 1930, p. 374. Balss, 1938, p. 48. Sakai, 1939, p. 343. Guinot, 1967, p. 559; 1971, p. 1070. Sankarankutty, 1968, p. 351. Takeda and Miyake, 1969, p. 470.

Macneillena Iredale, 1930, p. 175.

HISTORY:

De Haan (1841) established the genus for *T. dromiaeformis* from Japan. The other species of the genus are *australis* (Baker, 1906), *horii* Miyake, 1940, *sakaii* Balss, 1938, *indica* Sankarankutty, 1968, and *imajimai* Takeda and Miyake, 1969. *Z. dromiaeformis* is recorded from Japan, Australia and the Kafal reef. *Z. australis* is recorded from Australia, Timor and Madagascar. The other species are only known from the type specimens: *horii* from Japan, *indica* from Palk Bay (India), *imajima* from Japan.

Key to the Species of *Zalasius* (indicative only)

1. Carapace dorsally not remarkably convex and clearly much broader than long (breadth $>$ 1.12 length). Region not strongly convex and separated by wide shallow furrows. Lateral margins without strong conical tubercles. 2

   Carapace dorsally remarkably convex, somewhat globular, nearly as long as broad (breadth $<$ 1.08 length). Regions strongly convex and separated by deep furrows. Lateral margin with a strong conical tubercle; first abdominal segment without lobular prominence 5

2(1). First abdominal segment with two lobular prominences, one on each side. All granules of carapace more or less of the same size. Carapace coarsely granular. Two hepatic tubercles, one intestinal, two near posterior border, one branchial at intersection of postero-lateral and antero-lateral margins. Size of carapace cl: 49.0 mm, cb: 55.0 mm; ratio: 1.162 . . . . . *dromiaeformis* (de Haan, 1841)

   First abdominal segment without lobular prominence on each side. 3

3(2). Carapace nearly smooth, and not remarkable broader than long. Male unknown. Size: cl: 33.0 mm, cb: 37.0 mm; ratio: 1.121 ..... *indicus* Sankarankutty, 1968

Carapace coarsely granular and much broader 4

4(3). Carapace remarkably broadened and somewhat depressed. Carapace with granules but without large tubercle. Size: cl; 45.5 mm, cb: 61.0 mm; ratio: 1.340 ..... *horii* Miayke, 1940

Carapace more convex with tubercles covered with granules. Male pleopod unknown. Size: 30 x 40 mm; ratio: 1.33 ..... *australis* (Baker, 1906)

5(1). Furrows separating following regions: Meso + Metagastric, protogastric, urogastric + cardiac + intestinal, hepatic, Epi + Mesobranchial, Metabranchial. Tubercles: 3 along median line on Mesogastric, 3 forming triangle on protogastric, two lines of 2 on hepatic, around 8 on epibranchial and 3 on hepatic, around 8 on epibranchial and 3 on mesobranchial. On lateral border a round hepatic tubercle followed by five small tubercles, one larger than the four following. Size: cl: 28.5 mm, cb: 30 mm; ratio: 1.08 ..... *sakaii* Balss, 1938

Carapace narrow, nearly as long as broad. Tubercular granules on region: hepatic, postero-lateral, part of protogastric, inner areolet of branchial, outer margin of cardiac. On lateral border three tubercular granules and on hepatic region. Male pleopod in Takeda and Miyake (1969, fig. 2). Size: cl: 20.9 mm, cb: 22.4 mm; ratio: 1.07 ..... *imajimai* Takeda and Miyake, 1969

A common character of all the species is the dense fur of wooly setae covering all the body which gives the genus a close resemblance to *Banareia.* The genus originally, and as *Trichia* (a preoccupied name replaced by *Zalasius* Rathbun, 1897), was classified by de Haan (1947, p. 109) in the Trichiidae, a family including only the genus. Further it was classified near to *Etisus* in the Xanthidae by Ortmann (1893), in the Cancridae by Alcock (1899), in the Parthenopidae by Hale (1927). McNeill and Ward (1930) reported that, in a letter to them, Hale stated "he could not imagine the genus to be a true Brachyrhyncha as supposed by Borradaile". Hale considered the genus as "an Oxyrhyncha belonging to a subfamily Parthenopinae and the characters agree with those given for Parthenopidae by Borradaile. A comparison of *Trichia* with such a genus as *Thyrolambrus* shows many affinities despite the fact that they are very different in form".

Balss (1938) describing the new species, *Z. sakaii,* considered the genus as an aberrant one and its actual position in the classification as unsatisfactory. He thought that the complete orbit indicates a higher position but that the shape of the front and the third maxillipeds differ from all other brachyuran groups. The four frontal teeth are very different from Parthenopidae. The lateral spine is somewhat directed upwards towards the superior surface of the carapace of *sakaii* perhaps indicating an affinity with the Oxyrhncha.

Guinot (1967, p. 559) briefly indicated that *Banareia* and *Zalasius* (as well as *Calvactaea)* belong to the same natural group of genera. Serène (1968) reconstituted the subfamily of de Haan, 1841, under the name Zalasiinae.

Zalasius sakaii Balss, 1938

Pls. XX, A-B and XXI, A-B

Zalasius sakaii Balss, 1938, p. 48, pl. 2, figs. 1, 2, text-fig. 6.

MATERIAL:

Ng. 1102, female of 14 x 16 mm (deposited Musée Nationale d'Histoire Naturelle de Paris)

Locality: NAGA S8, St. No. 60-711, South China Sea, 22 mi. from Poulo Condore, 09° 03′ N, 106° 26′ E, sand, 2.5′ (wire) dredge, 14-15 fathoms, September 8, 1960.

HISTORY:

Balss (1938) described the species for a female of 28.5 x 30 mm in the collection of the National Museum of Singapore. The type is not now actually in that museum and has probably been kept by Balss.

OBSERVATIONS:

The NAGA specimen agrees generally with the observations and illustration of Balss (1938), but all the spines are longer and more acute; the distribution of the tubercles on the different region presents some slight differences. The (female) abdomen has seven segments. Sakai (1938) noted that on *dromiaeformis* "abdomen of both sexes composed of seven distinct segments". Miyake (1940) quotes only five abdominal segments on *horii* and *dromiaeformis*. On a photograph (ventral view) of a specimen of *Z. dromiaeformis* of the Australian Museum (Sydney) actually at our disposal the abdominal segments 3-4-5 are joined into one piece. Balss (1938) did not give any detail on the abdomen of his specimens. On the NAGA specimen the segments 2,3,4,5 have each a strong median tubercle, longer on segment 3, less prominent on segments 4,5, much less on segment 2. Only a slight indication of that tubercle exists on segment 6. On the segments 3,2,1 there is also on each side one lateral tubercle; it is strong and longer on segment 3, feebly marked on segment 2, developed like a knob on segment 1 on which there is no trace of the median tubercle. The median tubercle and the two smaller ones lateral of segment 2 are visible in dorsal view. But on *sakaii* nothing can be compared with the two large and prominent granular tubercles which exist on the segment 1 of *dromiaeformis*. Sankarankutty (1968) in his description of *indica* does not describe the abdominal segment 1, but on the photograph of the tyep kindly provided us no indication of a tubercle exists on that abdominal segment.

The episternal tubercles in front of the coxa of the pereiopods 1,2,3,4 are well developed on *sakaii*. Also a strong tubercle exists on the coxa of pereiopods 2,3,4 like those indicated by Buitendijk (1930) on *dromiaeformis*. By its general aspect *sakaii* differs strongly from the other species of the genus, save *imajimai*, and we are inclined to consider the two species as identical.

LITERATURE*

ADAMS, A. AND A. WHITE

1848. Crustacea. *In:* A. Adams, The Zoology of the voyage of H.M.S. "Samarang". 1843-1846. London. 4: 1-66, pls. I-XIII.

ALCOCK, A. W.

1894. Natural History Notes from H.M.I.M.S.S. "Investigator", Ser. II, No. 1. On the results of the deep sea dredging during the season 1890-1891. Ann. Mag. Nat. Hist. (6) 13: 225-245, 321-334, 400-411.

1895. Materials for a carcinological fauna of India. No. 1. The Brachyura Oxyrhyncha. J. Asiat, Soc. Bengal, Calcutta. 64 (2) No. 2: 157-291, pls. 3-5.

1896. Materials for a carcinological fauna of India. No. 2. The Brachyura Oxystomata. J. Asiat. Soc. Bengal, Calcutta. 65 (2) No. 2: 135-296, pls. 6-8.

1898. Materials for a carcinological fauna of India. No. 3. The Brachyura Cyclometopa. Part I. The Family Xanthidae. J. Asiat. Soc. Bengal, Calcutta. 67 (2) No. 1: 67-233.

1899a. Materials for a carcinological fauna of India. No. 4. The Brachyura Cyclometopa, Part II. A revision of the Cyclometopa with an account of the Families Portunidae. Cancridae, Corystidae. J. Asiat, Soc. Bengal, Calcutta. 68 (2) No. 1: 1-104, pls. 1-2.

1899b. Natural History Notes from the H.M.I.M.S.S. "Investigator". Ser. III, No. 3. On some notable new and rare species of Crustacea. J. Asiat. Soc. Bengal, Calcutta. 68 (2) No. 2: 111-119.

1899c. Materials for a carcinological fauna of India. No. 5. The Brachyura Primigenia or Dromiacea. J. Asiat. Soc. Bengal, Calcutta. 68 (3): 123-169.

1900. Materials for a carcinological fauna of India. No. 6. The Brachyura Catometopa or Grapsoidea. J. Asiat. Soc. Bengal. Calcutta. 69 (2): 279-486.

1901. Catalogue of the Indian Decapod Crustacea in the collection of the Indian Museum. Part I. Brachyura primigenia. Fasc. I. Introduction and Dromidea or Dromiacea. Cat. Ind. Mus., Calcutta. 1-80, i-ix, pls. 1-7.

ANDERSON, A. R. S.

1897. An account of the Deep Sea Crustacea collected during the season 1894-95. Natural History Notes from the H.M.I.M.S.S. "Investigator". Ser. II, No. 21 (Brachyura). J. Asiat. Soc. Bengal, Calcutta. 65 (2): 102-106.

ANDRÉ, M.

1931. Crustacés Décapodes provenant de l'Institut Océanographique de Nhatrang (Annam). Bull. Mus. Hist. Nat. Paris. (2) 3 (7): 638-650.

BAKER, W. H.

1907. Notes on South Australian Decapod Crustacea. Part V. Trans. Proc. R. Soc. Austr. 31 (5): 173-191, pls. 23-25.

*The limited references given must be complemented by others included in recent exhaustive bibliographies such as that of Guinot (1966, 1971); see also Griffin (1966a, 1966b).

BALSS, H.

1916. Decapoden des rotens meeres. II. Anomuren, Dromiaceen und Oxystomen. Expedition S.M. Schiff "Pola" in das Rote Meer, 1895/6-1897/8. Zool. Ergeb. XXXI. Denkschr. Akad. Wiss. Wien Math.-Nat. Kl. 92: 1-20, figs. 1-9.

1921. Diagnosen neuer Decapoden aus den Sammulungen der Deutschen Tiefsee-Expedition und der Japanischen Ausbeute Dofleins und Haberers. Zool. Anz. 52: 175-178.

1922a. Ostasiatische Decapoden. III. Die Dromiaceen, Oxystomen und Parthenopiden. Archiv. f. Naturgesch. 88 A (3): 104-140, figs. 1-9.

1922b. Ostasiatische Decapoden. IV. Die Brachyrhynchen (Cancridae). Archiv. f. Naturgesch. 88 A (11): 94-116, figs. 1-2, pls. 1-2.

1922c. Crustacea VII. Decapoda Brachyura (Oxyrhyncha bis Brachyrhyncha) und geographichte uebersicht uber die Crustacea Decapoda. *In:* Michaelsen, W., Beitrage zur Kenntnis der Meeresfauna Westafrika. 3 (3): 69-110, 1 fig.

1924. Decapoden des Roten Meeres. III. Die Parthenopiden, Cyclo-und Catometopen. Expedition S.M. Schiff "Pola" in das Rote Meer. Zool. Ergeb. XXXIV. Denkschr. Akad. Wiss. Wien Math.-Nat. Kl. 99: 1-18, fig. 1.

1929. Decapoden des Roten Meeres. IV. Oxyrhyncha und Schluss-betrachtungen. Expedition S.M. Schiff "Pola" in das Rote Meer. Zool. Ergeb. XXXVI. Denkschr. Akad. Wiss. Wien Math.-Nat. Kl. 102: 1-30, figs. 1-9, pl. 1.

1935. Die Brachyuren Dekapoden der Reise Michaelsen-Hartmeyer nach Sudwestaustralien 1905. Eine geographische Uebersicht nebst Beschreibung einiger neuer Formen. Zool. Anz. 3: 35-42, 5 figs.

1938a. Die Dekapoda Brachyura von Dr. Sixten Bocks Pazific-Expedition 1917-1918. Goteborgs Kungl. Vet.-och Vitter.-Samh. Handl. 5 B (7): 1-85, 18 figs., pls. 1-2.

1938b. Ueber einige Xanthidae (Crustacea Dekapoda) von Singapore und Umgebung. Bull. Raffles Mus. Singapore. No. 14: 48-63, figs. 1-2, pls. 2-3.

1957. *In:* Dr. H.G. Bronns, Klassen und Ordnungen des Tierreichs. Funfter Band, I. Abteilung, 7 Buch. Decapoda, 12 Lieferung. 1505-1672, figs. 1131-1199.

BARNARD, K. H.

1946. Description of new species of South African Decapod Crustacea with notes on synonyms and new records. Ann. Mag. Nat. Hist. (II) 13: 361-392.

1950. Description catalogue of South African Decapod Crustacea. Ann. S. Afr. Mus. 38: 1-838, figs. 1-154.

1955. Additions to the Fauna-list of South African Crustacea and Pycnogonida. Ann. S. Afr. Mus. 43 (1): 1-107, figs. 1-53.

BENNETT, E. W.

1964. The Marine Fauna of New Zealand: Crustacea Brachyura. N.S. Dept. Sci. Ind. Res., Bull. 153. N.Z. Ocean. Inst. Memoir 22: 1-119, figs. 1-141.

BORRADAILE, L. A.

1900. On some Crustaceans from the South Pacific. Part IV. The Crabs, Proc. Zool. Soc. London. (4): 568-596, pls. 40-42.

1903. On the genera of the Dromiidae. Ann. Mag. Nat. Hist. (VII) 11: 297-303.

BOUVIER, E. L.

1915. Décapodes Marcheurs (Reptantia) et Stomatopodes recueillis a l'ile Maurice par M. Paul Carié. Bull Sci. France Belg. (7) 48: 178-318, pls. 4-7, 42 figs.

1916. Etude sur un *Cyrtomaia suhmi* de Musée de Marseille. Ann. Mus. Hist. Nat. Marseille. 15: 9-15, pl. 1.

BUITENDIJK, A. M.

1939. The Dromiacea, Oxystomata and Oxyrhyncha of the Snellius Expedition. Temminckia. 4: 223-276, 5 pls., 27 figs.

1950. On a small collection of Decapoda Brachyura, chiefly Dromiidae and Oxyrhyncha, from the neighborhood of Singapore. Bull Raffles Mus. Singapore. No. 21 (1949): 59-82.

1960. Biological results of the Snellius Expedition. XXI. Brachyura of the Families Atelecyclidae and Xanthidae. (Part I) Temminckia. 10: 252-335, figs. 1-9.

CALMAN, W. T.

1909. On Decapoda Crustacea from Christmas Island, collected by Dr. C.W. Andrews. Proc. Zool. Soc. London. 703-713, pl. 72.

CAMPBELL, B. M.

1969. The Genus *Eucrate* (Crustacea: Goneplacidae) in Eastern Australia and the Indo-West Pacific. Mem Queensland Mus. 15 (3): 117-140, figs. 1-7.

CHANG, C. M.

1963. A check list of Taiwan Crabs with descriptions of 19 new records. Tunghai Journal, Taichung. 5 (2): 95-117, figs. 1-10, pls. 1-2.

CHOPRA, B.

1933a. Further notes on Crustacea Decapoda in the Indian Museum III. On the Decapoda Crustacea collected by the Bengal Pilot Service of the Mouth of the River Hughli. Dromiacea and Oxystomata. Rec. Ind. Mus. Calcutta. 35: 25-53, 7 figs.

1933b. Further notes on Crustacea Decapoda in the Indian Museum. IV. On two new species of Oxystomatous Crabs from the Bay of Bengal. Rec. Ind. Mus. Calcutta. 35 (1): 77-86, fig. 1, Pl. III.

CROSNIER, A.

1962. Crustacés Décapodes Portunidae. 1-154, figs. 1-256, pls. I-XIII. In: Faune de Madagascar, XVI. Orstom, 80, rte. d'Aulnay, Bondy, Seine.

DANA, J. D.

1852. Crustacea. United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842. Part I. 13: i-viii, 1-685.

1855. Crustacea. United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842. Atlas. 13: 1-27, pls. 1-96.

DOFLEIN, F.

1902. Ostasiatische Dekapoden. Abh. Bayer, Akad. Wiss. Math. – Phys., II, 21 (3): 611-670, pls. 1-6.

1904. Brachyura. *In:* Wiss. Ergeb. Deutschen Tiefsee Expedition "Valdivia". VI: 1-314, 68 figs. Atlas of 58 pls.

EDMONDSON, C. H.

1932 A Giant *Latreillopsis* from Hawaii. Occ. Pap. Bishop Mus. Honolulu. 9 (24): 3-9, 1 pl., 1 fig.

GARTH, J. S.

1958. Brachyura of the Pacific coast of America Oxyrhyncha. Allan Hancock Pacific Expedition. 21 (1): 1-499; 21 (2): 503-854, pls. A-Z, 1-55.

GORDON, I.

1931. Brachyura from the coasts of China. J. Linn. Soc. London, Zool. 37 (254): 525-558, 36 figs.

1950. Crustacea Dromiacea. I. Systematic account of the Dromiacea collected by the "John Murray" Expedition. Part II. The morphology of the spermatheca in certain Dromiacea. Sci. Rep. John Murray Exped. 1933-34. 9: 201-253, figs.

GRANT, F. E.

1905. Crustacea dredged off Port Jackson in deep water. Proc. Linn. Soc. N.S. Wales. 30: 312-324.

GRAY, J. E.

1831. Description of a new genus and some undescribed species of Crustacea. Zool. Misc., London. 39-41.

GRIFFIN, D. J. G.

1963. A new species of *Paromola* (Crustacea, Decapoda, Thelxiopidae) from New Zealand. Trans. Roy. Soc. N.Z. 7 (4): 85-91, figs. 1-8, pls. 1-2.

1966a. A review of the Australian Majid Spider Crabs (Crustacea, Brachyura). Austr. Zoologist. 13 (3): 259-297, pls. 15-17, figs. 1-3.

1966b. The Marine Faune of New Zealand: Spider Crabs, Family Majidae (Crustacea, Brachyura). Bull. 172. New Zealand Oceano. Inst. Mem. No. 35: 9-99.

GUINOT, D.

1964. Crustacés Décapodes Brachyoures (Xanthidae) des Campagnes de la Calypso en Mer Rouge (1952), dans le Golfe Persique et a l'ile Aldabra (1954). Mem. Mus. Hist. Nat., Ser. A, Zool. 32 (1): 1-108, figs. 1-57, pls. 1-12.

1966. La Faune Carcinologique (Crustacea Brachyura) de l'océan Indian Occidental et de la Mer Rouge. Catalogue, remarques biogeographiques et bibliographie. (*In:* Réunion de spécialistes C.S.A. sur les Crustacés, Zanzibar, 1964). Mem. I.F.A.N. 77: 237-352.

(1966)1967a. Recherches préliminaries sur les groupements naturels chez les Crustacés Décapodes Brachyoures. I. Les affinités des genres *Aethra, Osachila, Hepatus, Hepatella*

et *Actaeomorpha* (suite et fin). Bull. Mus. Hist. Nat. (2) 38 (6): 828-845, figs. 25-41.

1967b. *Id.*, III. A propos des affinités des genres *Dairoides* Stebbing et *Daira* de Haan. *Ibid.* (2) 39 (3): 540-563, figs. 1-36.

1968. *Id.*, IV. Observations sur quelques genres de Xanthidae. *Ibid.* (2) 39 (4): 695-727, figs. 1-60.

1969a. *Id.*, VII. Les Goneplacidae. *Ibid.* (2) 41 (1): 241-265, figs. 1-32, pl. 1.

1969b. *Id.*, VII. Les Goneplacidae (suite). *Ibid.* (2) 41 (2): 507-528, figs. 32-82, pl. 2.

1969c. *Id.*, VII, Les Goneplacidae (suite et fin). *Ibid.* (2) 41 (3): 688-724, figs. 83-146, pls. 3-5.

1969d. Sur divers Xanthidae, notament sur *Actaea* de Haan et *Paractaea* gen. nov. (Crustacea Decapoda Brachyura). Cahiers du Pacifique. 13: 223-267, figs. 1-36.

1970 (1971). Recherches préliminaires sur les groupements naturels chez les Crustacés Décapodes Brachyoures. VIII. Synthèse et Bibliographie. Bull. Mus. Hist. Nat. (2) 42 (5): 1063-1090.

HAAN, W. DE

1833-1849. Crustacea. *In:* P.F. von Siebold, Fauna Japonica sive descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis superiorum, qui summum in India Batava Imperium tenent, suscepto, annis 1823-1830 collegit, notis, observationibus et adumbrationibus illustravit. i-xvii, i-xxxi, 1-244, pls. 1-55, A-Q.

HALE, H. M.

1927. Crustacea. *In:* The Crustaceans of South Australia. Part I. 201 pp., 202 figs. Adelaide (Decapoda: 35-201).

HASWELL, W. A.

1880. On the Australian Brachyura Oxyrhyncha. Proc. Linn. Soc. N.S. Wales. 4: 431-458, pls. 25-27.

HELLER, C. L.

1861. Beitrage zur Crustaceen-Fauna des Rothen Meeres. I. Sitz.-Ber. Akad. Wiss. Wien. 43 (1): 297-374, pls. 1-4.

1865. Die Crustaceen. *In:* Reise der oesterreichischen Fregatte "Novara" um die Erde in den jahren 1857-1859 unter den Befehlen des Commodors B. von Wullestorf-Urbair. Zool. 2 (3): 1-280, pls. 1-25.

HENDERSON, J. R.

1888. Report on the Anomura collected by H.M.S. "Challenger" during the years 1873-76. Rep. Zool. Challenger Exp. 27: 1-41, pl. III.

1893. A Contribution to Indian Carcinology. Trans. Linn. Soc. London, Zool. (2) 5: 325-458, pls. 36-40.

HERKLOTS, J. A.

1861. Symbolae carcinologicae. Etudes sur la classe des Crustacés. I. Catalogue des Crustacés qui ont servi de base au système carcinologique de M.W. de Haan, redigé d'apres la collection du Musée des Pays-Bas et les Crustacés de la faune du Japon. Tijdschr. Ent. 4: 116-156.

HILGENDORF, F.

1878. Die von Herrn W. Peters in Mozambique gesammelten Crustaceen, bearbeitet von Herrn Dr. F. Hilgendorf. Monasbericht Akad. Wiss. Berlin, Sitz. d. Phys.-Math. Kl., 1878 (1879). 782-851, pls. 1-4.

HOLTHUIS, L. B. AND E. GOTTLIEB

1956. Two interesting crabs (Crustacea Decapoda, Brachyura) from Mersin Bay, S.E. Turkey. Zool. Meded., Leiden. 34 (21): 287-299, 2 figs., 7 pls.

IHLE, J. E. W.

1913. Die Decapoda Brachyura der Siboga-Expedition. I. Dromiacea. *In:* Siboga Expeditie, Monogr. XXXIXb (85): 159-322, figs. 78-148.

1916. Die Decapoda Brachyura der Siboga-Expedition. II. Oxystomata, Dorippidae. *In:* Siboga-Expeditie, Monogr. XXXIXb 2 (78): 97-158, figs. 1-39.

1918. Die Decapoda Brachyura der Siboga-Expedition. III. Oxystomata: Calappidae, Leucosiidae, Raninidae. *In:* Siboga-Expeditie, Monogr. XXXIXb 2 (85): 155-322, figs. 78-148.

IHLE, J. E. W. AND M. E. IHLE-LANDERBERG

1931. Ueber einige Tiefsee-Brachyuran der Siboga-Expedition aus der Gruppe der Oxyrhyncha. Zool. Anz. 93 (5-6): 147-163.

KEMP, S. AND R. B. SEYMOUR SEWELL

1912. Notes on Decapoda in the Indian Museum, III. Rec. Ind. Mus. 7 (1), No. 2: 15-32, 1 pl.

KOSSMANN, R.

1877. Zoologische Ergebnisse einer im Auftrage der koniglichen Academie der Wissenschaften zu Berlin ausgefuhrten Reise in die Kustengebiete des Rothen Meeres. Erste Halfte, III. Malacostraca (I. Theil: Brachyura). 1-66, pl. 1-3.

KUBO, I.

1936. A new Homoloide Crab from Japan. J. Imp. Fish Inst. Tokyo. 31 (2): 63.

LANCHESTER, W. F.

1900. On a collection of Crustaceans made at Singapore and Malacca. Part I. Crustacea Brachyura. Proc. Zool. Soc. London (1): 719-770, pls. 44-47.

LAURIE, R. D.

1906. Report on the Brachyura collected by Prof. Herdman at Ceylon in 1902. Ceylon Pearl Oyster Fish. Rep. London, part 5, Suppl. Rep. No. 40: 349-432, figs. 1-12, pls. 1-2.

LEACH, W. E.

1814. Crustaceaology. *Ih:* D. Brewster, The Edinburgh Encyclopaedia. 7: 383-437.

MCARDLE, A. F.

1900. Natural History Notes from the H.M.I.M.S.S. "Investigator", Ser. 3, No. 4. Some results of the dredging season 1899-1900. Ann. Mag. Nat. Hist. (7) 6: 471-478.

1901. Natural History Notes from the H.M.I.M.S.S. "Investigator", Ser. 3, No. 5. An account of trawling operation during the surveying season of 1900-1901. Ann. Mag. Nat. Hist. (7) 8: 517-526.

McCULLOCH, A. R.

1908. Studies in Australian Crustacea. No. 1. Rec. Austr. Mus. 7: 51-59, pl. 12.

1913. Studies in Australian Crustacea, No. 3. Rec. Austr. Mus. 9: 320-353, figs. 42-53, pls. 10-11.

MACGILCHRIST, A. C.

1905. Natural History Notes from the H.M.I.M.S.S. "Investigator", Ser. 3 No. 6. An account of the new and some of the rarer Decapod Crustacea obtained during the surveying seasons 1901-1904. Ann. Mag. Nat. Hist. (7) 15 (87): 233-268.

McNEILL, A. F.

1929. Studies in Australian Carcinology. No. 3. Rec. Austr. Mus. 17 (3): 144-158, figs. 1-4, pls. 35-37.

McNEILL, F. A. AND M. WARD

1930. Carcinological Notes. No. 1. Rec. Austr. Mus. 17: 357-383, pls. 59-61, 1 fig.

MAN, J. G. DE

1887-1888. Report on the Podophthalmous Crustacea of the Mergui Archipelago, collected for the Trustees of the Indian Museum, Calcutta, by Dr. John Anderson, F.R.S., Superintendent of the Museum. Part I-IV. J. Linn. Soc. London, Zool. 22: 1-312, pls. 1-19.

MIERS, E. J.

1879. On a collection of Crustacea made by Capt. H.C. St. John in the Corean and Japanese Seas. Part I. Podophthalmus. Proc. Zool. Soc. London. 18-61, pls. I-III.

1884. Crustacea. *In:* Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. "Alert" 1881-82. (Brit. Mus. Nat. Hist.) London. 178-322, pls. 18-34; 518-575, pls. 46-52.

1886. Report on the Brachyura collected by H.M.S. "Challenger" during the years 1873-1876. *In:* Report Scient. Res. Voyage H.M.S. "Challenger", Zool. (49) 17, part II: 1-363, 29 pls.

MILNE EDWARDS, A.

1865a. Etudes zoologiques sur les Crustacés récents de la famille des Cancériens. Nouv. Arch. Mus. Hist. Nat. Paris. 1: 177-308, pls. 11-19.

1865b. Description de quelques Crustacés nouveaux appartenant à la tribu des Maiens. Ann. Soc. ent. France. (4) 5: 133-159, pls. 3-5.

1873. Recherches sur la faune carcinologique de la Nouvelle-Calédonie. Part 2. Nouv. Archiv. Mus. Hist. Nat. Paris. 9: 155-332, pls. 4-18.

1874. Recherches sur la faune carcinologique de la Nouvelle-Calédonie. Part 3. Groupe des Oxystomes. Nouv. Archiv. Mus. Hist. Nat. Paris. 10: 39-56, 2 pls.

MILNE EDWARDS, A. AND E. L. BOUVIER

1923. Les Porcellanides et les Brachyures. *In:* Report of the Results of Dredging under the Supervision of Alexander Agassiz in the Gulf of Mexico. Mem. Mus. Comp. Zool. Cambridge, Mass. 47 (4): 1-472, 11 pls.

MILNE EDWARDS, H.

1834-1837. Histoire naturelle des Crustacés. Paris. 1-3: 1-461, 1-531, 1-638, pls. 1-42.

MIYAKE, S.

1940a. Crustacean Decapoda from Micronesia. II. A revision of the Micronesian Brachyuran collected by the late Mr. Eikiti Horii. Kagaku Nanyo. 3: 24-29. Japanese only.

1940b. Crustacean Decapoda from Micronesia. II. A revision of the Micronesian Brachyuran collected by the late Mr. Eikiti Horii. Kagabu Nanyo. 3: 154-159.

MONOD, T.

1956. Hippidea et Brachyura ouest-africains. Mem. I.F.A.N. No. 45: 1-674, 884 figs.

NOBILI, G.

1906. Faune Carcinologique de la Mer Rouge. Décapodes et Stomatopodes. Ann. Sci. Nat. Zool. (9) 4: 1-347, figs. 1-12, pls. 1-11.

ORTMANN, A. E.

1892-1894. Die Decapoden-Krebse des Strassburger Museums. 1892. V. Hippidae, Dromiidea und Oxystomata. Zool. Jahrb. Iena, Abt. f. Syst. 6: 532-588, pl. 26, 1893. VI. Brachyura. I. Majoidea und Cancroidea. *Ibid.* 7: 23-88, pl. 3.

1894. Crustaceen. *In:* R. Semon, Zoologische Forschungsreisen in Australien und dem Malayischen Archipel, vol. V. Denkschr. med.-naturw. Ges. Iena. 8:1-80, pls. 1-3.

PARISI, B.

1915. I Decapodi Giapponesi del Museo di Milano. II. Dromiacea. Atti. Soc. Ital. Sci. Nat. Milano. 54: 102-116, 2 figs., pls. 2-3.

RATHBUN, M. J.

1893. Catalogue of the Crabs of the Family Maiidae in the United States National Museum. Proc. U.S. Nat. Mus. 16: 63-103, pls. 3-8.

1897. A revision of the nomenclature of the Brachyura. Proc. Biol. Soc. Washington. ii: 153-167.

1906. The Brachyura and Macrura of the Hawaiian Islands. U.S. Fish Comm., Bull for 1903. 23 (3): 828-930, figs. 1-79, pls. 1-24.

1910. The Danish Expedition to Siam, 1899-1900. V. Brachyura. Mem. Acad. Roy. Soc. Denmark. (7) 5 (4): 301-368, figs. 1-44, pls. 1-2.

1911. The Percy Sladen Expedition to the Indian Ocean in 1905. Vol. III, No. 11, Marine Brachyura. Trans. Linn. Soc. London, Zool. (2) 14, part 2: 191-261, figs. 1-2, pls. 15-20.

1914. A new genus and some new species of Crabs of the Family Goneplacidae. (Scientific Results of the Philippine Cruise of Fisheries Steamer "Albatross". 1907-1910. No. 32). Proc. U.S. Nat. Mus. 48 (2067): 137-154.

1916. New species of crabs of the Families Inachidae and Parthenopidae. (Scientific Results of the Philippine Cruise of Fisheries Steamer "Albatross". 1907-1910. No. 34.) Proc. U.S. Nat. Mus. 50: 527-559.

1919. A new species of Crabs from Japan. Bull. Amer. Mus. Nat. Hist. 41 (17): 593, pl. 33.

1923. Reports on the Crabs obtained by the F.I.S.: Endeavour" on the Coasts of Queensland, New South Wales, Victoria, South Australia and Tasmania. *In:* Biol. Res. "Endeavour". 5 (3): 93-156, figs. 1-3, pls. 16-42.

1932. Preliminary description of new species of Japanese Crabs. Proc. Biol. Soc. Washington. 45: 29-38.

SAKAI, T.

1934. Brachyura from the Coast of Kyusyu, Japan. Sci. Rep. Tokoyo Bunrika Daigaku, Sect. B. 1 (25): 281-330, 26 figs., pls. 17-18.

1936a. Report on the Brachyura collected by Mr. E. Hiro at Palao Islands. Sci. Rep. Tokyo Bunrika Diagaku, Sect. B. 2 (37): 155-177, 7 figs., pls. 12-14.

1936b. Crabs of Japan. 239 + 12 + 17 pp., 122 figs. 66 pls. in color, Tokyo. (Japanese).

1936c. Studies on the Crabs of Japan. I. Dromiacea. Sci. Rep. Tokyo Bunrika Diagaku, Sect. B. 3, Suppl. No. 1: 1-66, figs. 1-13, pls. 1-9.

1937. Studies on the Crabs of Japan. II. Oxystomata. Sci. Rep. Tokyo Bunrika Daigaku, Sect. B. 3, Suppl. No. 2: 67-192, 45 figs., pls. 10-19.

1938. Studies on the Crabs of Japan. III. Brachygnatha. Oxyrhyncha. Sci. Rep. Tokyo Bunrika Diagaku, Sect. B. Suppl. No. 3: 193-364, 55 figs., pls. 20-41.

1939. Studies on the Crabs of Japan. IV. Brachygnatha, Brachyrhyncha. Sci. Rep. Tokyo Bunrika Daigaku, Sect. B. Suppl. No. 3: 365-741, 129 figs., pls. 42-111.

1961. New Species of Japanese Crabs from the collection of His Majesty the Emperor of Japan. Crustaceana. 3 (2): 131-150, figs. 1-4, pls. 3-4.

1965. The Crabs of Sagami Bay collected by H.M. the Emperor of Japan. Maruzen, Toyko. xvii, 206, 92, 32 (English part), figs. 1-27, color pls. 1-100.

SAMOUELLE, G.

1918. "The Entomologist's Useful Compendium, or an Introduction to the Knowledge of British Insects, etc." London, 496 pp., 12 pls. (Quoted from Garth, 1958).

SERENE, R.

1962. Revision du genre *Pseudosquilla* (Stomatopoda). Bull. Inst. Ocean. Monaco, #1241: 27 pp. 5 figs.

1964a. Goneplacidae et Pinnotheridae. *In:* Papers from Dr. Th. Mortensen's Pacific Expedition 1914-1916. 80. Vidensk, Medd. dansk naturh. Foren. Kbh. 126: 181-282, figs. 1-22, pls. 16-24.

1964b. Re-description du genre *Megaethesius* Rathbun (avec *M. sagedae)* et definition des Chasmocarcininae nouvelle sous famille des Goneplacides. Crustaceana. 7 (3): 175-187, figs. 1-6.

1968. Prodromus for a Check List of the (non-planctonic) Marine Fauna of South East Asia. (Indo-Pacific Brachyurans). *In:* Unesco, Fourth Meeting of the Marine Sciences. Singapore. 1-4.

1971. Observations préliminaires sur des Brachyoures nouveaux ou mal connus de Sud-Est Asiatique (Crustacea Decapoda). Bull. Mus. Hist. Nat. Paris. (2) 42 (5): 903-918, pls. 1-6.

SHEN, C. J.

1937. Second addition to the fauna of Brachyuran Crustacea of North China, with a check list of the species recorded in this particular region. Contr. Inst. Zool. Nat. Acad. Peiping. 3 (6): 277-312, 11 figs.

1940. On the collections of Crabs of South China. Bull. Fan. Mem. Inst. Biol. Zool., Ser. 10: 69-104.

STEBBING, T. R. R.

1910. General catalogue of the South African Crustacea. (Part V of the South African Crustacea, for the Marine Investigation in South Africa.) Ann. S. Afr. Mus. 6 (4): 281-593, pls. 15-22.

1917a. The Malacostraca of Natal. Ann. Durban Mus. 2 (1): 1-33, pls. 1-6.

1917b. South African Crustacea (Part IX of South African Crustacea, for the Marine Investigation in South Africa.) Cape Town Ann. S. Afr. Mus. 17 (1): 23-46, pls. 1-8.

STEPHENSEN, K.

1945. The Brachyura of the Iranian Gulf. Danish Sci. Invest. Iran, Copenhagen, Part IV. 57-237, figs. 1-60.

STEPHENSON, W.

1961. The Australian Portunids (Crustacea; Portunidae). V. Recent collections. Austr. J. Mar. Freshwater Res. 12 (1): 92-128, figs. 1-4, 5 pls.

1967. Scientific Results of Marine Investigations of the South China Sea and the Gulf of Thailand 1959-1961. NAGA Report 4 (1): 4-37, pls. 1-4.

STEPHENSON, E. AND B. CAMPBELL

1960. The Australian Portunids (Crustacea; Portunidae). IV. Remaining genera. Austr. J. Mar. Freshwater Res. 11 (1): 72-122, 3 figs., 6 pls.

STIMPSON, W.

1858. Prodromus descriptionis animalium evertebratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers Ducubus, observavit et descripsit. Pars V. Crustacea Ocypodoidea. Proc. Acad. Nat. Sci. Philad. 10: 93-110 (39-56).

1907. Report on the Crustacea (Brachyura and Anomura) collected by the North Pacific Exploring Expedition, 1853-1856. Smithsonian Misc. Coll., Washington. 49 (1717); 1-240, pl. 1-26.

STUDER, T.

1883. Verzeichness der Crustaceen, welche wahrend der Reise S.M.S. "Gazelle" an der Westkuste von Afrika, Ascension und dem Cap der Guten Hoffnung gesammelt wurden. Abh. K. Akad. Wiss. Berlin, (1882) 1883, No. 2: 1-32, pls. I-II.

TAKEDA, M. AND S. MIYAKE

1968. Crabs from the East China Sea. I. Corystoidea and Brachygnatha Brachyrhyncha. J. Fac. Agri. Kyushu Univ. 14 (4): 541-582, figs. 1-11, pls. 6.

1969. Crabs from the East China Sea. III. Brachyrhyncha Oxyrhyncha. J. Fac. Agri. Kyushu Univ. 15 (4): 469-521, figs. 1-12, pls. 17-18.

TARGIONI-TOZZETTI, A.

1877. Zoologia del Viaggio intorno al Globo della R. Pirocorvetta Magenta durante gli anni 1865-1868. Crostacei Brachiurie Anomouri. Publi. R. Inst. di Studi. Super Firenze, I: i-xxix, 1-257, pls. 1-12.

TEREZAKI, T.

1903. On Japanese Crabs (XV). Zoological Magazine. 15 (177): 234, 6 figs. (Japanese only)

TESCH, J. J.

1918. The Decapoda Brachyura of the Siboga-Expedition. II. Goneplacidae and Pinnotheridae. *In:* Siboga-Expeditie, Monogr. XXXIXc 1 (84): 149-295, pls. 7-18.

WALKER, A. O.

1890. Notes on a collection of Crustacea from Singapore. J. Linn. Soc. London, Zool. (20): 107-117, pls. 6-9.

WARD, M.

1933. New genera and species of marine Decapoda Brachyura from the coasts of New South Wales and Queensland. Austr. Zool. 7 (V): 377-394, pls. 21-23.

WHITE, A.

1847. Descriptions of new Crustacea from the Eastern Seas. Proc. Zool. Soc. London. (4) 15: 56-58.

WHITELEGGE, T.

1900. Crustacea, Part I, Decapoda and Stomatopoda. Scientific Results of the trawling Expedition of H.M.C.S. "Thetis" off the coast of New South Wales in February and March, 1898. Mem. Austr. Mus. 4: 135-199, pls. 32-35.

WOOD-MASON, J.

1891. Natural History Notes from H.M.I.M.S.S. "Investigator" Commander R.F. Hoskyu, R.N. commanding. Ser. II, No. 1. On the Results of the Deep-sea Dredging during the Season 1890-1891. Ann. Mag. Nat. Hist. (6) 8 (October, 1891): 268-286; (November, 1891): 253-362.

YOKOYA, Y.

1933. On the Distribution of Decapod Crustaceans inhabiting the Continental Shelf around Japan, chiefly based upon the Materials collected by S.S. Soyo-Maru, during the years 1923-1930. J. Coll. Agri. Tokyo. 12 (1): 1-226, figs. 1-71.

INDEX TO SCIENTIFIC NAMES

APPENDIX: Station numbers of NAGA Brachyura collections. (Order of species, each station, as appears in text).

Cruise No.	Station No.		Lat. N.	Long. E
S2	59-131	*Dromidiopsis cranioides*	13°01'45"	100°50'30"
S3	60-102	*Conchoecetes andamanicus* *Hyastenus aries*	12°33'	100°44'
S3	60-127	*Pariphiculus mariannae* *Carcinoplax purpurea*	08°37'	102°21.5'
S4	60-211	*Pariphiculus mariannae* *Ixoides cornutus* *Carcinoplax purpurea* *Lophoplax teschi*	15°41'	108°41'
S4	60-212	*Dromidiopsis cranioides* *Homola orientalis* *Pariphiculus agariciferus* *Pleistacantha oryx* *Naxioides mamillata* *Paranthrites orientalis* *Demania rotundata* *Ralumia balssi* *Carcinoplax longimana* *Neopilumnoplax heterochir*	15°40'	109°22.9'
S4	60-216	*Paromola alcocki faughni* *Paramolopsis boasi* *Ethusa gracilipes* *Cyrtomaja owstoni* *Rochinia strangeri*	15°40'	109°45.5'
S4	60-219	*Hypsophrys superciliosa*	15°39'	111°51'
S4	60-237	*Latreillopsis bispinosa* *Carcinoplax purpurea*	12°09.7'	109°24.7'
S4	60-264	*Carcinoplax confragosa*	10°31'30"	109°25'00"
S8	60-711	*Zalasius sakaii*	09°03'	106°26'
S8	60-777	*Cryptodromia areolata* *Latreillopsis bispinosa* *Maja japonica*	12°09'40"	109°24'00"
S9A	60-1094	*Ethusa gracilipes*	12°16.8'	100°07.2'
S10	61-45	*Lophoplax teschi*	15°41.0'	108°39.3'
S10	61-76	*Lophoplax teschi*	13°27'	109°20'
Ordonnez Coll.		*Heteroplax dentatus*		
Authors' Coll.		*Heteroplax transversus*		
Thai Danish Expd.	1001-9	*Heteroplax nitidus*		

Location	Gear	Bottom	Depth (in m, unless otherwise stated)	Date
Gulf of Thailand, between Ko Lau & Ko. Sichon	40' Otter Trawl	–	25	Dec. 15, 1959
Gulf of Thailand off Ko Kram Yoi	6' Beam Trawl	Crs. grn. S.	27	Jan. 19, 1960
Gulf of Thailand	40' Otter Trawl	–	73	Jan. 24, 1960
South China Sea	10' Beam Trawl	Fn. S. & grn M.	37	Feb. 27, 1960
South China Sea	10' Beam Trawl	Sh. det., S.	60-108 (f.)	Feb. 27, 1960
South China Sea	10' Beam Trawl	–	479	Feb. 28, 1960
South China Sea	10' Beam Trawl	Gry M. & fn. S.	1234-1264	Feb. 29, 1960
South China Sea 5-7 mi. off Hon Lon	10' Beam Trawl	M.,Sh. det., fn. S.	91-101	Mar. 4, 1960
South China Sea	10' Beam Trawl	hard (S. or s.-grav.)	183-128	Mar. 9, 1960
South China Sea	2.5' (wire) Dredge	S.	14-15 (f.)	Sept. 8, 1960
South China Sea	6' Beam Trawl	–	93	Sept. 20, 1960
Gulf of Thailand 6.4 mi. off Ko Koram	16' Otter Trawl	–	50	Dec. 13, 1960
South China Sea 5.4 mi. off Cap An Hoa	7' Beam Trawl	M. & S.	32-35	Jan. 24, 1961
South China Sea	Petersen Grab	M.	64	Jan. 28, 1961
Manilla Bay				1958
Gulf of Thailand	Trawl Net	S. & Sh.		Nov., 1965
Andaman Sea				1966

FIGURES 1-7

Conchoecetes andamanicus Alcock, Ng. 137, male of 19 x 19 mm

Figure 1. Penis.

Figure 2. Pleopod 1.

Figure 3. Pleopod 2.

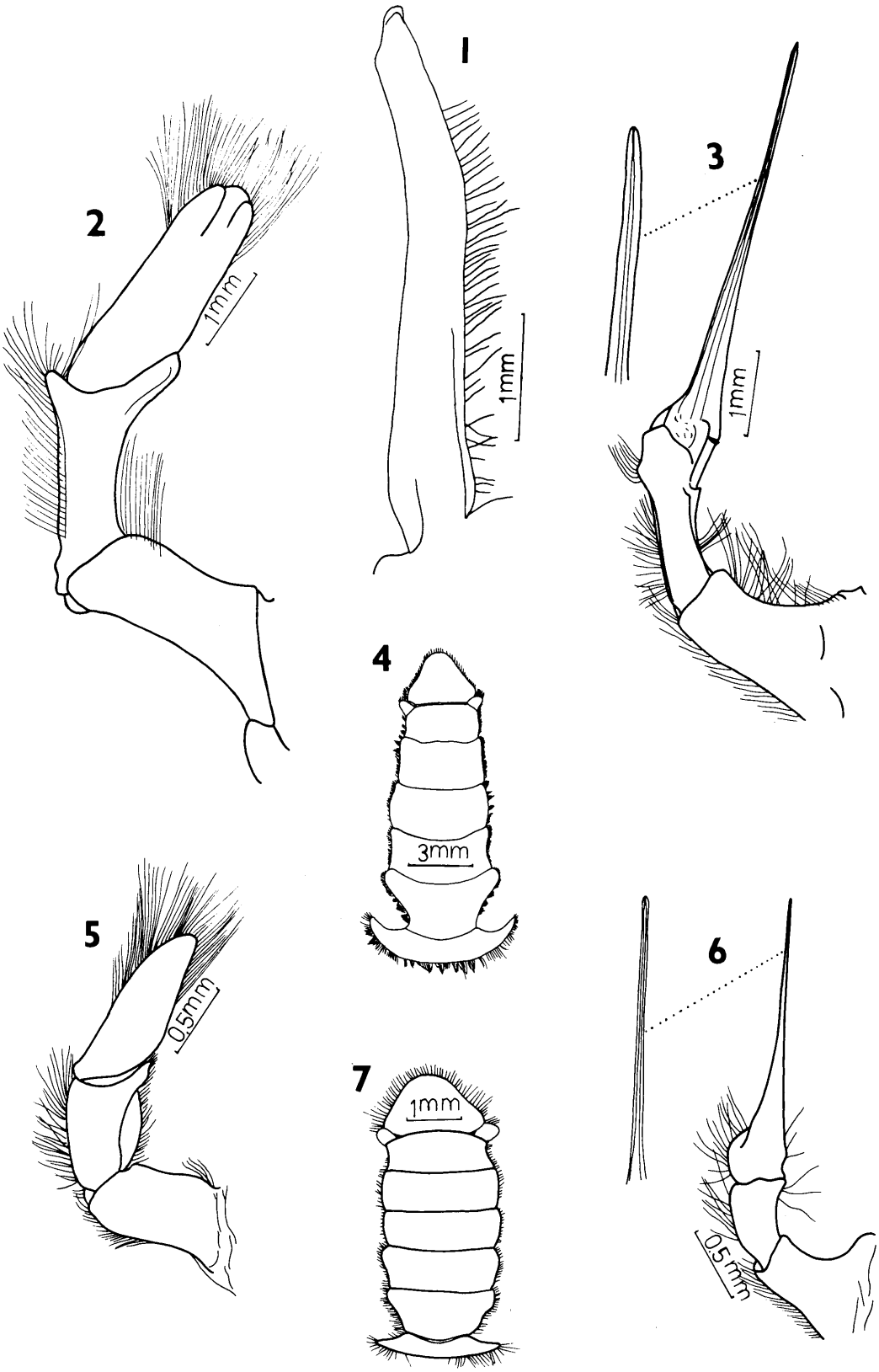
Figure 4. Abdomen.

Cryptodromia areolata Ihle, Ng. 1026, male of 7 x 7 mm

Figure 5. Pleopod 1.

Figure 6. Pleopod 2.

Figure 7. Abdomen.


1
1mm
2
1mm
3
1mm
4
3mm
5
0.5mm
6
0.5mm
7
1mm

FIGURES 8-13

Dromidiopsis cranioides (de Man), Ng. 690A, male of 30 x 29 mm

Figure 8. Lateral border of carapace:

A. (male of 30 x 29 mm),

B. (male of 68 x 75 mm, from NMS. 1964.6.11.1).

Figure 9. Dactylus and propodus of pereiopod 3.

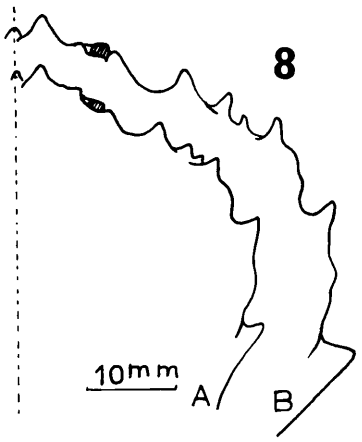
Figure 10. Pereiopod 4.

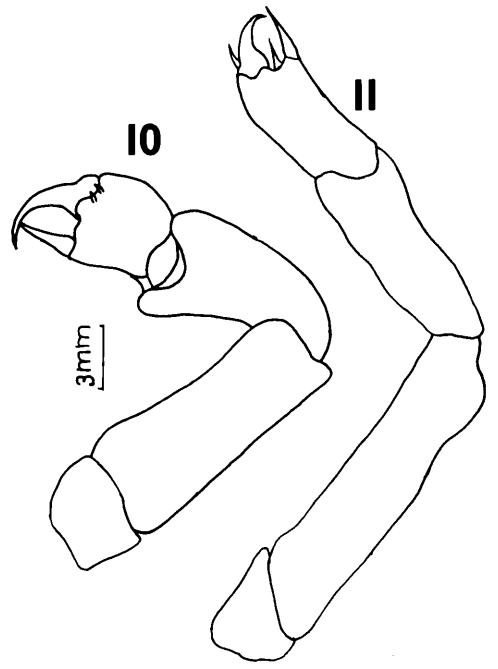
Figure 11. Pereiopod 5.

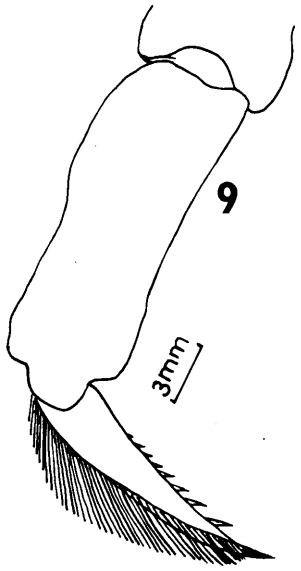
Figure 12. A and B. Dactylus and distal part of propodus of pereiopod 4.

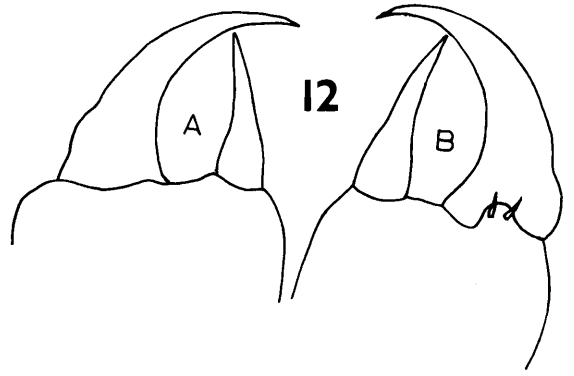
Figure 13. A and B. Dactylus and distal part of propodus of pereiopod 5.

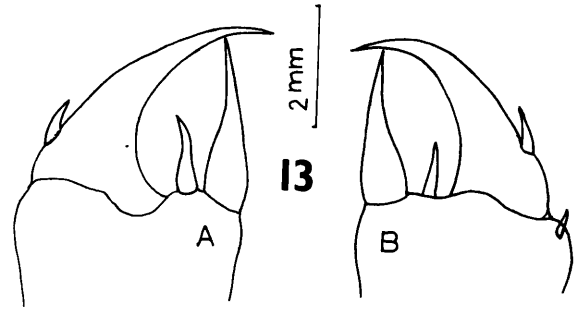
(continued)


8
10mm
A
B


10
11
3mm


9
3mm


12
A
B


2mm
13
A
B

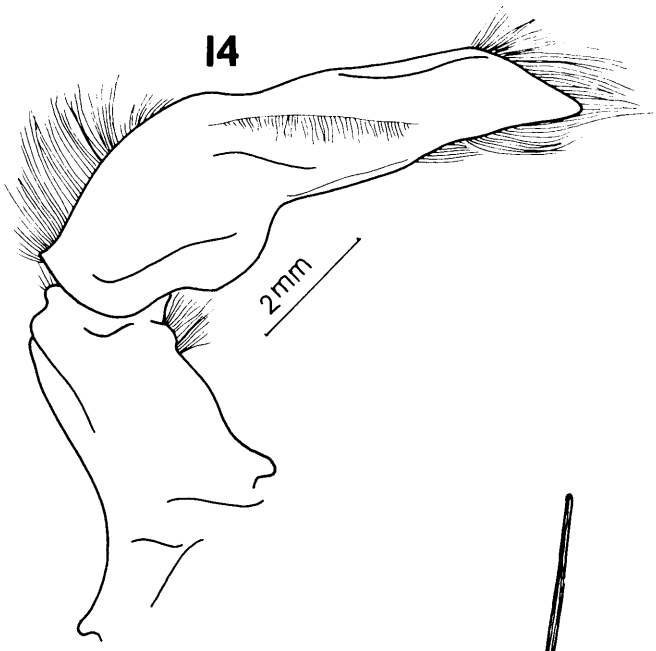
FIGURES 14-16

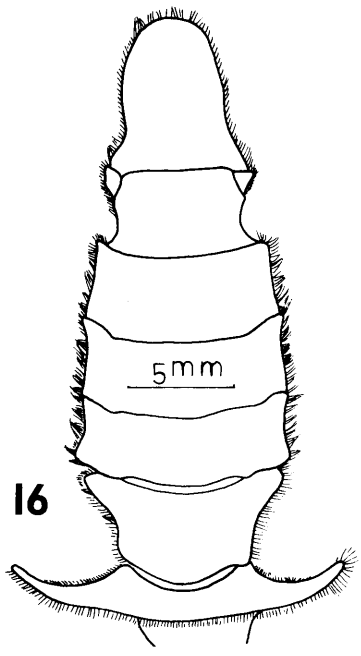
[(continued) *Dromidiopsis cranioides* (de Man), Ng. 690A, male of 30 x 29 mm]

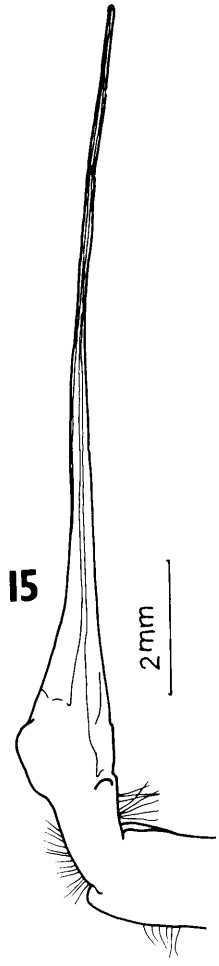
Figure 14. Pleopod 1.

Figure 15. Pleopod 2.

Figure 16. Abdomen.


14
2mm


5mm
16


15
2mm

FIGURES 17 AND 18

Homolide.

Figure 17. Dorsal view of carapace:

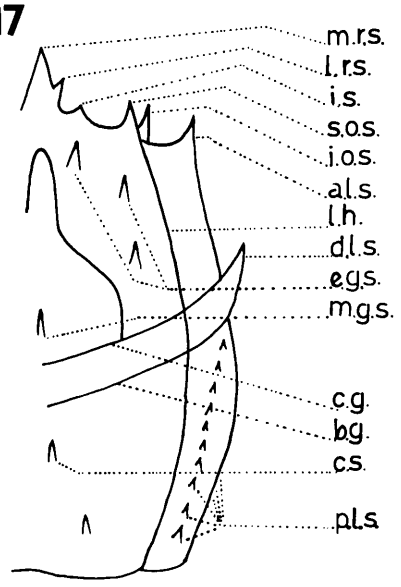
m.r.s., median rostral spine
l.r.s., lateral rostral spine
i.s., intermediate spine
s.o.s., supraorbital spine
i.o.s., infraorbital spine
a.l.s., antero-lateral spine
l.h., *linea homolica*
d.l.s., dorso-lateral spine
e.g.s., epigastric spines
m.g.s., median gastric spine
c.g., cervical groove
b.g., branchial groove
c.s., cardiac spine
p.l.s., postero-lateral spines

Homolide.

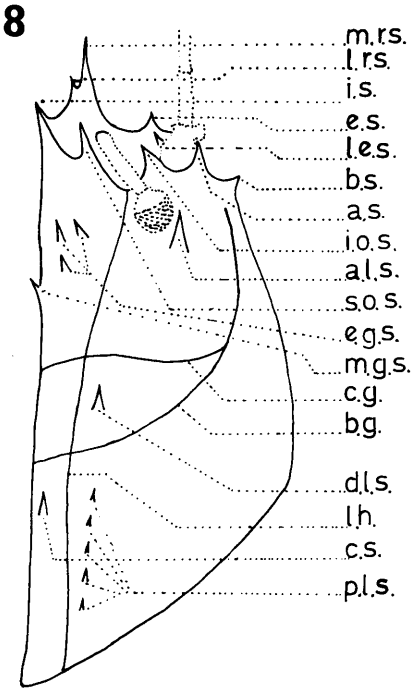
Figure 18. Lateral view of carapace:

m.r.s., median rostral spine
l.r.s., lateral rostral spine
i.s., intermediate spine
e.s., median epistomal spine
l.e.s., lateral epistomial spine
b.s., buccal spine
a.s., antennal spine
i.o.s., infra-orbital spine
a.l.s., antero-lateral spine
s.o.s., supraorbital spine
e.g.s., epigastric spine
m.g.s., median gastric spine
c.g., cervical groove
b.g., branchial groove
d.l.s., dorso-lateral spine
l.h., *linea homolica*
c.s., cardiac spine
p.l.s., postero-lateral spine

17


m.r.s.
l.r.s.
i.s.
s.o.s.
i.o.s.
a.l.s.
l.h.
d.l.s.
e.g.s.
m.g.s.
c.g.
b.g.
c.s.
p.l.s.

18


m.r.s.
l.r.s.
i.s.
e.s.
l.e.s.
b.s.
a.s.
i.o.s.
a.l.s.
s.o.s.
e.g.s.
m.g.s.
c.g.
b.g.
d.l.s.
l.h.
c.s.
p.l.s.

FIGURES 19-22

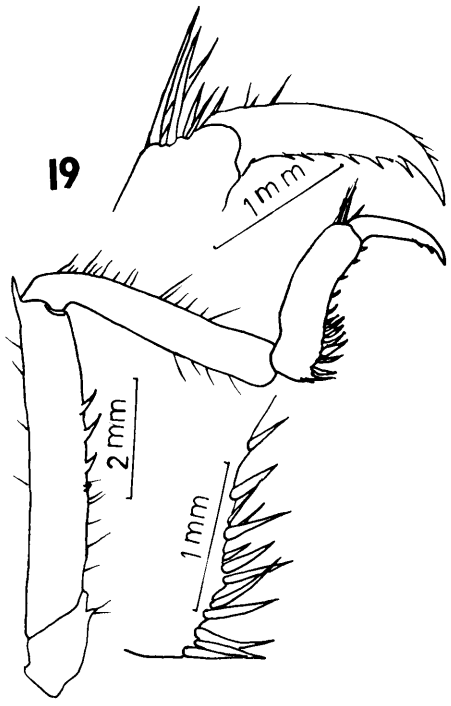
Homola orientalis Henderson, Ng. 695, male of 11 x 8.5 mm

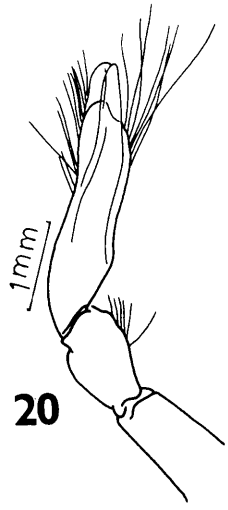
Figure 19. Pereiopod 5.

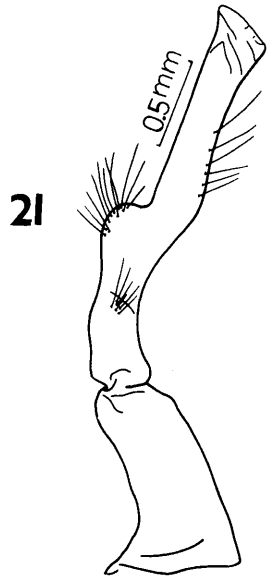
Figure 20. Pleopod 1.

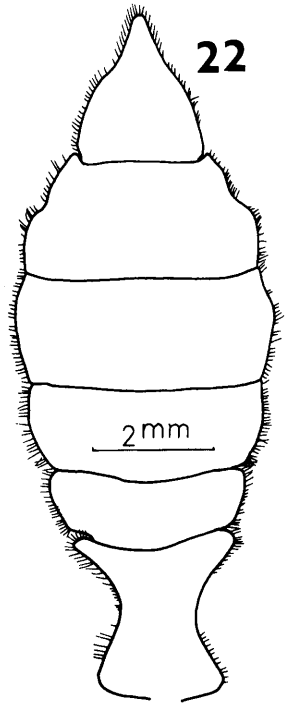
Figure 21. Pleopod 2.

Figure 22. Abdomen.


19
1mm
2mm
1mm


1mm
20


21
0.5mm


22
2mm

FIGURES 23-31

Diagrammatic figures of the carapace of the species of *Paromola:*

Figure 23. *japonica* (after Sakai, 1937).

Figure 24. *hawaiiensis* (after Edmondson, 1932).

Figure 25. *acutispina* (after Sakai, 1961).

Figure 26. *multispinosa* (after Ihle, 1913).

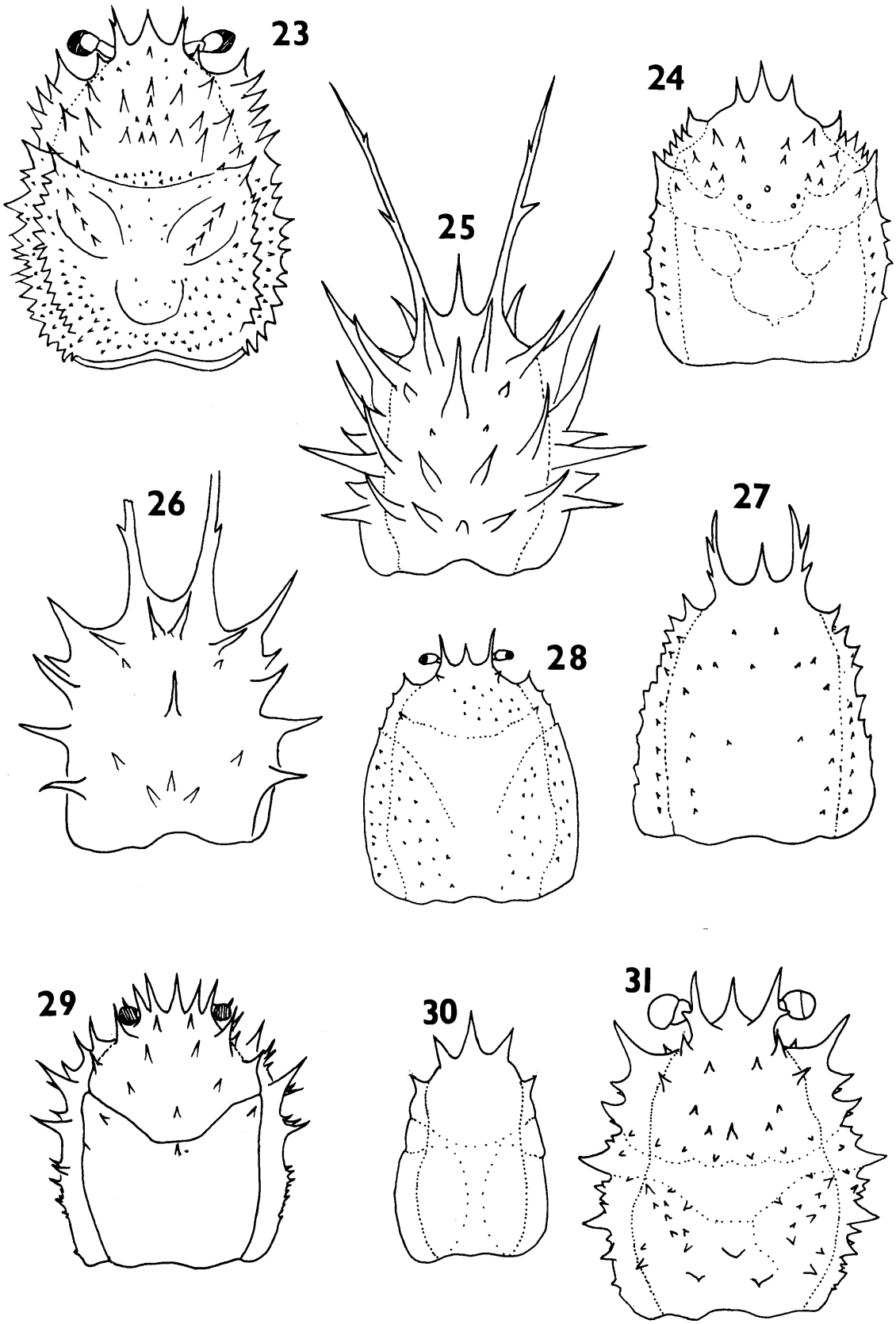
Figure 27. *petterdii* (after Bennett, 1964).

Figure 28. *macrochira* (after Sakai, 1961).

Figure 29. *spinimana* (after Griffin, 1956).

Figure 30. *profundorum* (after Alcock, 1900).

Figure 31. *alcocki* (after Gordon, 1950).


23
24
25
26
27
28
29
30
31

FIGURES 32-38

Paromola alcocki faughni new subspecies, Holotype, Ng. 723, male of 34 x 24 mm

Figure 32. Dorsal view of the carapace.

Figure 33. Lateral view of carapace.

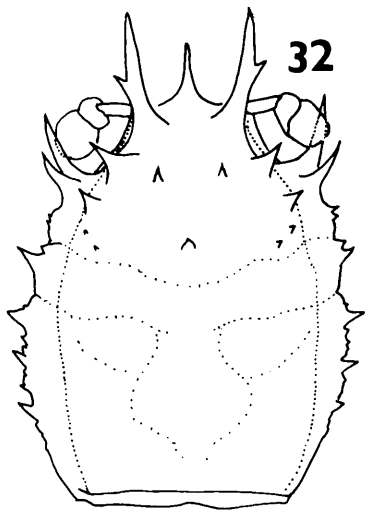
Figure 34. Anterior ventral view.

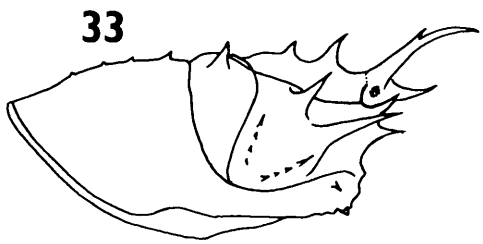
Figure 35. Maxilliped.

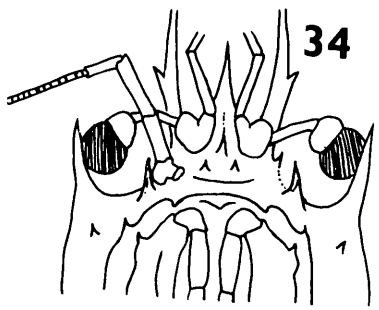
Figure 36. Pleopod 1.

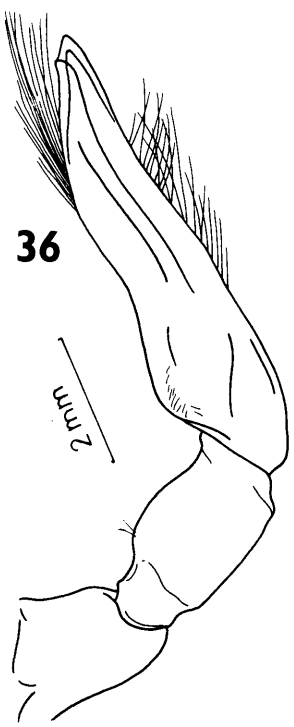
Figure 37. Pleopod 2.

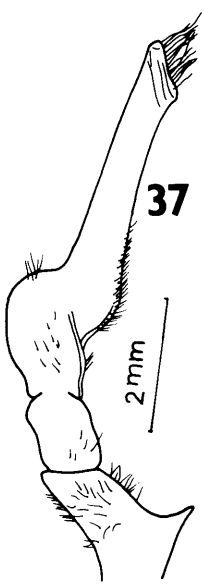
Figure 38. Abdomen.

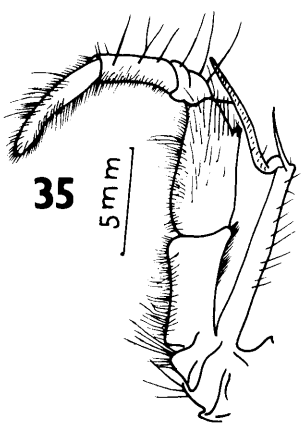

32

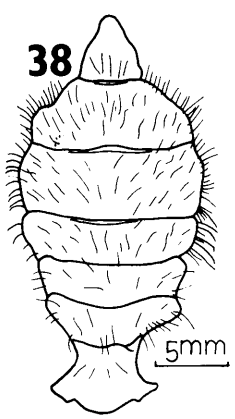

33


34


36
2mm


37
2mm


35
5mm


38
5mm

FIGURES 39-46

Paromolopsis boasi Wood-Mason, Ng. 722, male of 34 x 30 mm

Figure 39. Third maxilliped.

Figure 40. Pleopod 1.

Figure 41. Pleopod 2.

Figure 42. Abdomen.

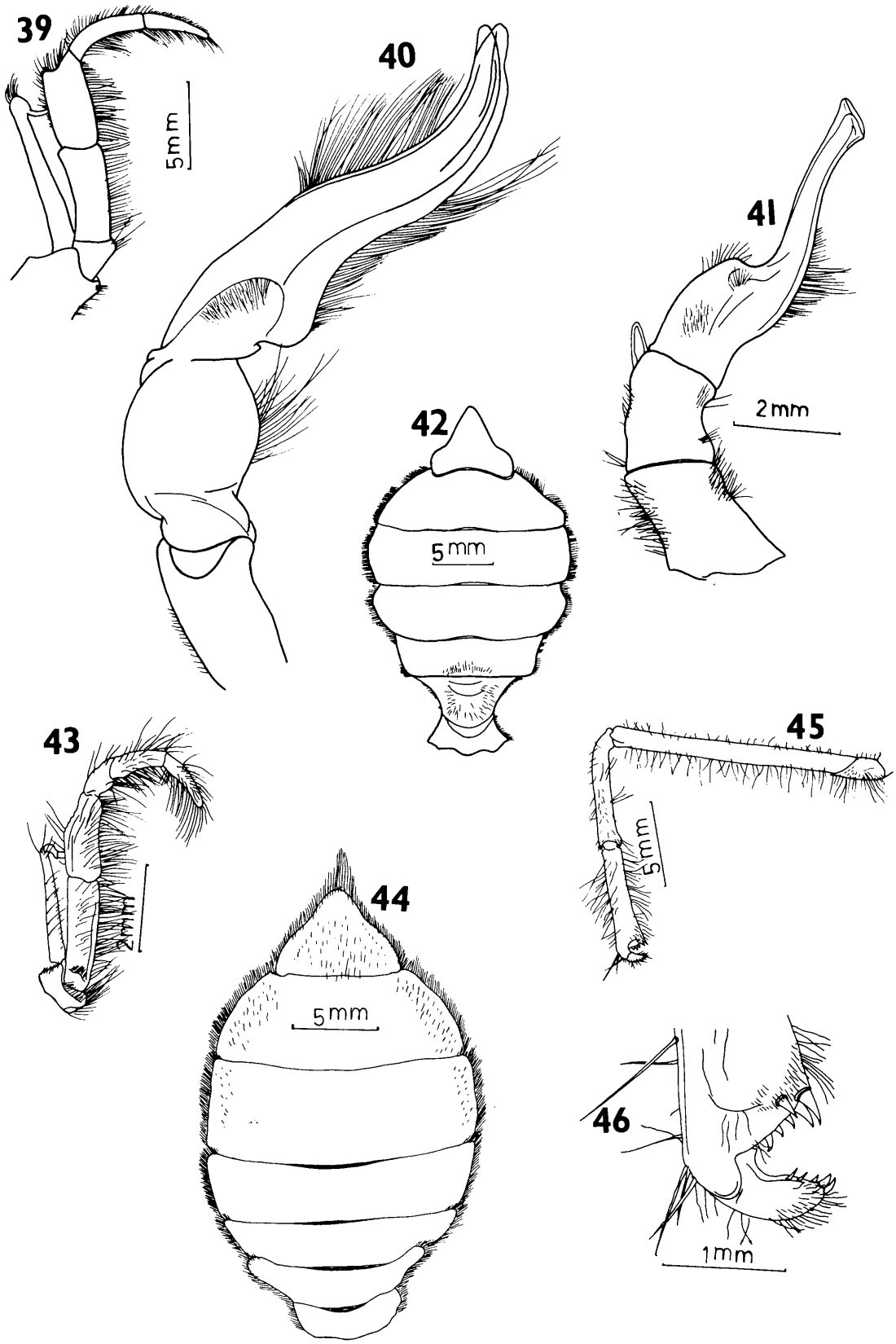
Hypsophrys superciliosa Wood-Mason, Ng. 535, female of 25 x 22 mm

Figure 43. Third maxilliped.

Figure 44. Abdomen.

Figure 45. Pereiopod 5.

Figure 46. Dactylus and distal part of propodus of pereiopod 5.


39
5mm
40
41
2mm
42
5mm
43
2mm
44
5mm
45
5mm
46
1mm

FIGURES 47-55

Latreillopsis bispinosa Henderson, Ng. 638, female of 10 x 7 mm

Figure 27. Third maxilliped.

Figure 28. Abdomen.

Figure 49. Pereiopod 5.

Figure 50. Dactylus of pereiopod 5.

Latreilla valida de Haan, NMS. 1968.2.14.4,

male of 12 x 9 mm

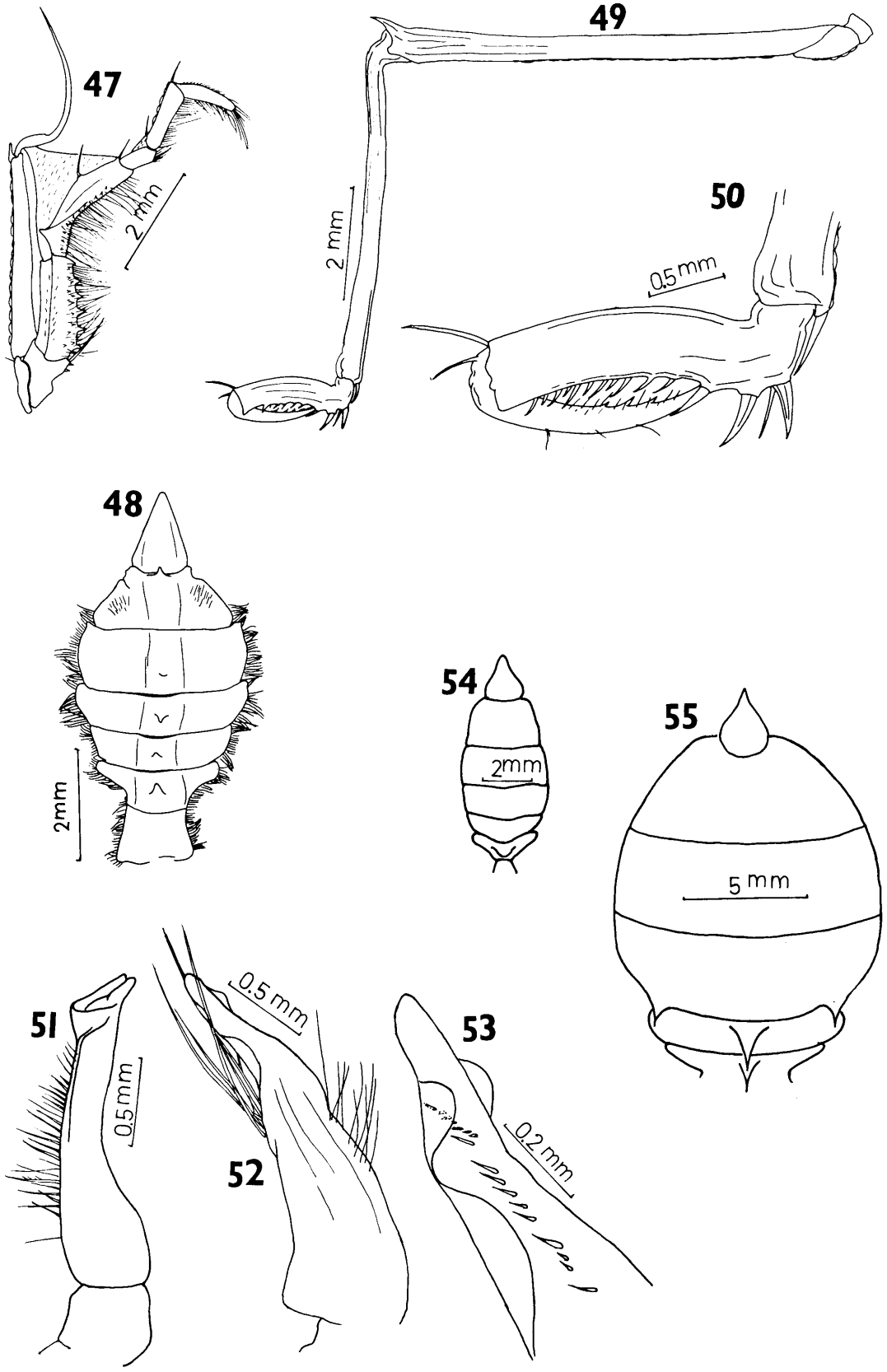
Figure 51. Pleopod 2.

Figure 52 and 53. Pleopod 1.

Figure 54. Abdomen.

female of 16 x 12 mm

Figure 55. Abdomen.


47
2 mm
49
2 mm
50
0.5 mm
48
2mm
54
2mm
55
5 mm
51
0.5 mm
0.5 mm
52
53
0.2 mm

FIGURES 56-63

Ethusa gracilipes (Miers), Ng. 743, male of 5.5 x 5 mm

Figure 56. Pleopod 2.

Figure 57 and 58. Pleopod 1.

Figure 59. Abdomen.

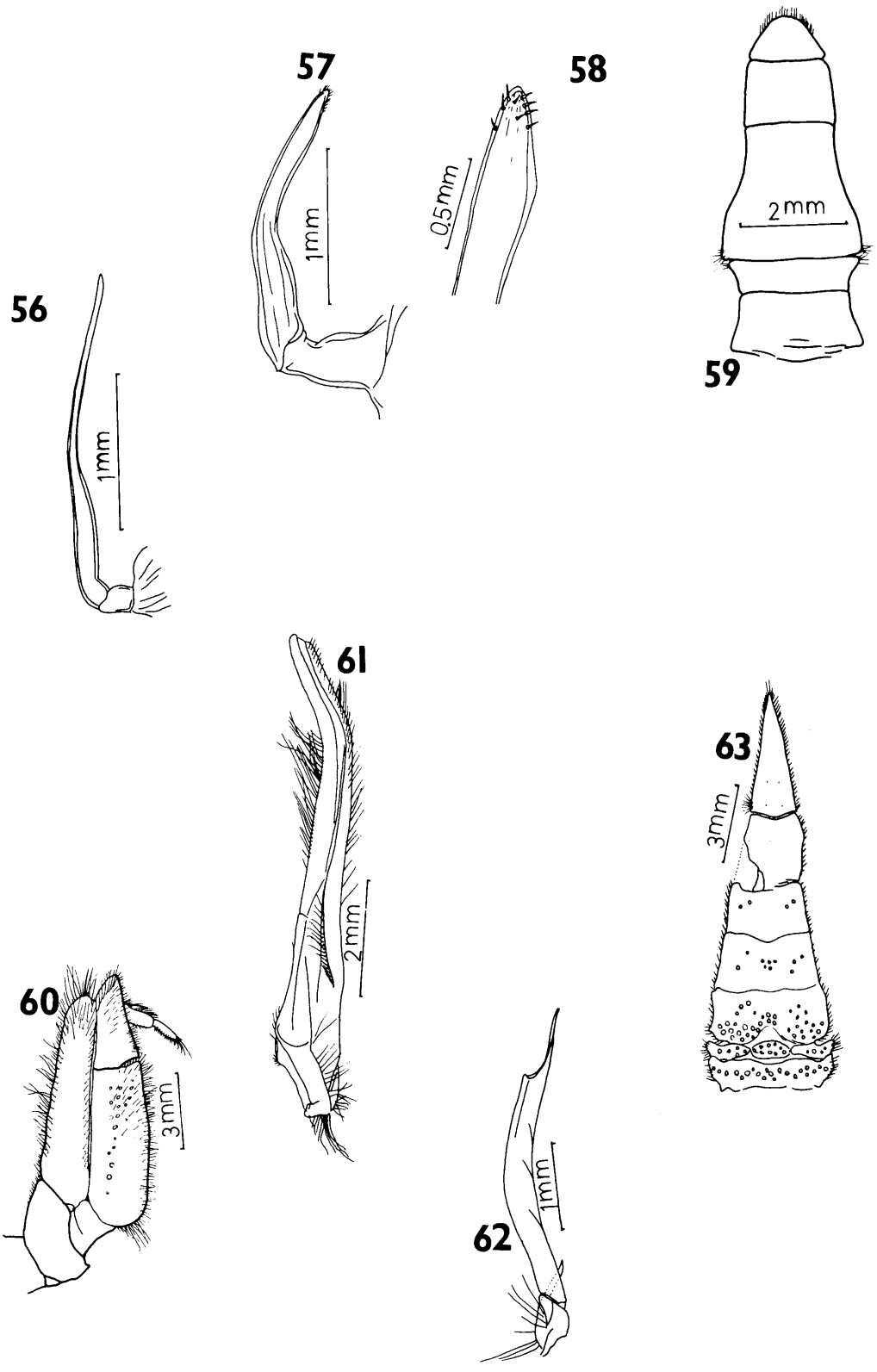
Pariphiculus mariannae (Herklots), Nt. 858, male of 16 x 15 mm

Figure 60. Third maxilliped.

Figure 61. Pleopod 1.

Figure 62. Pleopod 2.

Figure 63. Abdomen.


56
1mm
57
1mm
58
0.5mm
59
2mm
60
3mm
61
2mm
62
1mm
63
3mm

FIGURES 64-72

Pariphiculus agariciferus Ihle, Ng. 700, male of 14.5 x 14.5 mm

Figure 64. Pleopod 1.

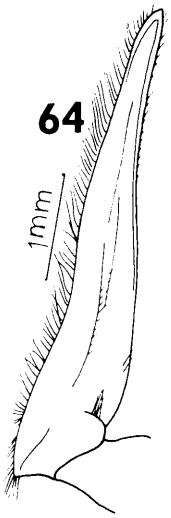
Figure 65. Pleopod 2.

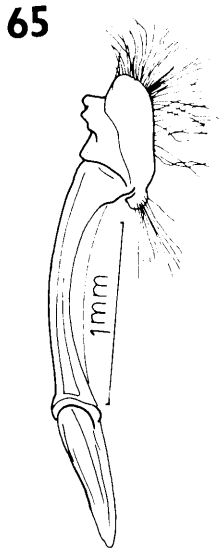
Figure 66. Abdomen.

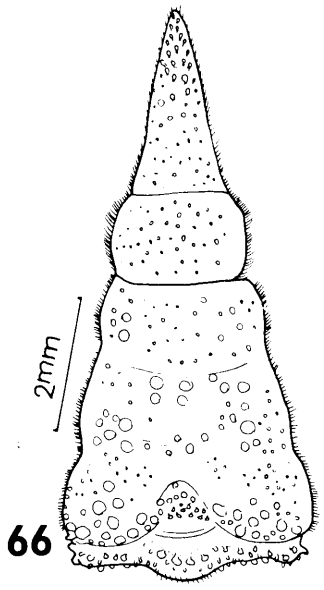
Pleistacantha sancti-johannis Miers, NMS. 1968.2.14.7., male of 20 x 12 mm

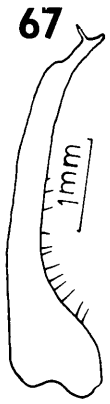
Figures 67, 68 and 69. Pleopod 1.

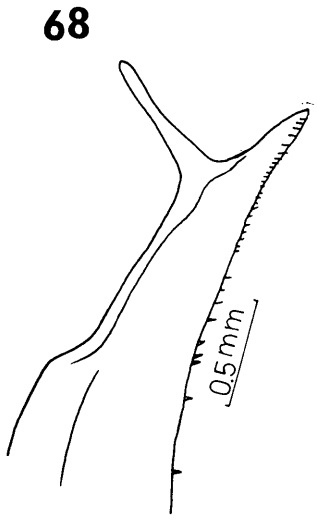
Figures 70, 71 and 72. Pleopod 2.

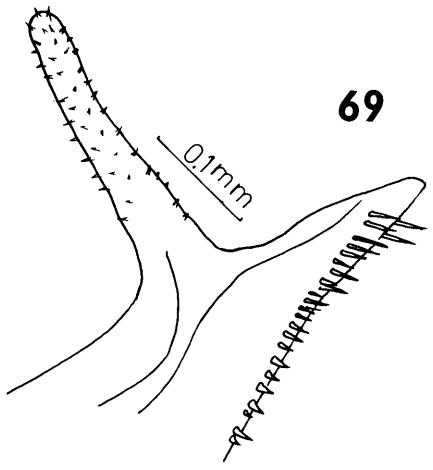

64
1mm


65
1mm

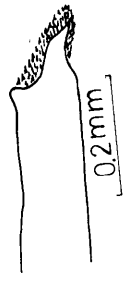

2mm
66


67
1mm


68
0.5mm


0.1mm
69

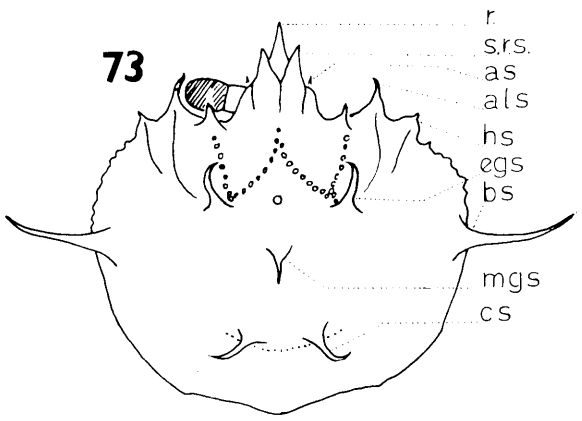

70
0.5mm

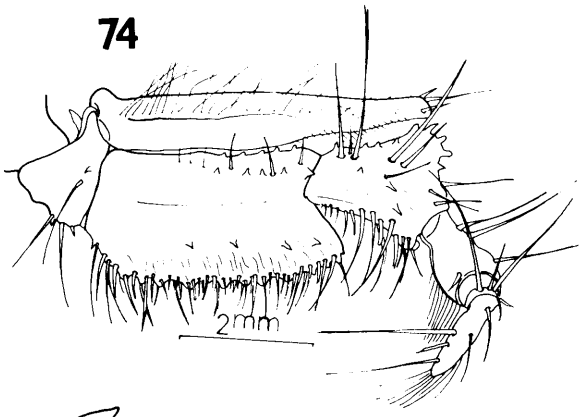

71
0.2mm

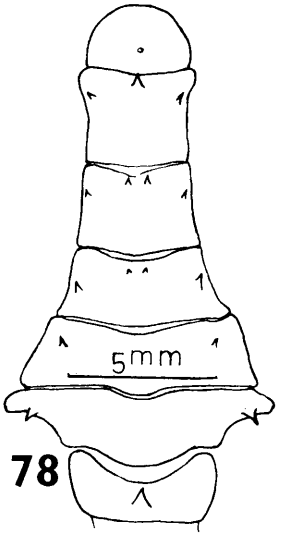

0.1mm
72

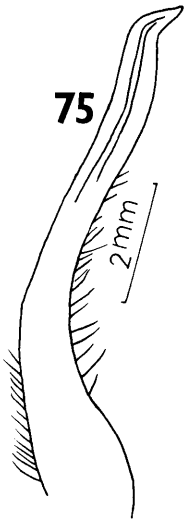
FIGURES 73-78

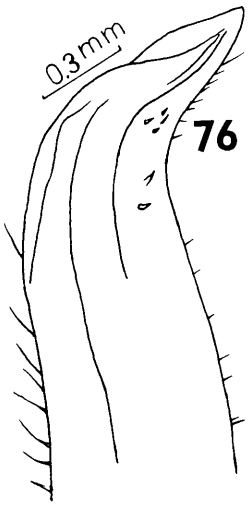
Cyrtomaja owstoni Terazaki,
Ng. 724, female of 18.5 x 19 mm,
Figure 73. Dorsal view:
r., rostrum
s.r.s., pseudorostral spine
a.s., antennal spine
a.l.s., antero-lateral spine
h.s., hepatic spine
e.g.s., epigastric spine
b.s., branchial spine
m.g.s., median gastric spine
c.s., cardiac spine
Figure 74. Third maxilliped.
male of 31 x 31 mm (Sakai don.)
Figures 75, 76 and 77. Pleopod 1.
Figure 78. Abdomen.

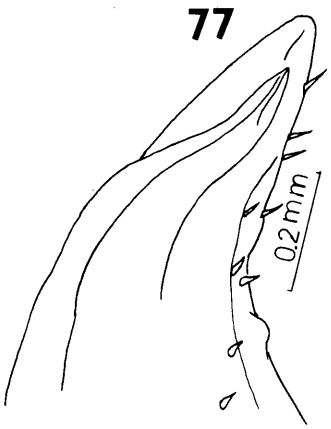

73
r
s.r.s.
as
als
hs
egs
bs
mgs
cs


74
2mm


1
5mm
78


75
2mm


0.3mm
76


77
0.2mm

FIGURES 79-92

Platymaja remifera Rathbun, NMS. 1968.2.1.37., male of 40 x 40.5 mm

Figure 79. Dorsal view of carapace.

Figure 80. Epimeral spine.

Figures 81 and 82. Left cheliped, outer and inner faces.

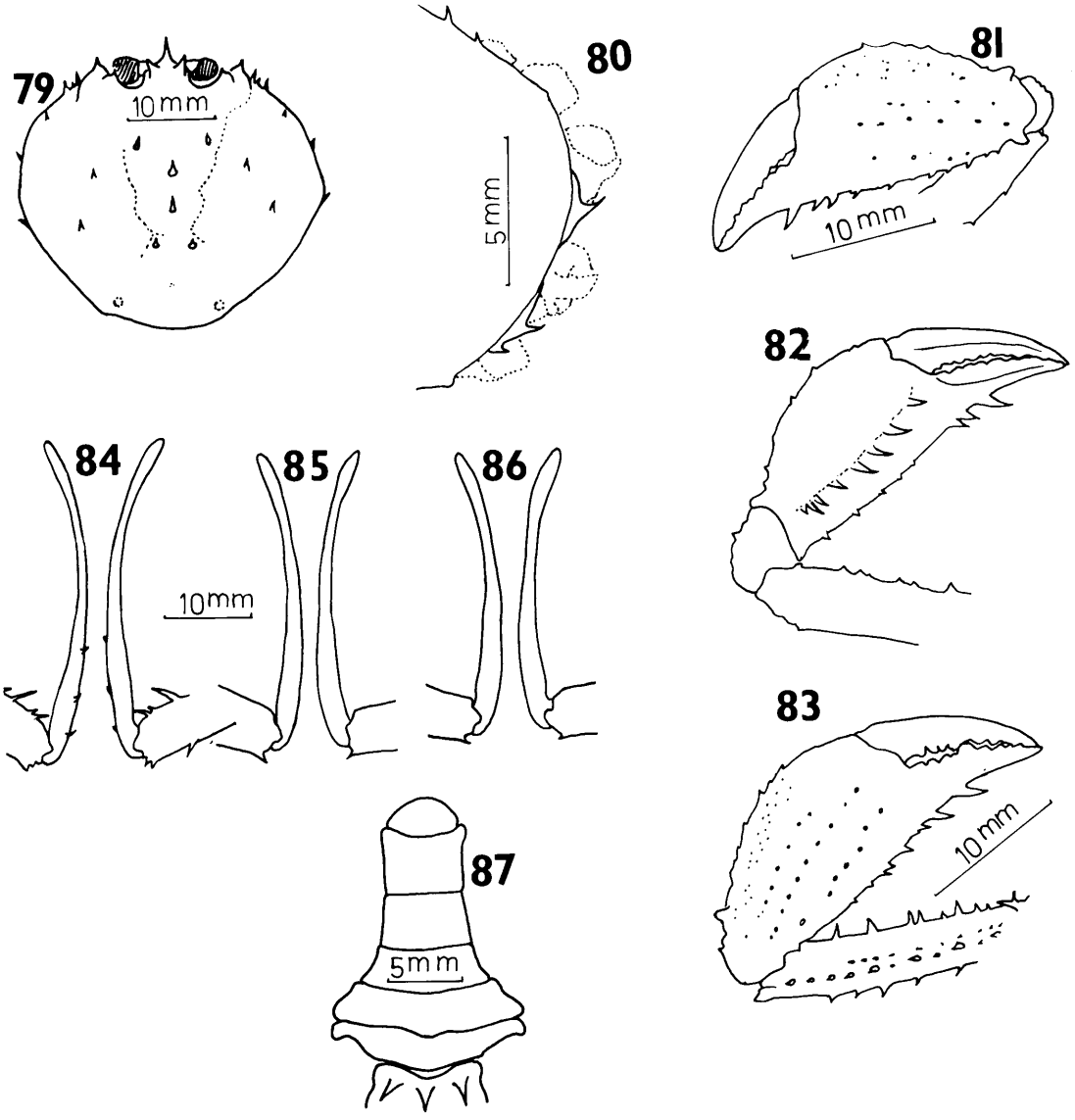
Figure 83. Right cheliped, outer face.

Figures 84, 85 and 86. Pereiopods 3, 4 and 5, outer and inner faces.

Figure 87. Abdomen.

Figures 88, 89 and 90. Pleopod 1.

Figures 91 and 92. Pleopod 2.


79
10 mm
80
5 mm
81
10 mm
82
84
85
86
10mm
83
10 mm
87
5mm
88
3mm
89
0.3mm
90
0.2mm
91
3mm
92
0.5mm

FIGURES 93-103

Maja japonica Rathbun, Ng. 1024, male of 16 x 11.5 mm

Figure 93. Third maxilliped.

Figures 94 and 95. Pleopod 1.

Figure 96. Pleopod 2.

Figure 97. Abdomen.

Naxioides mamillata (Ortmann),

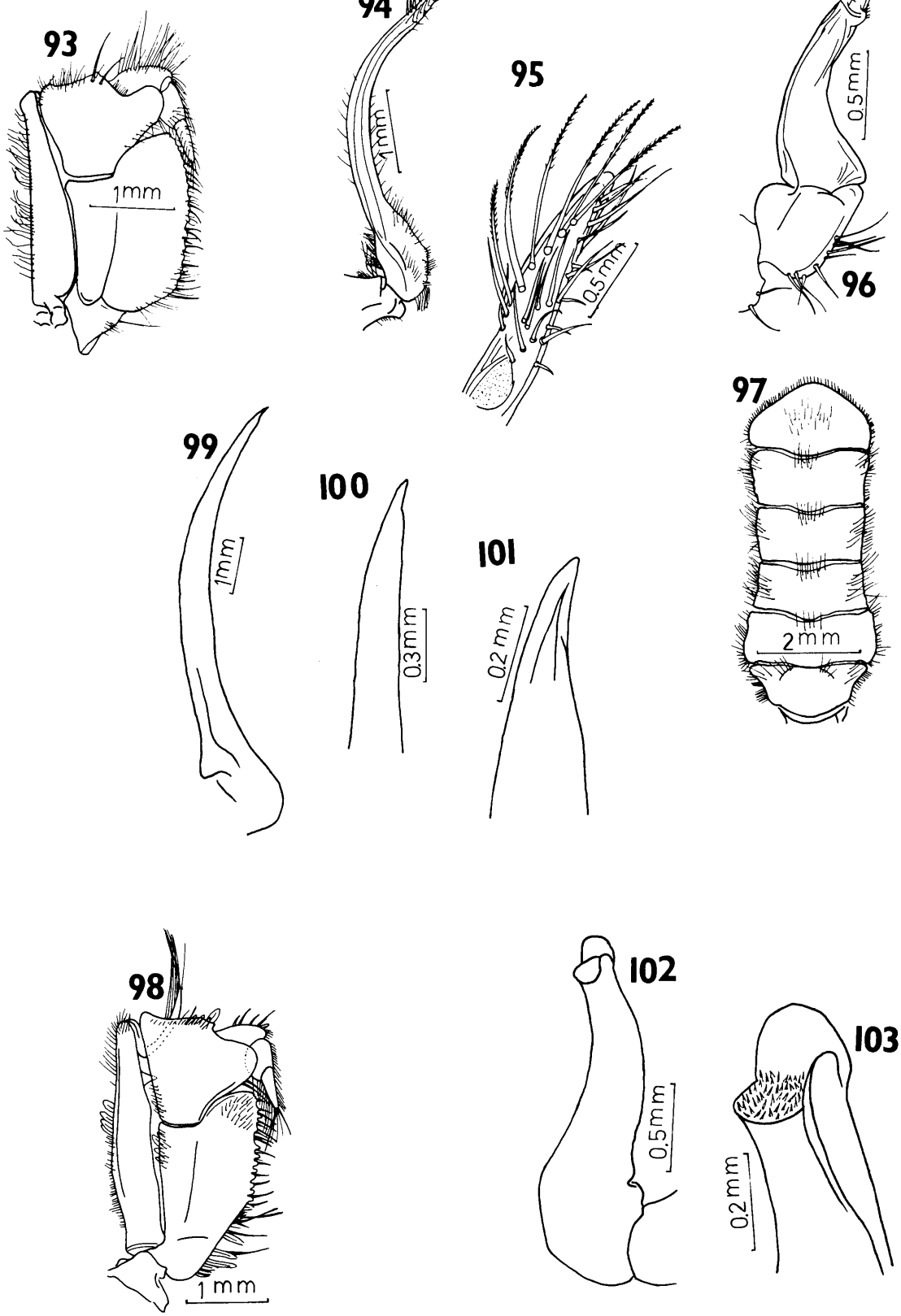
Ng. 599, male of 23 x 10 mm,

Figures 98. Third maxilliped.

NMS. 1968.2.14.14., male of 50 x 24 mm

Figures 99, 100 and 101. Pleopod 1.

Figures 102 and 103. Pleopod 2.


93
1mm
94
1mm
95
0.5mm
96
0.5mm
97
2mm
99
1mm
100
0.3mm
101
0.2mm
98
1mm
102
0.5mm
103
0.2mm

FIGURES 104-113

Naxioides hystrix (Miers), NMS. 1968.2.13.6., male of 21 x 13 mm

Figures 104, 105 and 106. Pleopod 1.

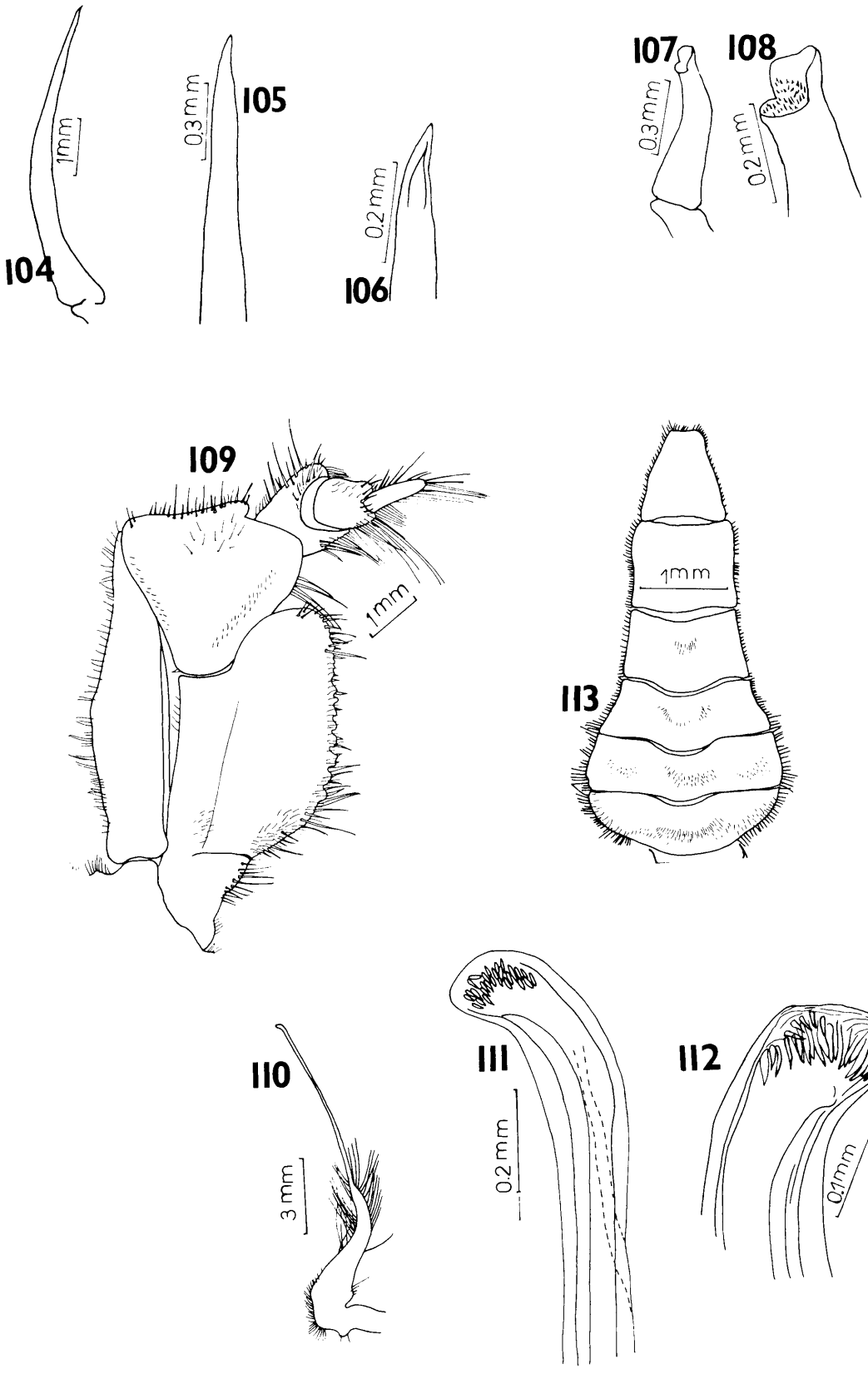
Figures 107 and 108. Pleopod 2.

Hyastenus aries (Latreille), NMS. 1973.3.9.1., male of 47 x 26.5 mm

Figure 109. Third maxilliped.

Figures 110, 111 and 112. Pleopod 1.

Figure 113. Abdomen.


104
1mm
105
0.3mm
106
0.2mm
107
0.3mm
108
0.2mm
109
1mm
113
1mm
110
3mm
111
0.2mm
112
0.1mm

FIGURES 114-122

Hyastenus diacanthus (de Haan), NMS. 1973.3.9.2., male of 36 x 21 mm

Figure 114. Third maxilliped.

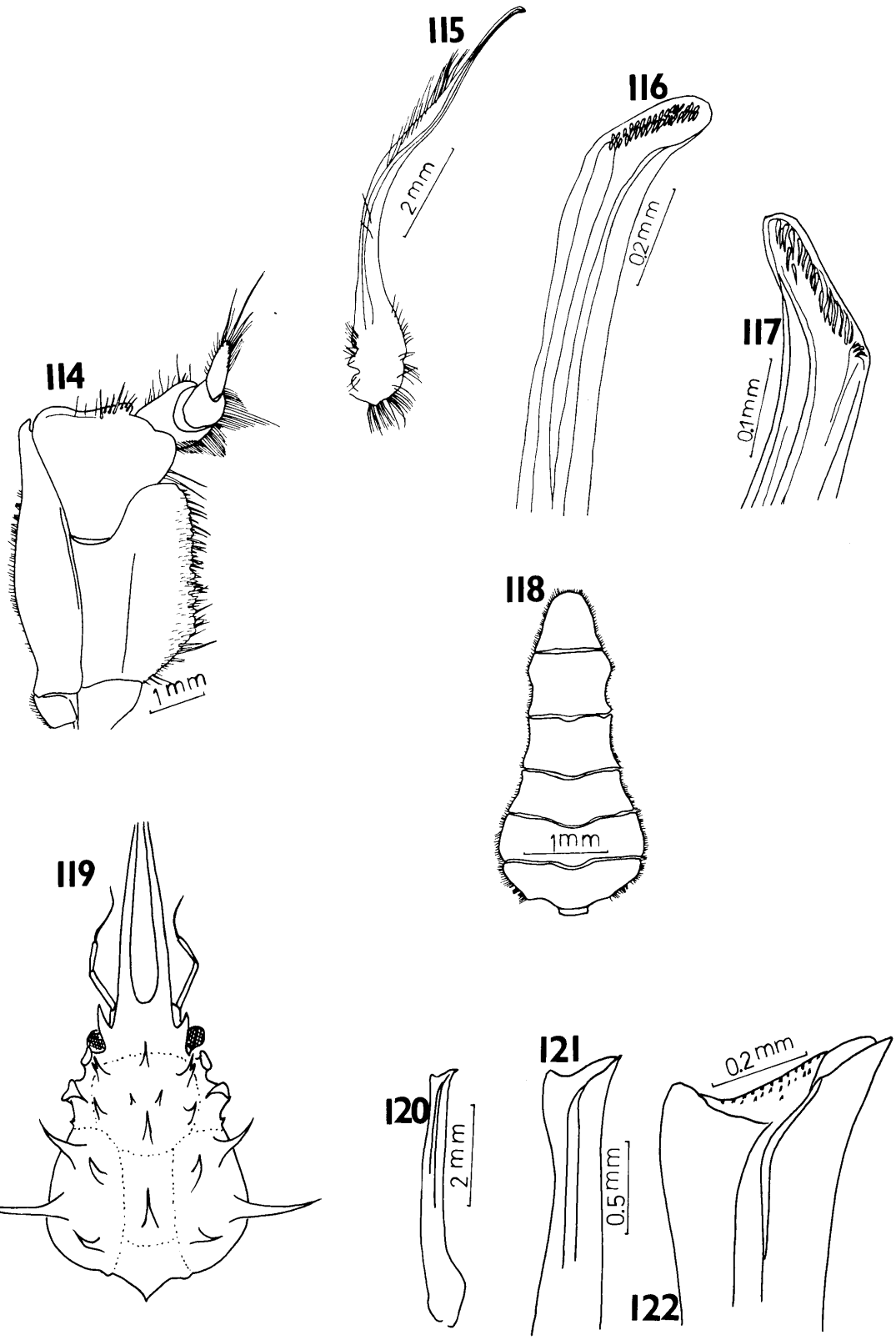
Figures 115, 116 and 117. Pleopod 1.

Figure 118. Abdomen.

Rochinia pulchra (Miers), NMS. 1968.2.13.14., male of 30 x 17 mm

Figure 119. Carapace outline.

Figures 120, 121 and 122. Pleopod 1.


115
2mm
116
0.2mm
117
0.1mm
114
1mm
118
1mm
119
120
2mm
121
0.5mm
0.2mm
122

FIGURES 123-132

Rochinia strangeri new species, Type, Ng. 744, male of 15 x 9.5 mm

Figure 123. Carapace outline.

Figures 124, 125 and 126. Pleopod 1.

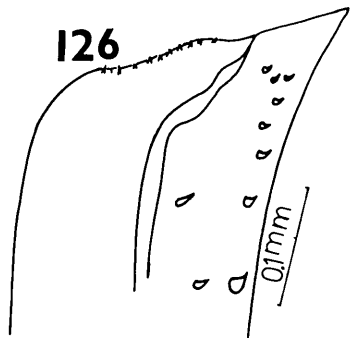
Figure 127. Pleopod 2.

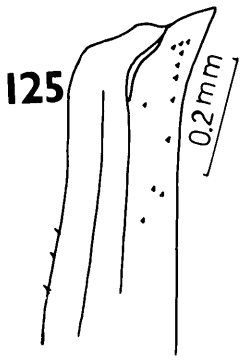
Figure 128. Abdomen.

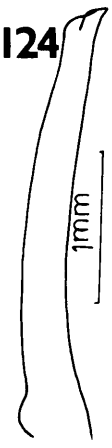
Rochinia rivers-andersoni (Alcock), NMS. 1968.2.15.2, male of 30 x 23 mm

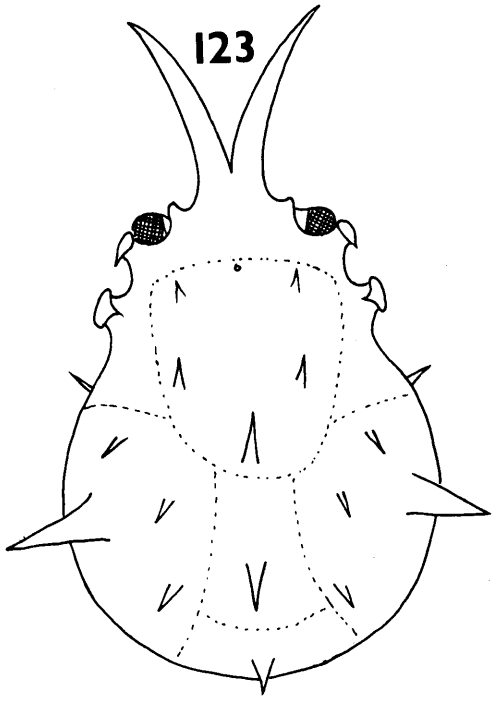
Figure 129. Carapace outline.

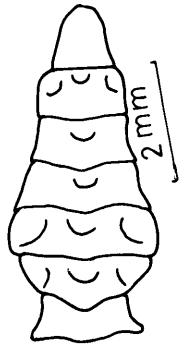
Figures 130, 131 and 132. Pleopod 1.

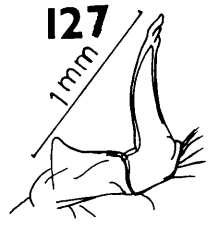

126
0.1mm

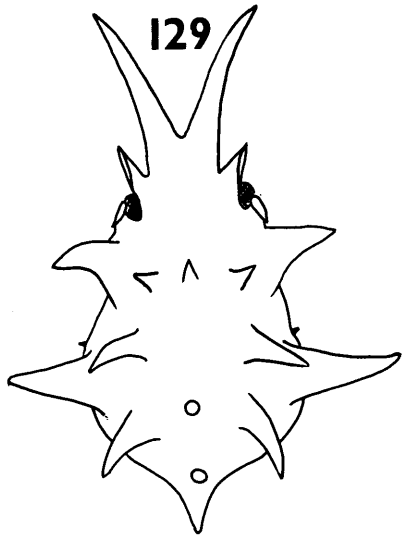

125
0.2mm

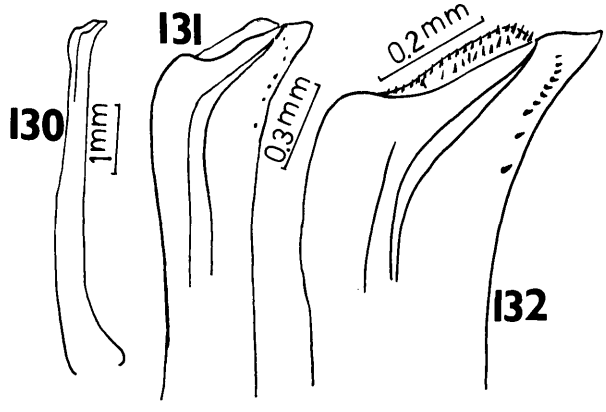

124
1mm


123


128
2mm


127
1mm


129


130
1mm
131
0.3mm
0.2mm
132

FIGURES 133-140

Rochinia velutina (Miers), NMS. 1968.2.13.2., male of 17 x 12.5 mm

Figure 133. Carapace outline in dorsal view.

Figure 134. Carapace outline in lateral view.

Figures 135, 136 and 137. Pleopod 1.

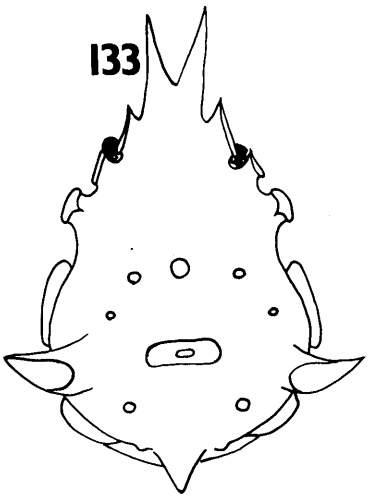
Ralumia balssi Sakai, Ng. 699, female of 5 x 6 mm

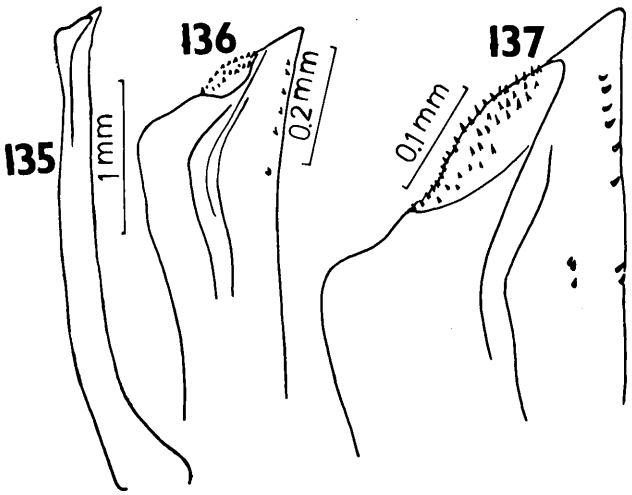
Figure 138. Third maxilliped.

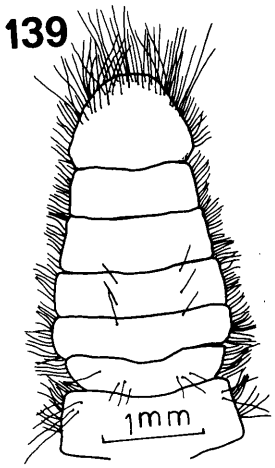
Figure 139. Abdomen.

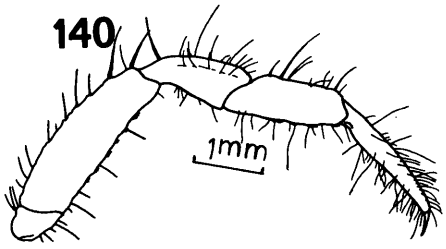
Figure 140. Third pereiopod.

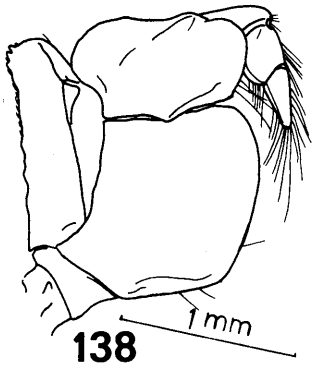

134


133


135
1mm
136
0.2mm
137
0.1mm


139
1mm


140
1mm


1mm
138

FIGURES 141-155

Demania rotundata Serène, Ng. 690B, male of 20.5 x 30.5 mm

Figure 141. Pleopod 1.

Figure 142. Pleopod 2.

Carcinoplax longimana (de Haan), Ng. 577, male of 18.5 x 25 mm

Figure 143. Pereiopod 5.

Figure 144. Abdomen.

Figures 145, 146 and 147. Pleopod 1.

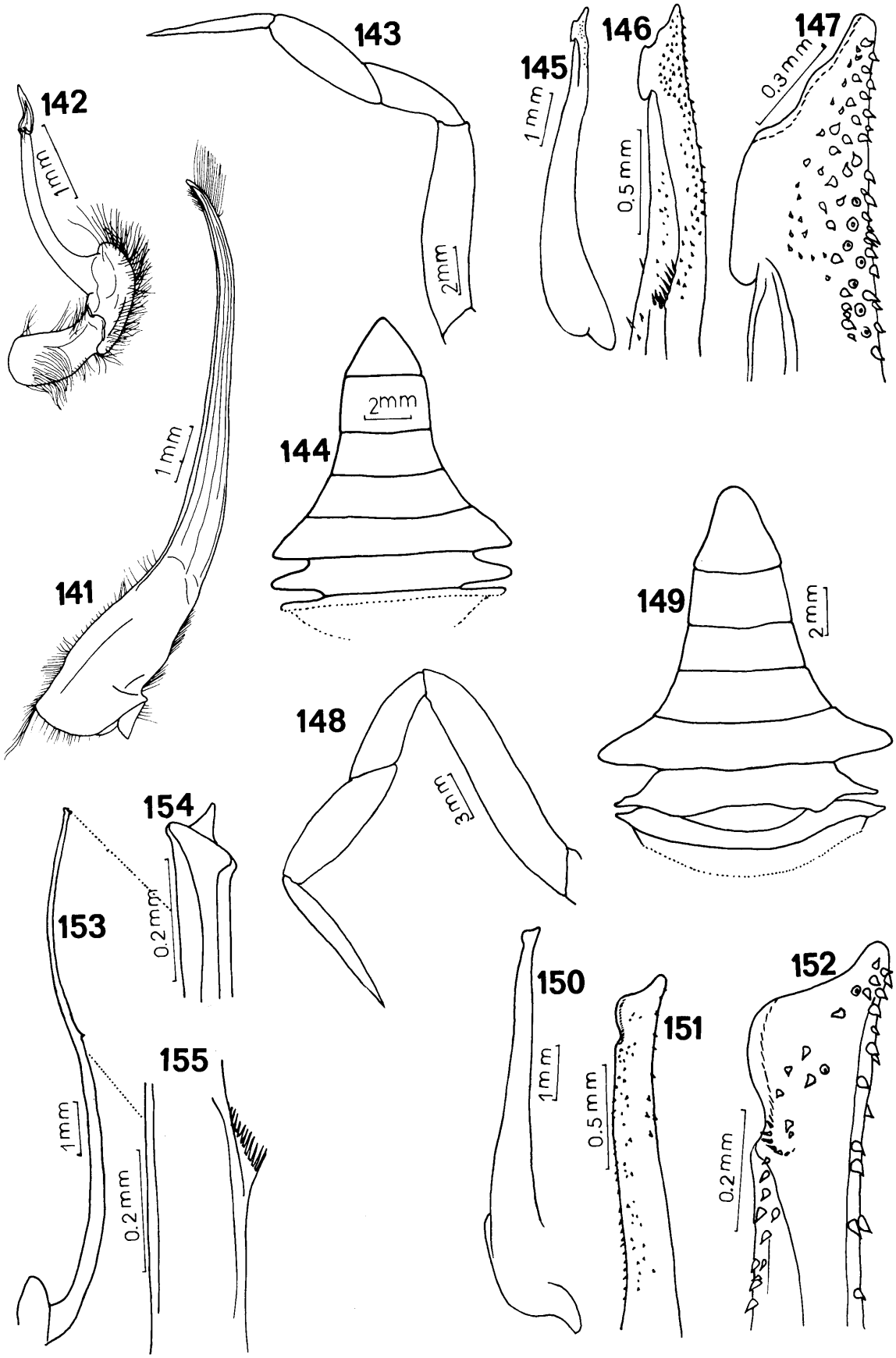
Carcinoplax purpurea Rathbun, Ng. 152, male of 19 x 28 mm

Figure 148. Pereiopod 5.

Figure 149. Abdomen.

Figures 150, 151 and 152. Pleopod 1.

Figures 153, 154 and 155. Pleopod 2.


142
1mm
143
2mm
145
1mm
146
0.5mm
147
0.3mm
144
2mm
141
1mm
149
2mm
148
3mm
154
0.2mm
153
155
1mm
0.2mm
150
1mm
151
0.5mm
152
0.2mm

FIGURES 156-165

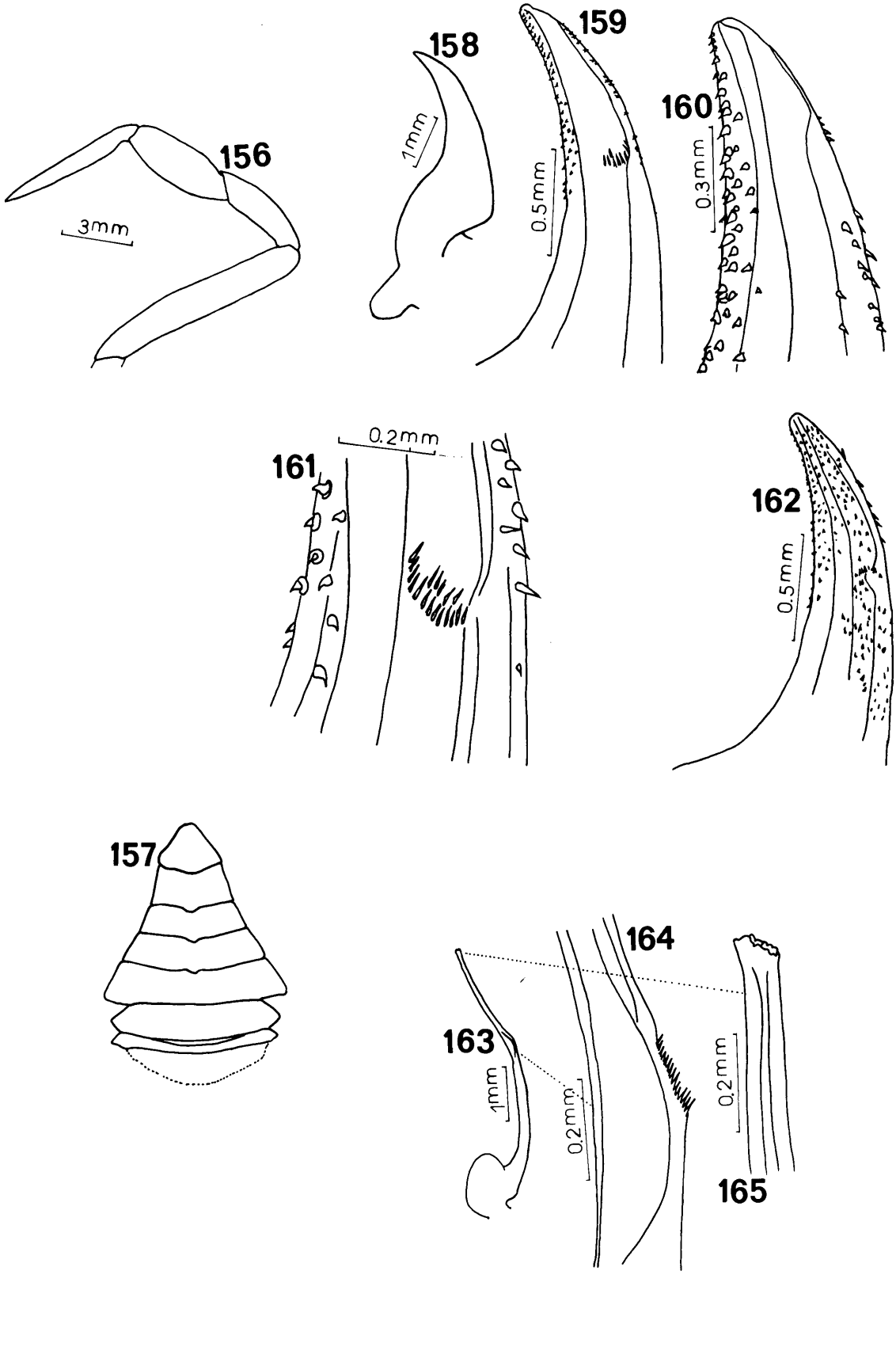
Carcinoplax bispinosa Rathbun, NMS. 1968.3.29.2, male of 13 x 14 mm

Figure 156. Pereiopod 5.

Figure 157. Abdomen.

Figure 158, 159, 160, 161 and 162. Pleopod 1.

Figure 163, 164 and 165. Pereiopod 2.


156
3mm
158
1mm
159
0.5mm
160
0.3mm
161
0.2mm
162
0.5mm
157
163
1mm
0.2mm
164
0.2mm
165

FIGURES 166-173

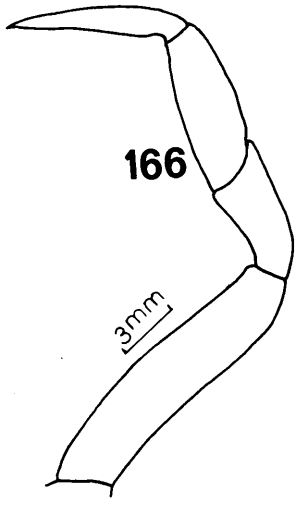
Carcinoplax meridionalis Rathbun, NMS. 1965.11.24.4, male of 19 x 25 mm

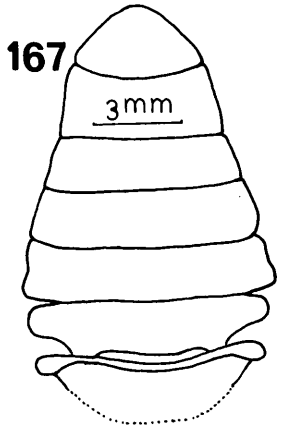
Figure 166. Pereiopod 5.

Figure 167. Abdomen.

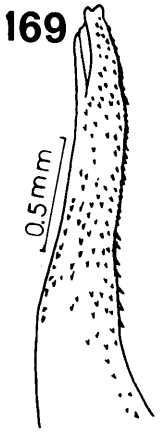
Figures 168, 169 and 170. Pleopod 1.

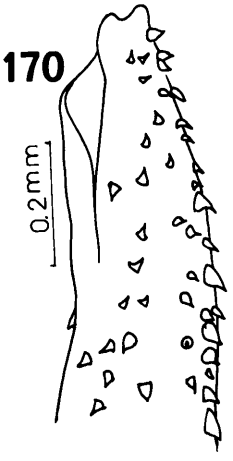
Figures 171, 172 and 173. Pleopod 2.

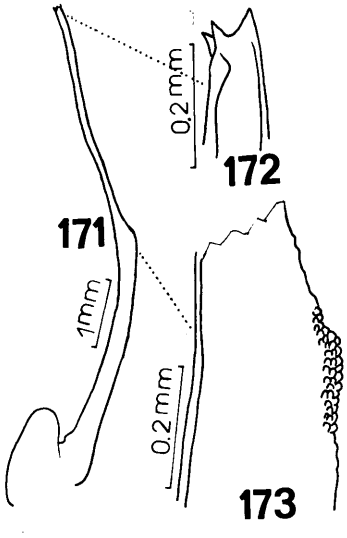

166
3mm


167
3mm


168
1mm


169
0.5mm


170
0.2mm


0.2mm
172
171
1mm
0.2mm
173

FIGURES 174-177

Carcinoplax confragosa ? Rathbun, Ng. 711, female of 9 x 10 mm

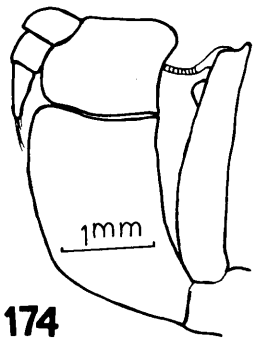
Figure 174. Third maxilliped.

Figure 175. Abdomen.

Neopilumnoplax heterochir (Studer), Ng., 694, female of 9 x 11 mm

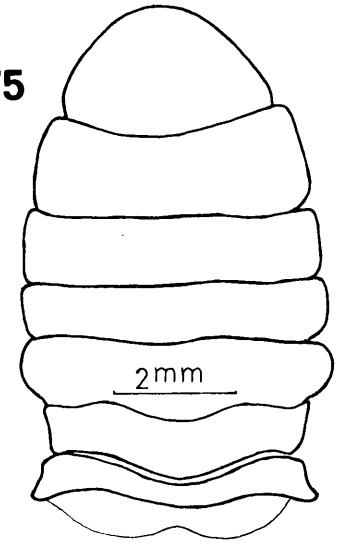
Figure 176. Third maxilliped.

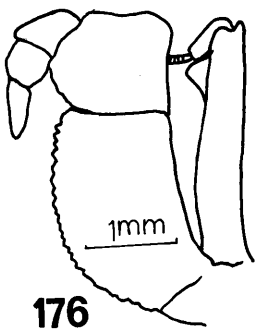
Figure 177. Abdomen.



174

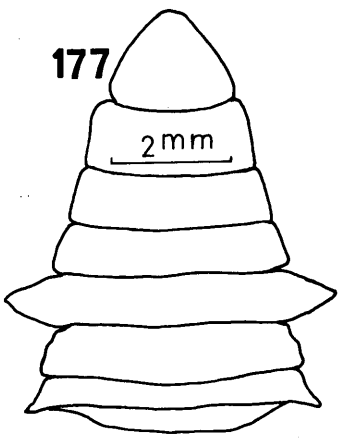
175





176

177

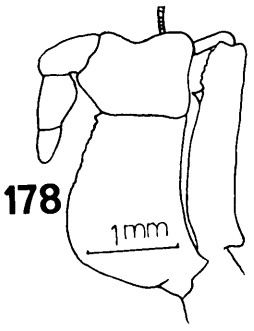


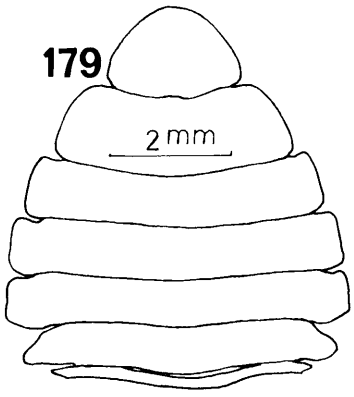
FIGURES 178-186

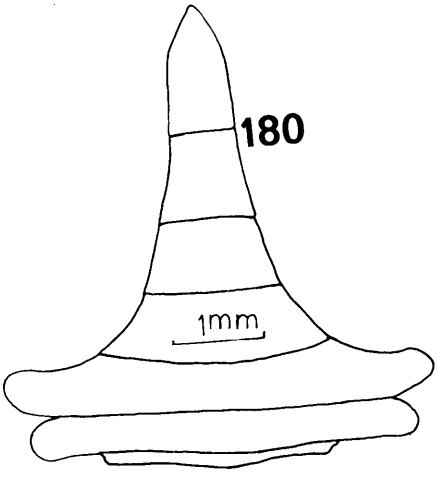
Heteroplax dentatus Stimpson,
R.S. 843, female of 12.5 x 9 mm,
Figure 178. Third maxilliped.
Figure 179. Abdomen.
R.S. 842, male of 11.5 x 7.5 mm
Figure 180. Abdomen.
Figures 181 and 182. Pleopod 1.

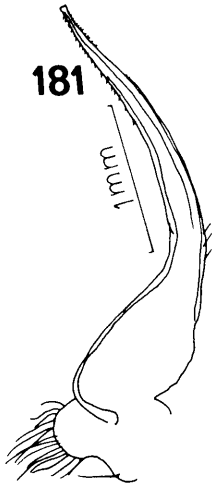
Heteroplax transversus Stimpson, R.S. 111, female of 9 x 6.5 mm
Figure 183. Third maxilliped.
Figure 184. Abdomen.

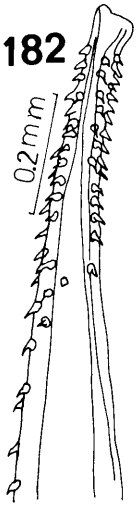
Lophoplax teschi Serène, Holotype, Ng. 862, female of 11.5 x 14 mm
Figure 185. Third maxilliped.
Figure 186. Abdomen.

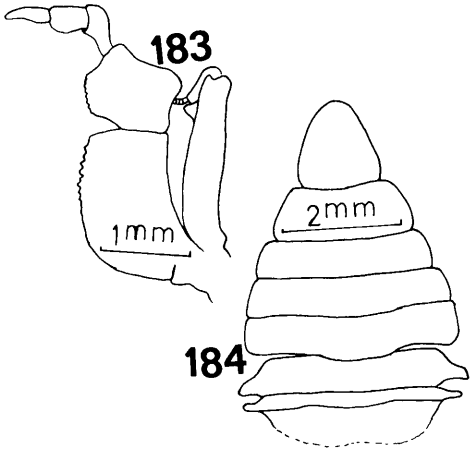

178
1mm


179
2mm


180
1mm


181
1mm


182
0.2mm


183
1mm
2mm
184

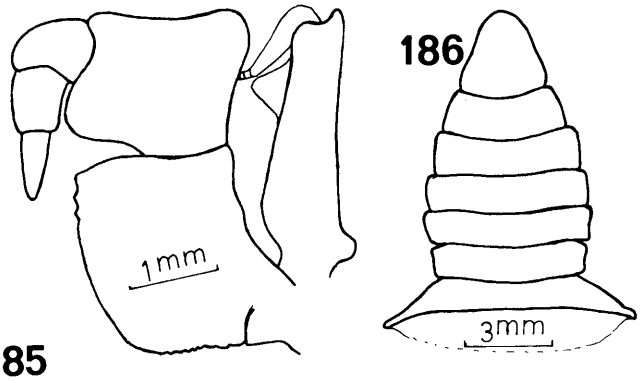

185
1mm
186
3mm

PLATE I

Conchoecetes andamanicus Alcock, Ng. 137, male of 19 x 19 mm

A. Dorsal view.

B. Fronto-orbital region.

C. Ventral view.

D. Chelipeds.

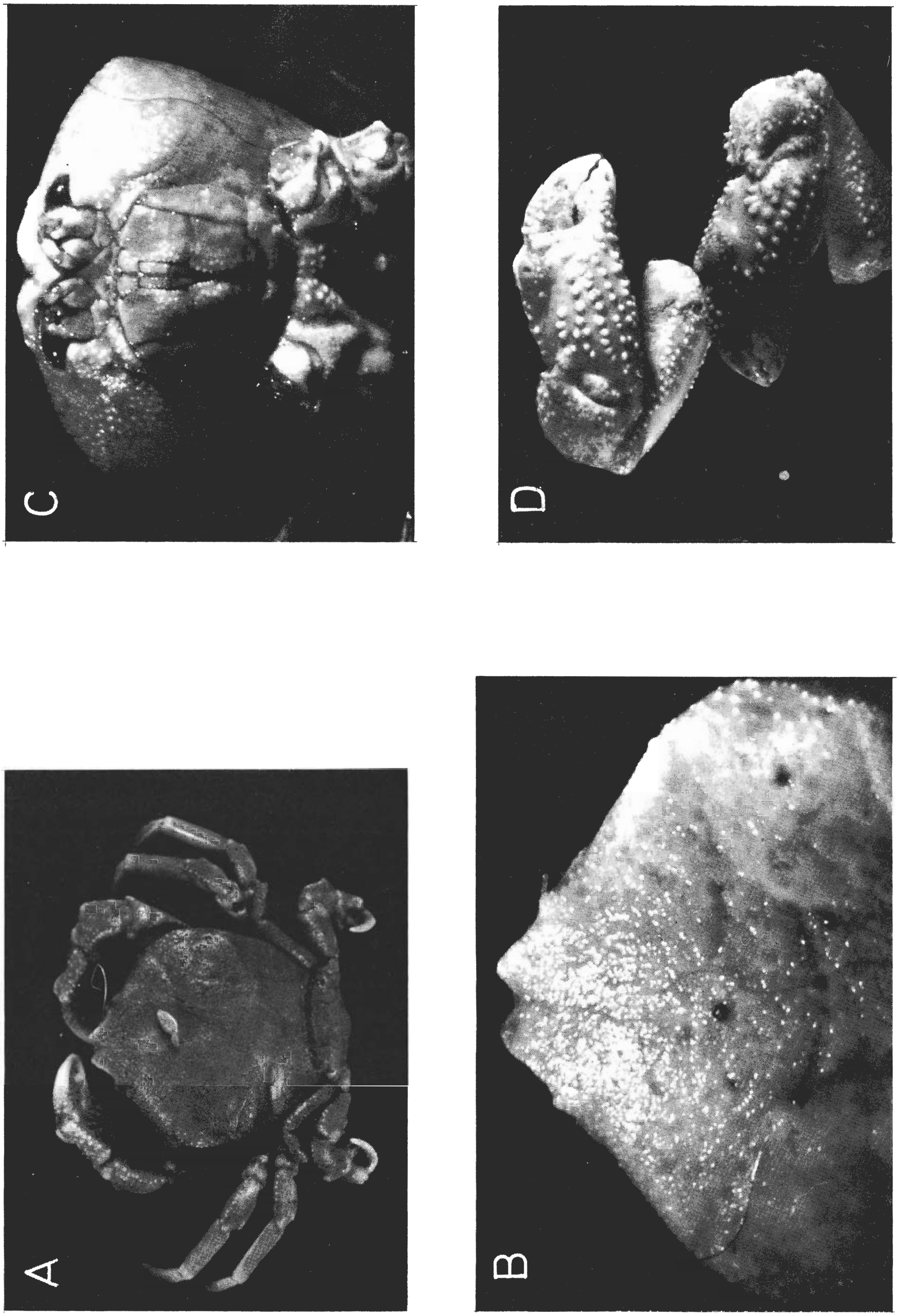

C
D
A
B

PLATE II

Cryptodromia areolata Ihle, Ng. 1026, male of 7 x 7 mm

A. Dorsal view.

Dromidiopsis cranioides (de Man), Ng. 690A, male of 30 x 29 mm

B. Dorsal view, natural condition.

C. Dorsal view, without tomentosum.

D. Cheliped.

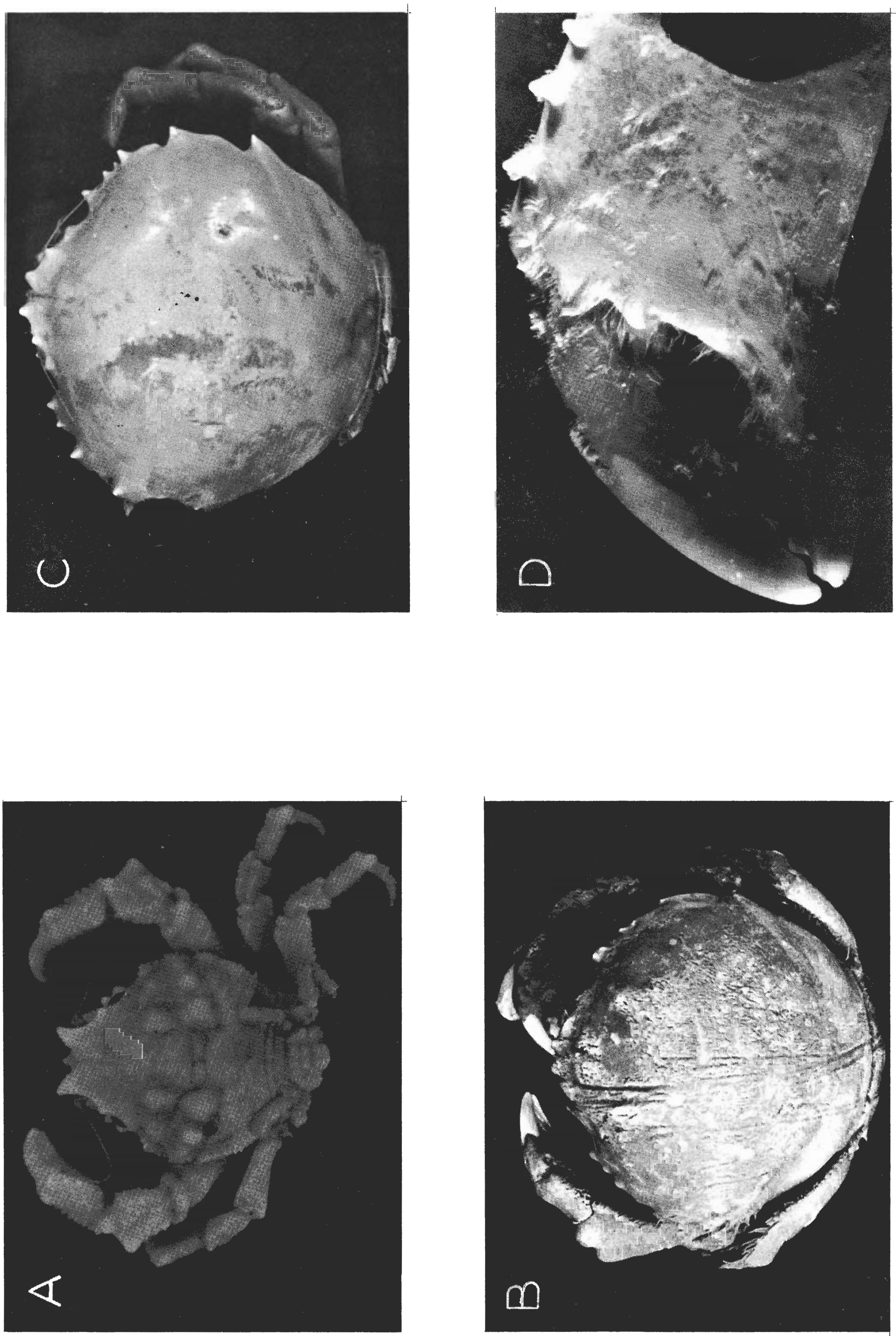

C
D
A
B

PLATE III

Homola orientalis Henderson, Ng. 695, male of 8.5 x 11 mm

A. Dorsal view.

B. Anterior part of carapace.

Paromola alcocki faughni new subspecies, Holotype, Ng. 723, male of 34 x 24 mm

C. Dorsal view.

Paromolopsis boasi Wood-Mason, Ng. 722, male of 34 x 30 mm

D. Dorsal view.

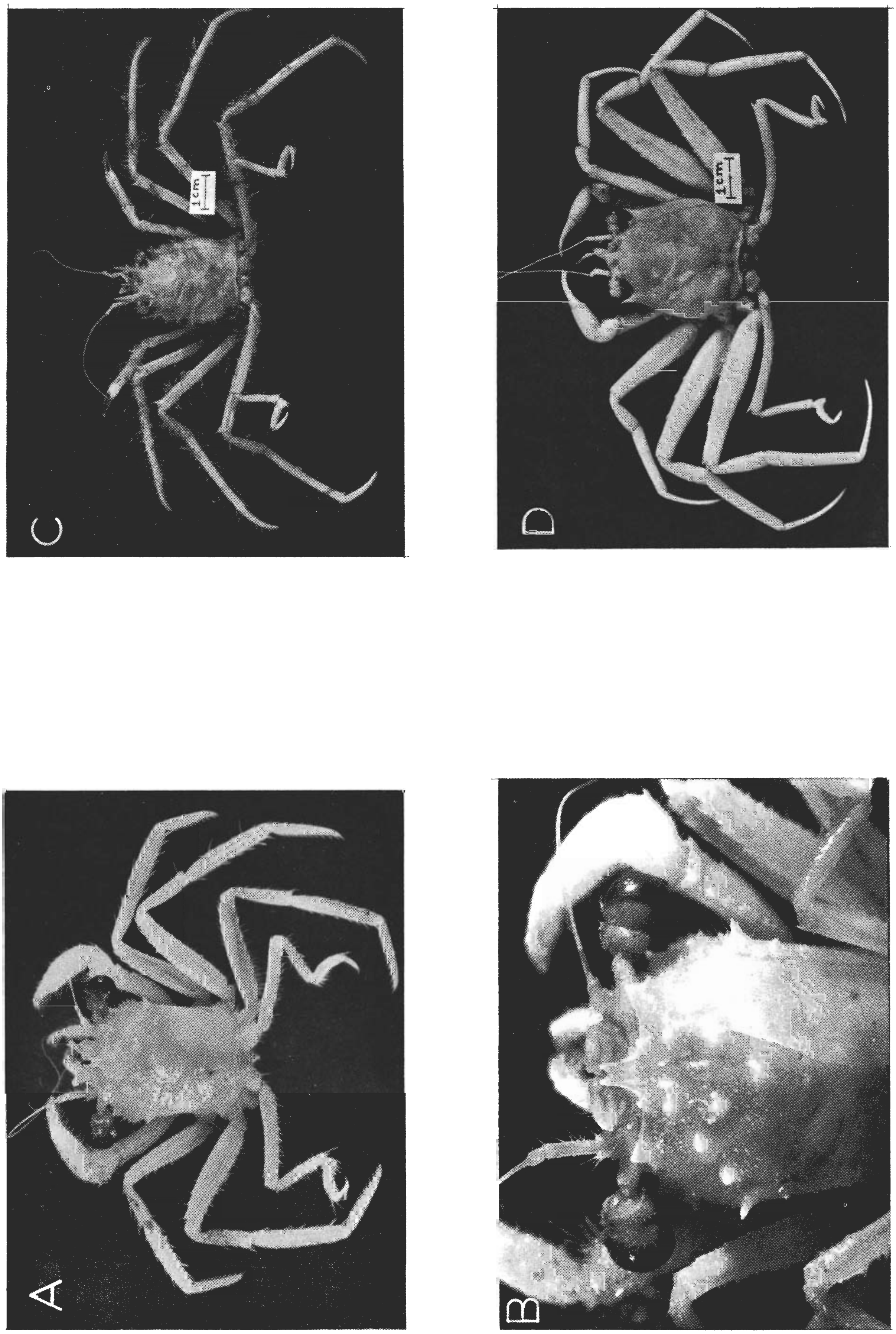

A
B
C
1 cm
D
1 cm

PLATE IV

Hypsophrys superciliosa Wood-Mason, Ng. 731, female of 25 x 22 mm

A. Dorsal view.

Latreillopsis bispinosa Henderson, Ng. 638, female of 10 x 7 mm

B. Dorsal view.

Ethusa gracilipes (Miers), Ng. 743, male of 5.5 x 5 mm

C. Dorsal view.

D. Anterior part of carapace.

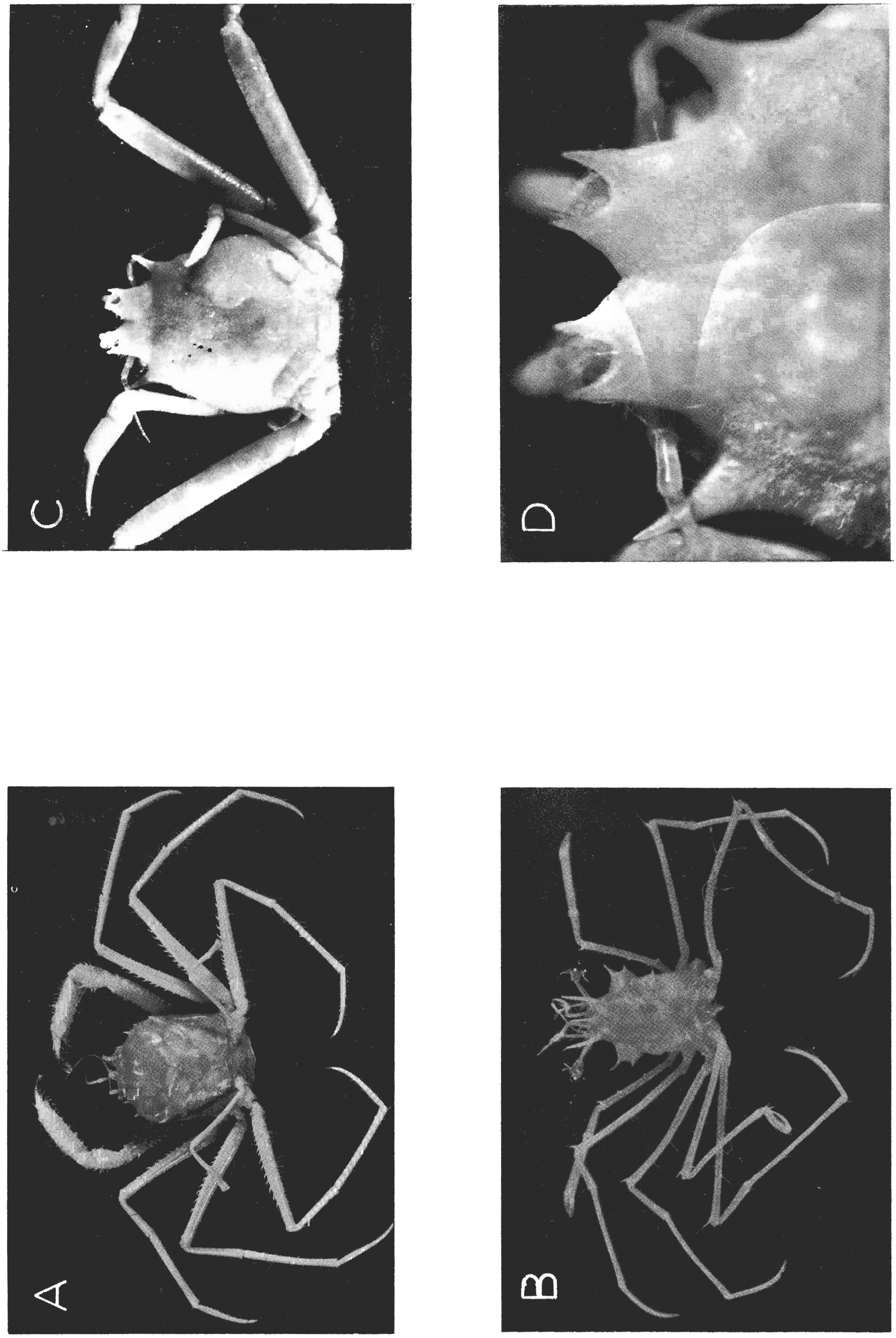

C
D
A
B

PLATE V

Pariphiculus coronatus (Alcock and Anderson), Z.S.I., Type, male of 16 x 17 mm

A. Dorsal view.

Pariphiculus mariannae (Herklots), Ng. 858, female of 22 x 19.5 mm

B. Dorsal view.

Pariphiculus agariciferus Ihle, Ng. 700, male of 14.5 x 14.5 mm

C. Dorsal view.

Ixoides cornutus MacGilchrist, Ng. 861, female of 20 x 38.5 mm

D. Dorsal view.

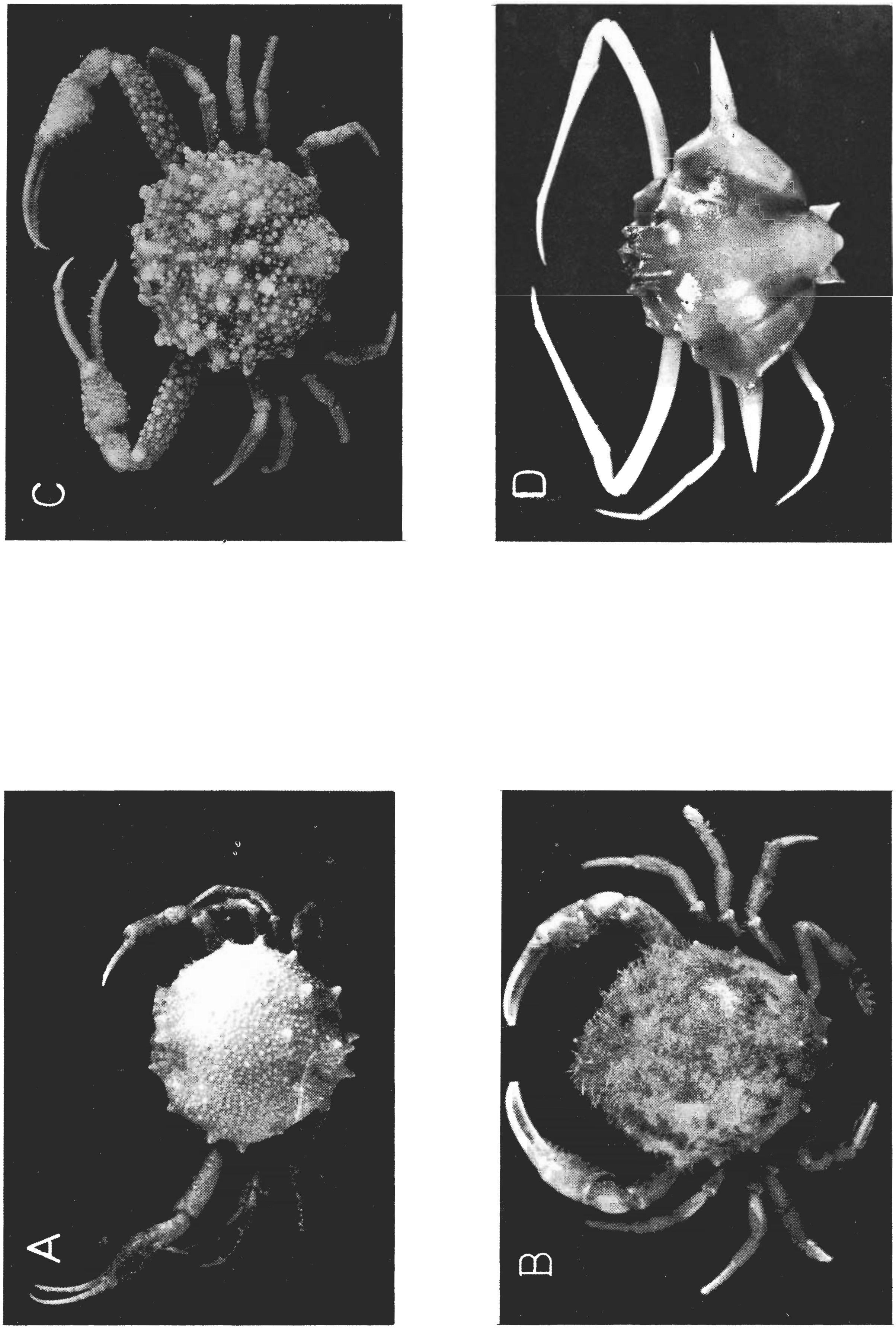

C
D
A
B

Plate VI

Ixa pulcherrima (Haswell), NMCR 1186, female of 14.5 x 8 mm

A. Dorsal view.

Ixa cylindra (Fabricius), (ION) female of 27 x 57 mm

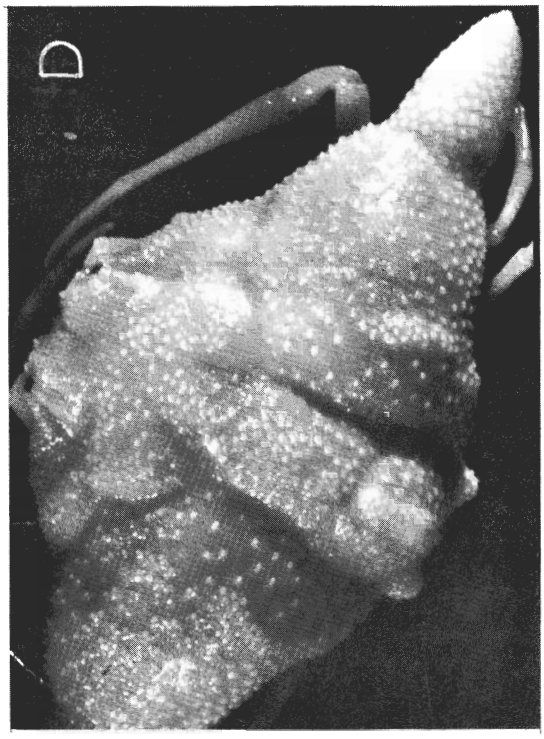
B. Dorsal view.

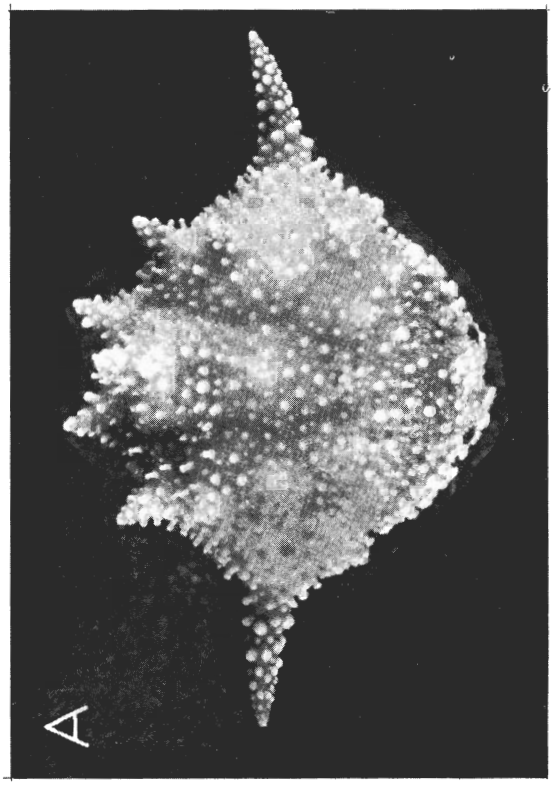
Ixa edwardsi Lucas, IMRI. C.1314, female of 17 x 37 mm

C. Dorsal view.

D. Anterior part of carapace.


C


D


A

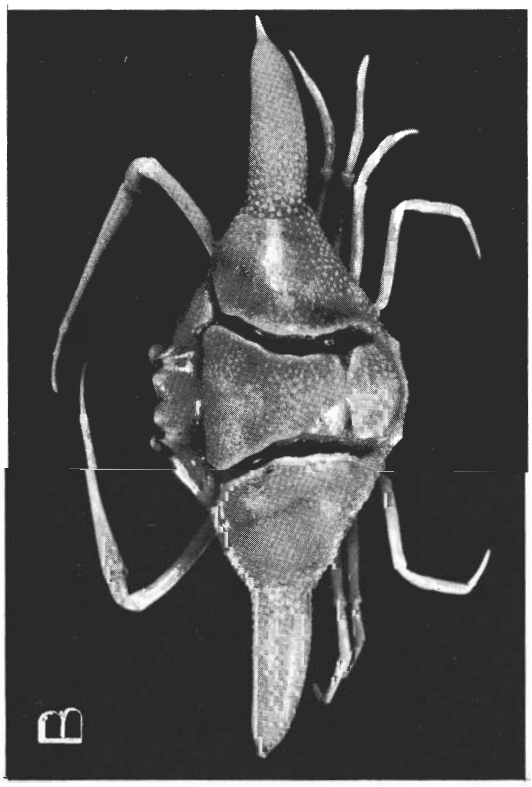

B

Plate VII

Pleistacantha oryx Ortmann, Ng. 600, female of 11.5 x 7 mm

A. Dorsal view.

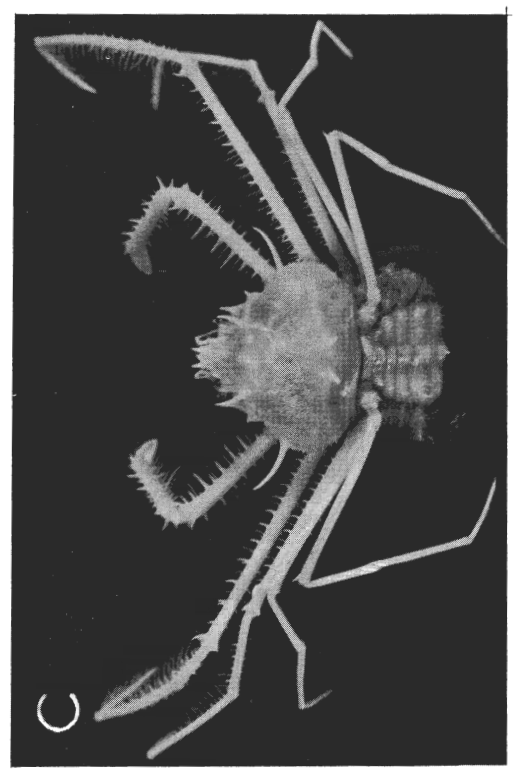
Pleistacantha sancti-johannis Miers, NMS. 1968.2.14.7., male of 20 x 12 mm and female of 25 x 18 mm

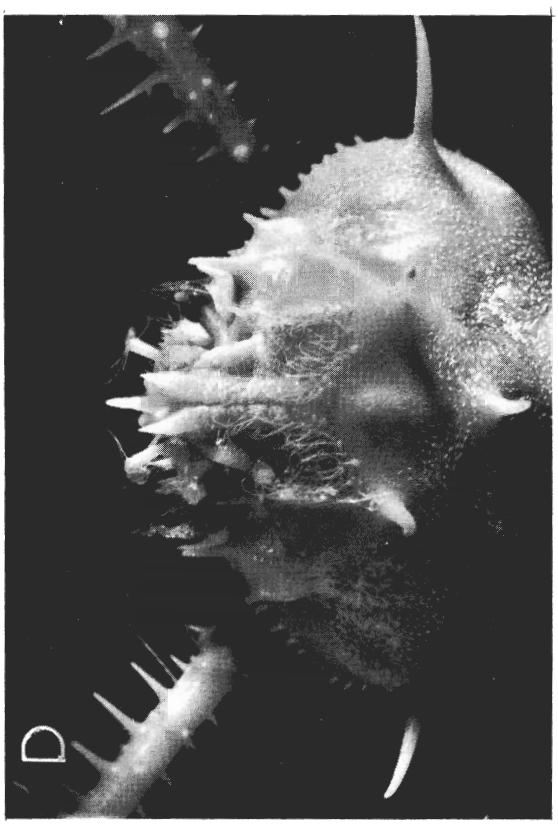
B. Carapaces.

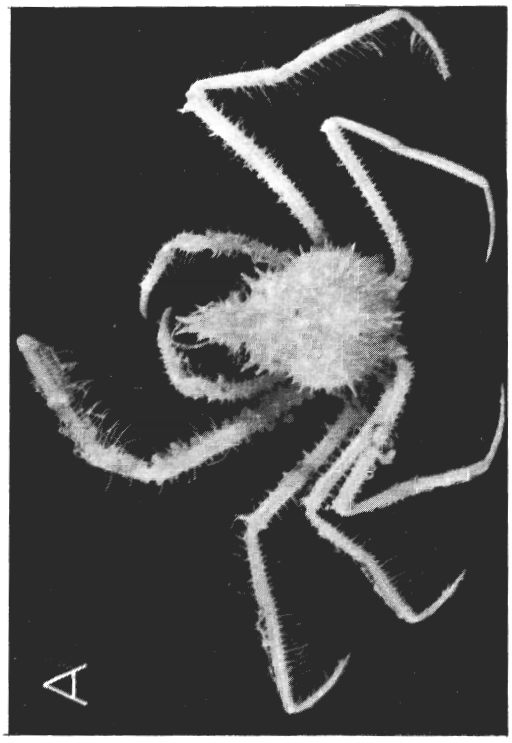
Cyrtomaja owstoni Terazaki, Ng. 724, female of 18.5 x 19 mm

C. Dorsal view.

D. Anterior part of carapace.


C


D


A

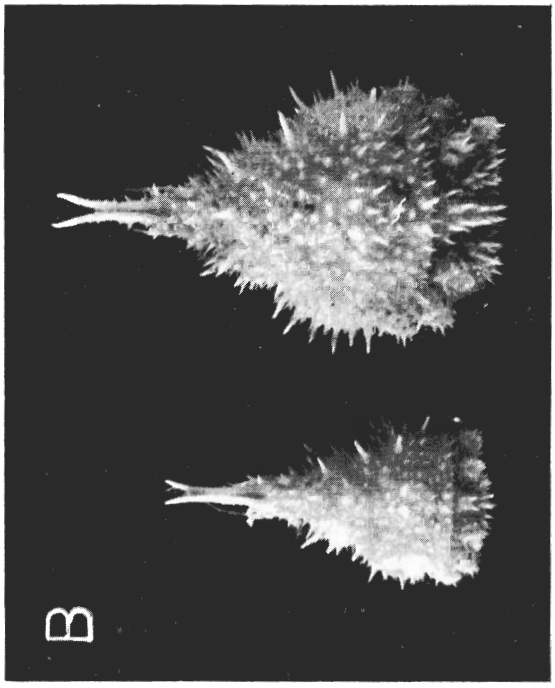
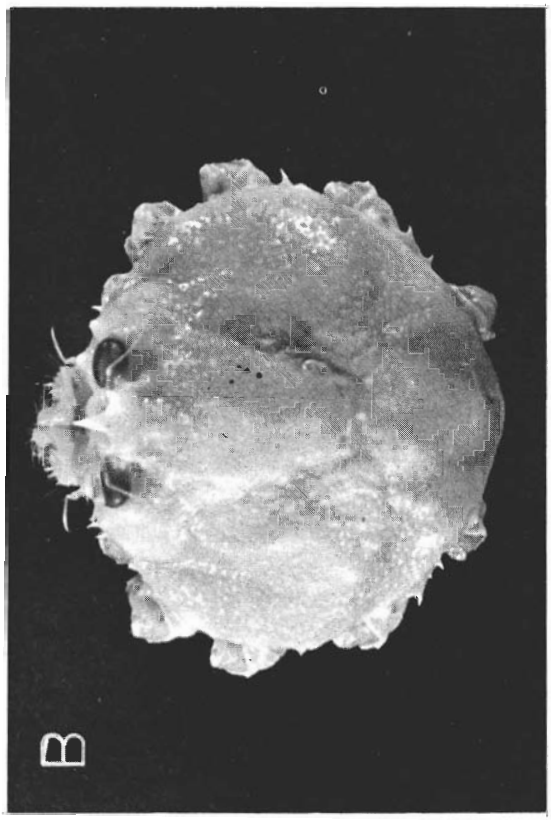
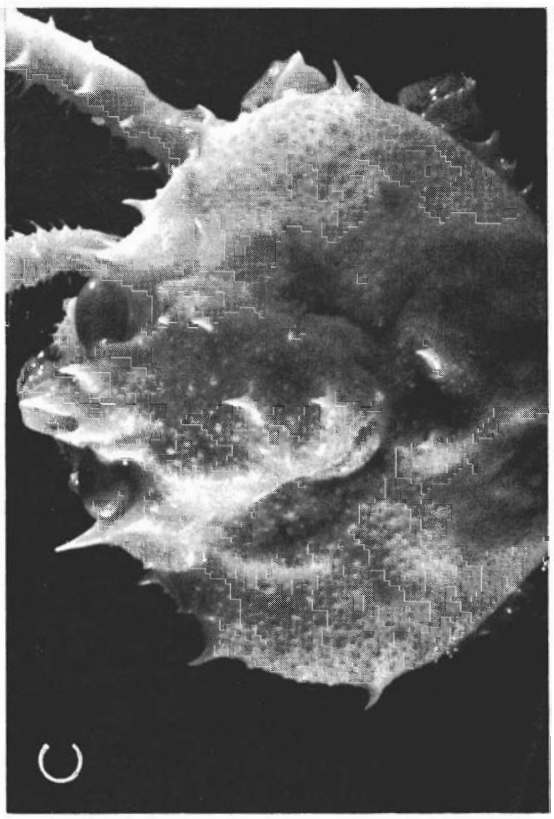

B

Plate VIII

Platymaja remifera Rathbun, NMS. 1968.2.13.7.,
male of 40 x 40.5 mm,
A. Dorsal view.
male of 33 x 34 mm,
B. Carapace.
female of 31 x 30 mm,
C. Carapace.


B


C

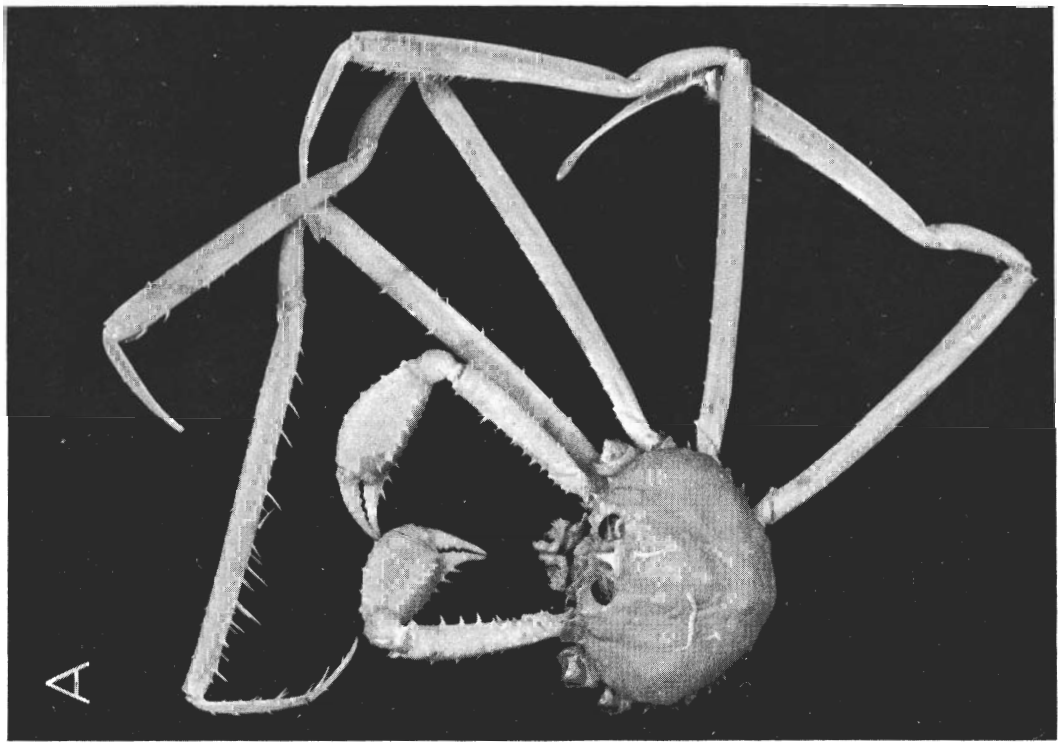

A

PLATE IX

Maja japonica Rathbun, Ng. 1024, male of 16 x 11.5 mm

A. Dorsal view.

Maja gibba Alcock, female of 52 x 38 mm (Kasijan coll.)

B. Dorsal view.

Naxioides mamillata Ortmann,

Ng. 599, male of 23 x 10 mm,

C. Dorsal view.

NMS. 1968.2.14.14, male of 50 x 24 mm,

D. Dorsal view.

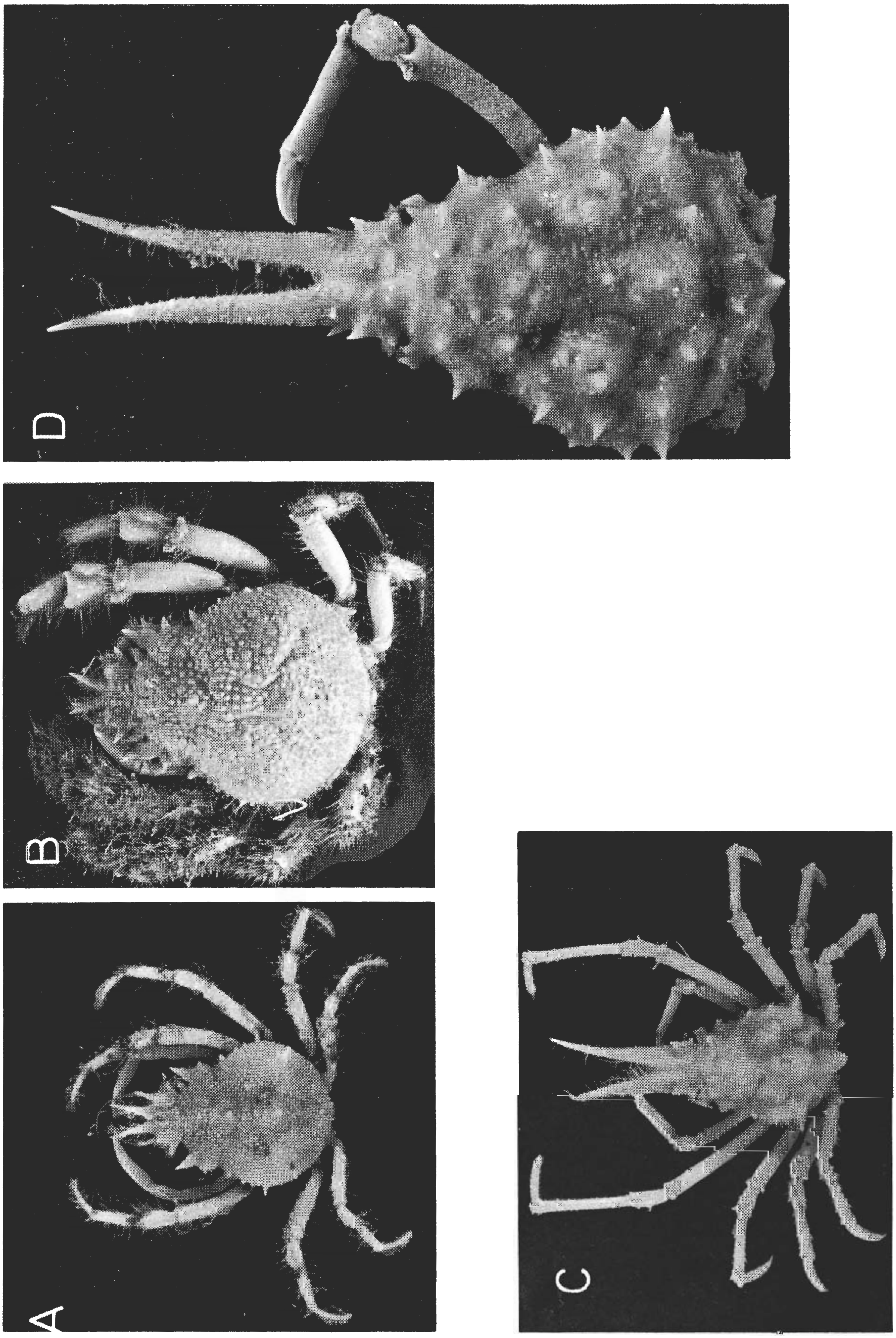

D
B
A
C

PLATE X

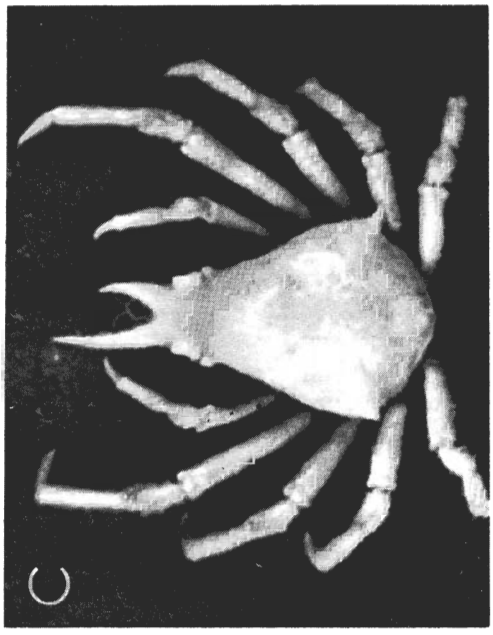
Hyastenus aries (Latreille), NMS. 1973.3.9.1., male of 47 x 26.5 mm

A. Dorsal view.

B. Lateral view.

Hyastenus diacanthus (de Haan), NMS. 1973.3.9.2., male of 36 x 21 mm

C. Dorsal view.


C


A

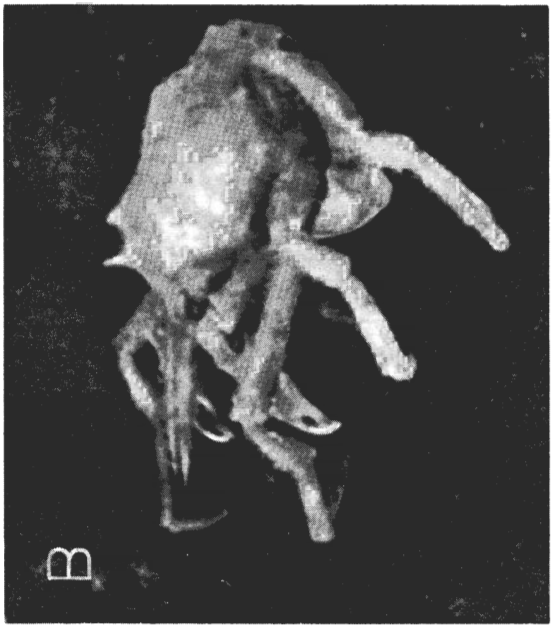

B

PLATE XI

Rochinia pulchra (Miers), NMS. 1968.2.13.4., male of 30 x 17 mm

A. Dorsal view.

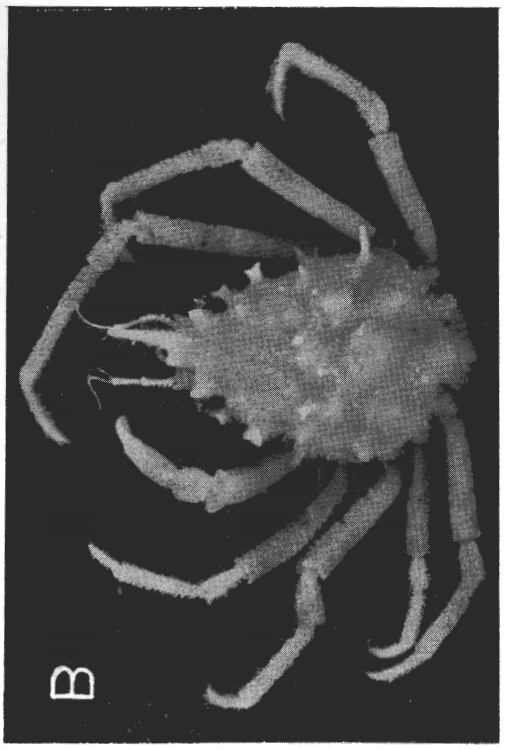
Rochinia strangeri new species,

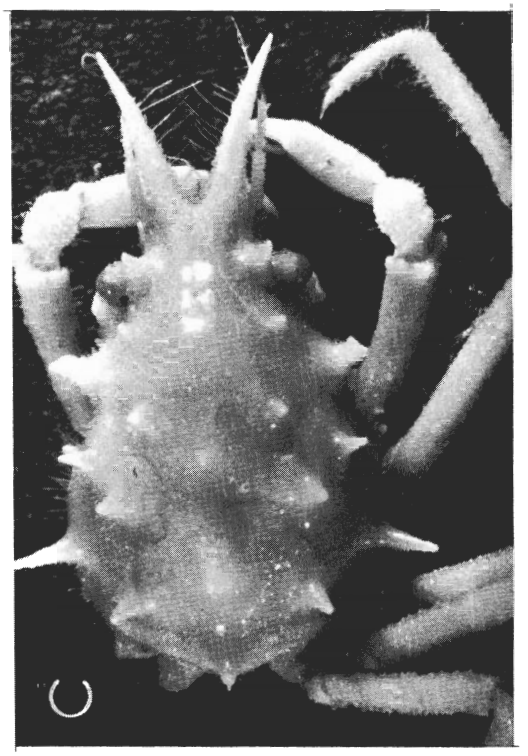
Ng. 742, Paratype, female of 18 x 13 mm

B. Dorsal view.

Ng. 744, Type, male of 15 x 9.15 mm

C. Dorsal view (ION Ph. 1038).


B


C

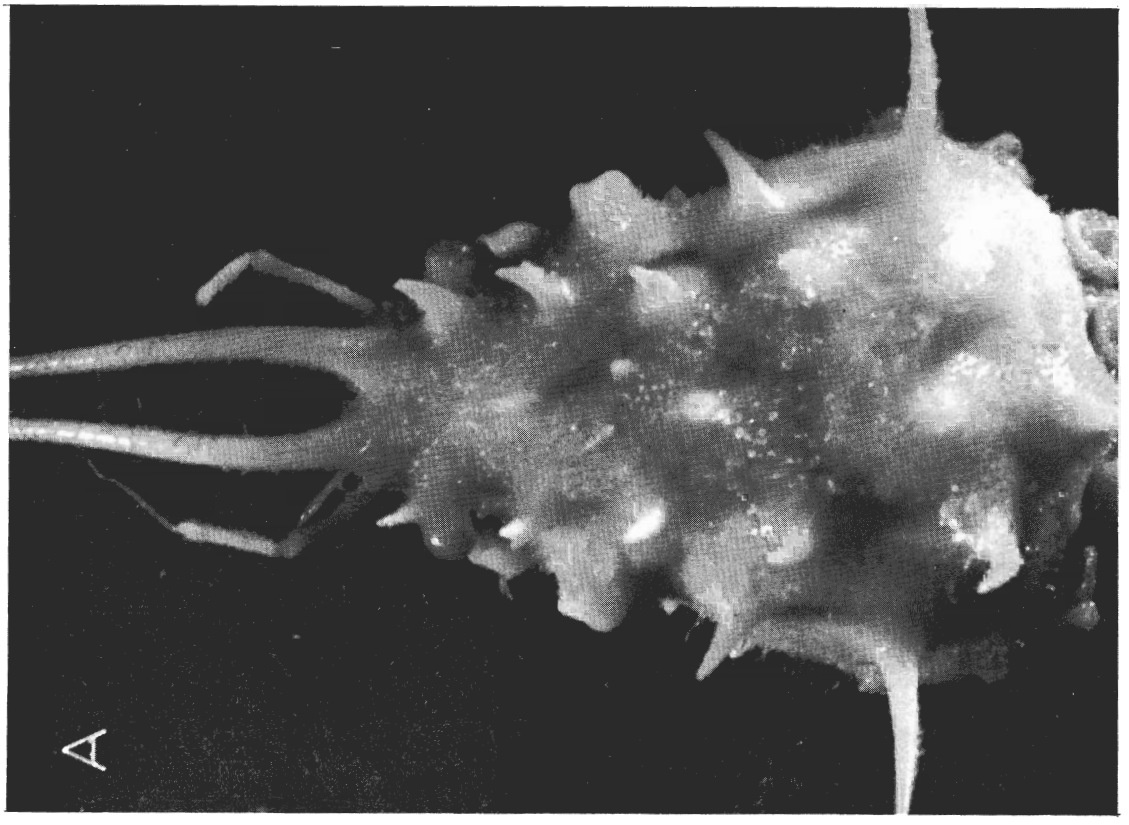

A

Plate XII

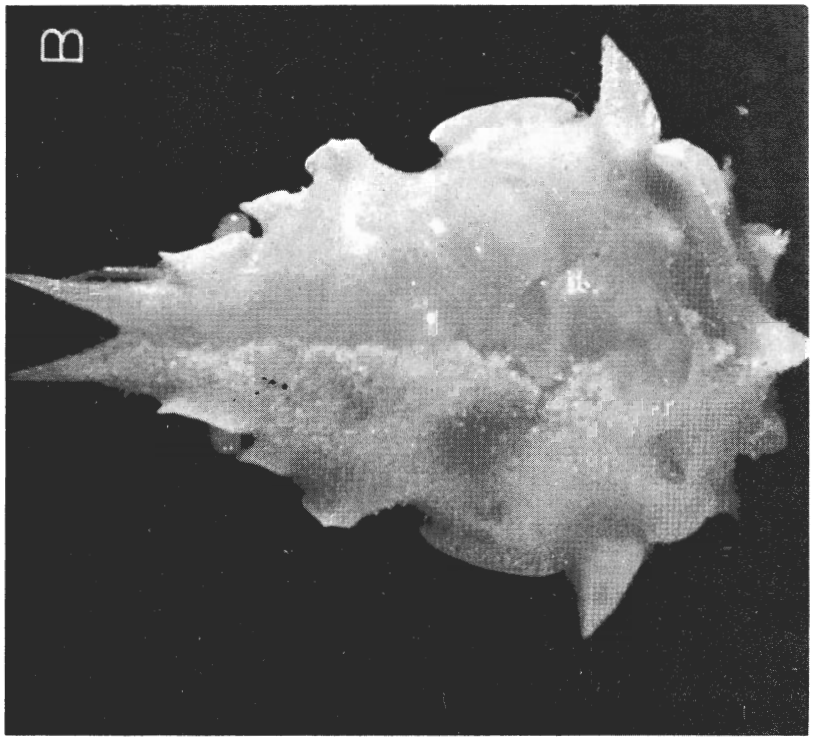
Rochinia rivers-andersoni (Alcock), NMS. 1968.2.15.2, male of 30 x 23 mm

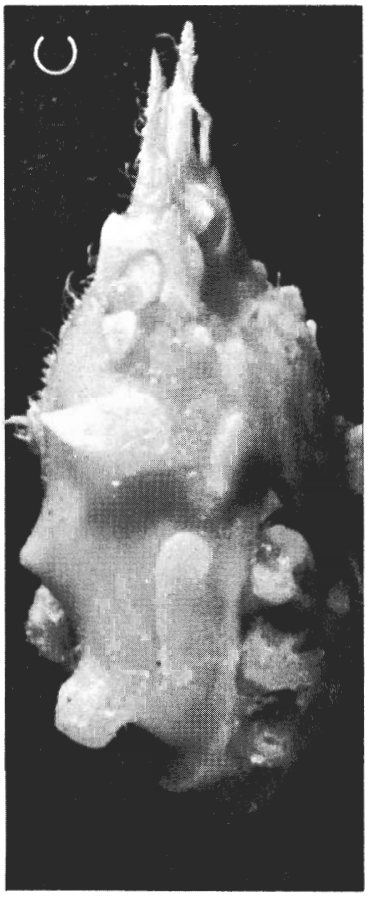
A. Dorsal view.

Rochinia velutina (Miers), NMS. 1968.2.13.2., male of 17 x 12.5 mm

B. Dorsal view.

C. Lateral view.


B


C

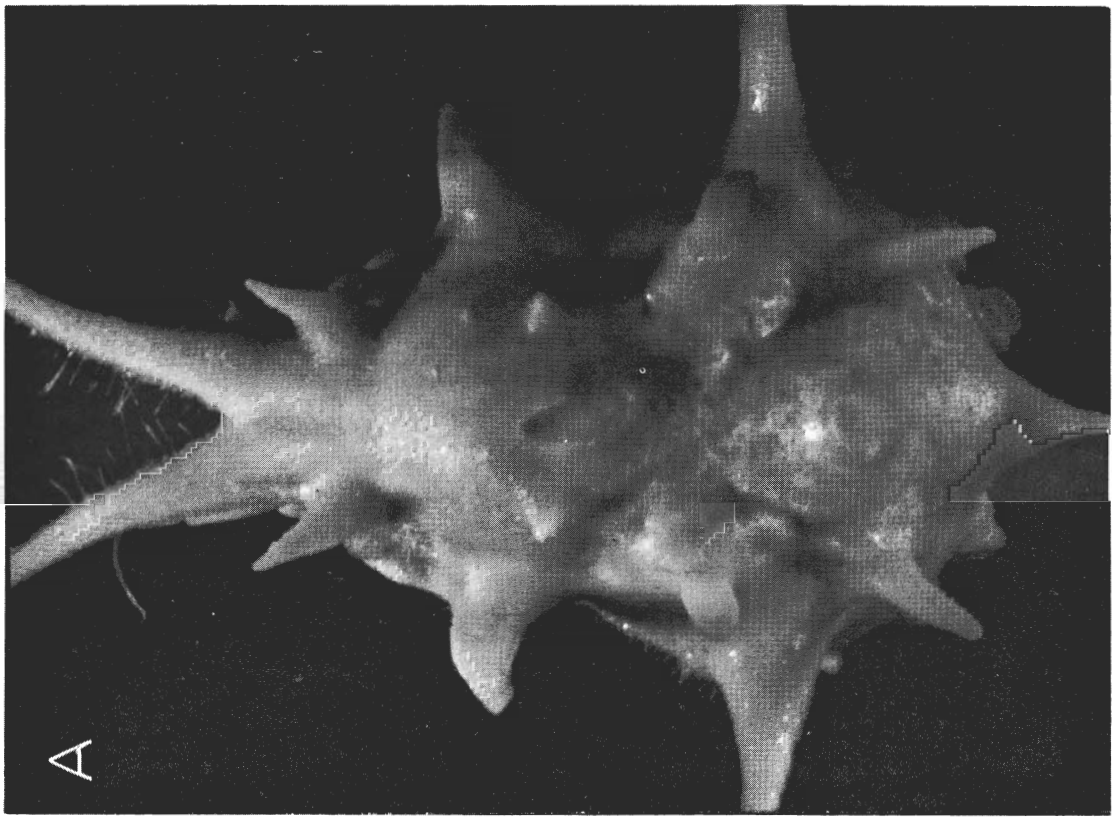

A

PLATE XIII

Parathranites orientalis Miers, Ng. 696, male of 14.5 x 18.5 mm

A. Dorsal view.

Ralumia balssi Sakai, Ng. 699, female of 5 x 6 mm

B. Dorsal view.

C. Right cheliped.

Demania rotundata Serène, Ng. 690B, male of 20.5 x 30.5 mm

D. Dorsal view.

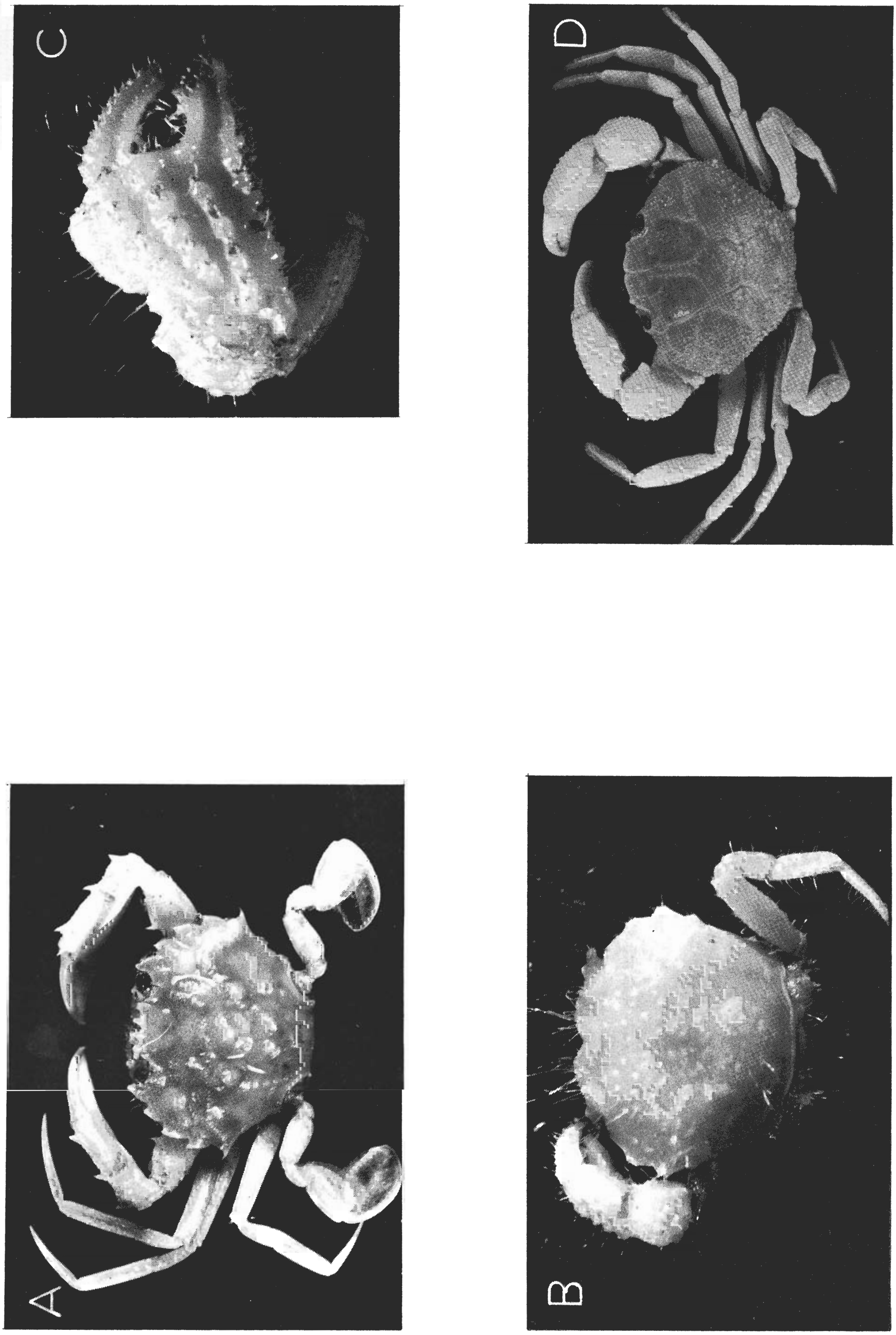

C
D
A
B

PLATE XIV

Carcinoplax longimana (de Haan), Ng. 577, male of 18.5 x 25 mm

A. Dorsal view.

Carcinoplax purpurea Rathbun,

NMS. 1968.3.29.1., male of 22 x 23 mm,

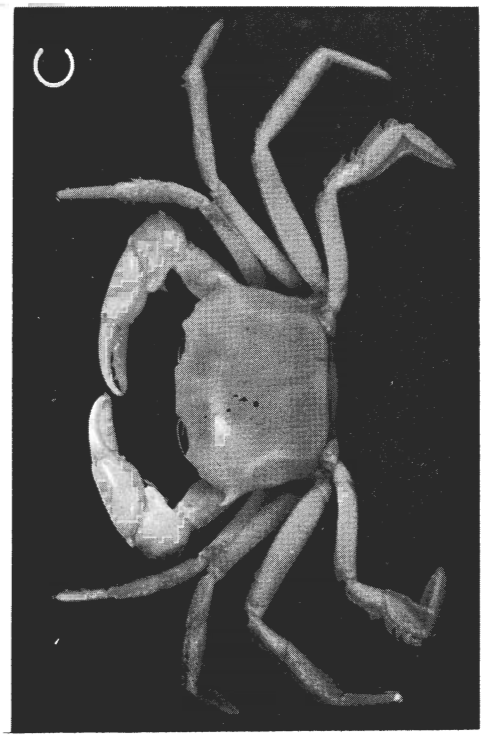
B. Dorsal view.

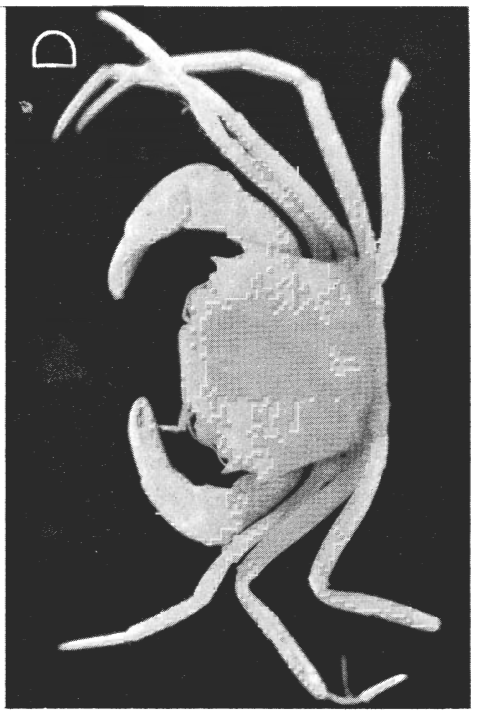
Ng. 152, male of 19 x 28 mm,

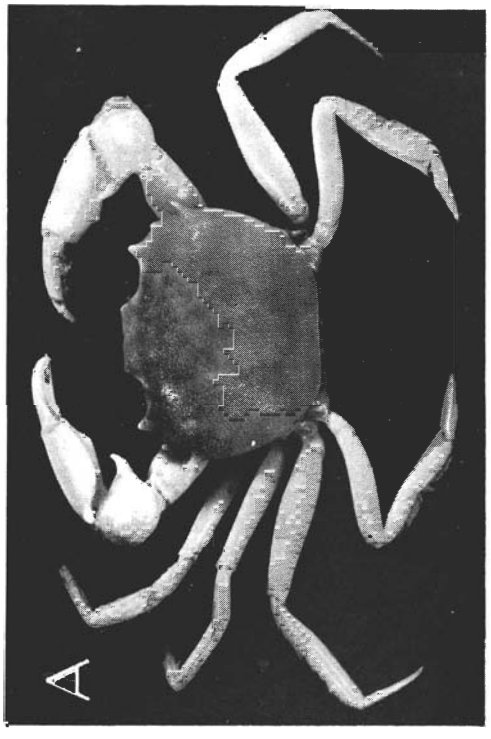
C. Dorsal view.

Carcinoplax longipes (Wood-Mason), Z.S.I., Cotype, male of 12 x 10 mm

D. Dorsal view


C


D


A

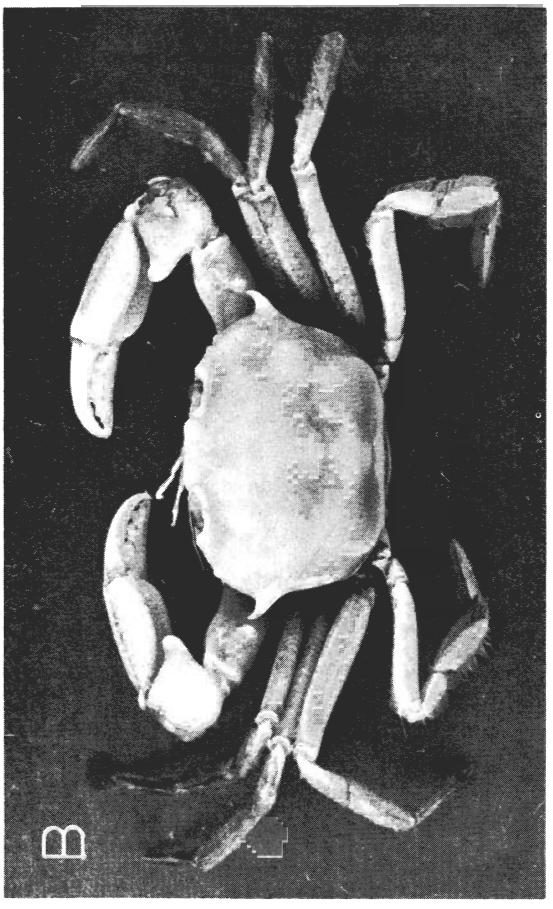

B

Plate XV

Carcinoplax longimana (de Haan), Ng. 577, male of 18.5 x 25 mm

A. Carapace.

Carcinoplax purpurea Rathbun, Ng. 152, male of 19 x 28 mm

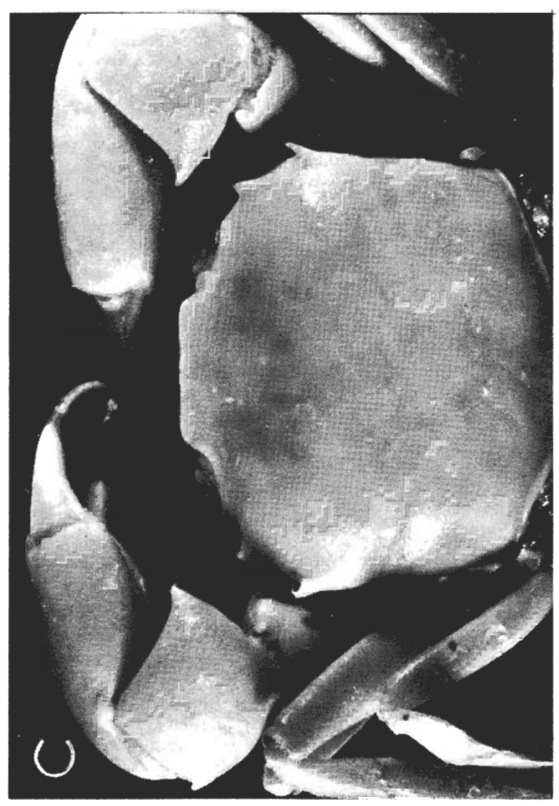
B. Carapace.

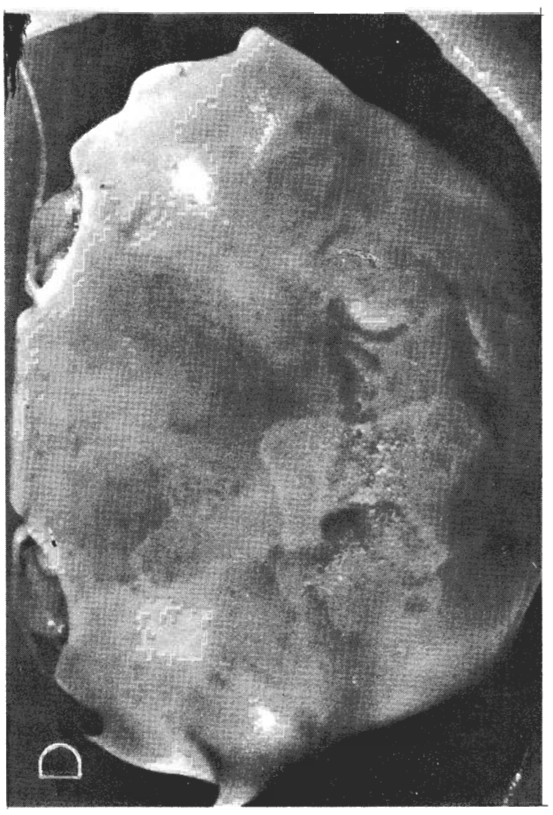
Carcinoplax bispinosa Rathbun, NMS. 1968.3.29.2., male of 13 x 14 mm

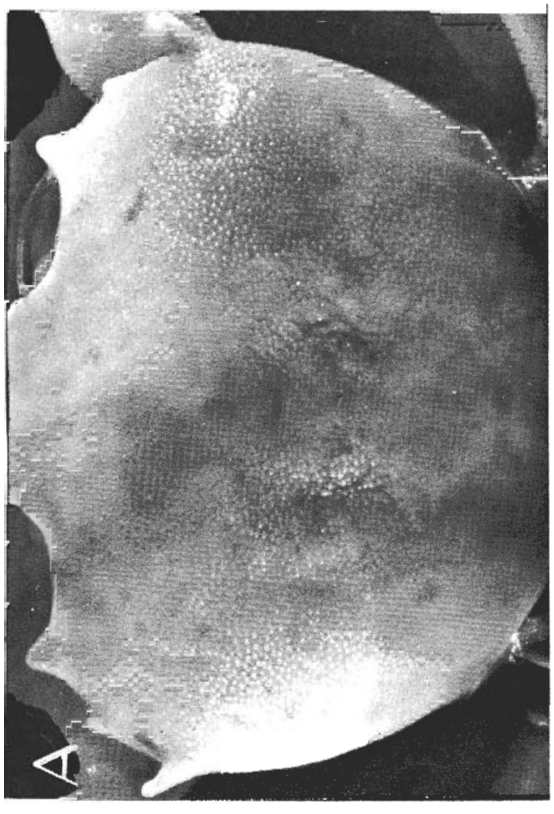
C. Dorsal view.

Carcinoplax meridionalis Rathbun, NMS. 1965.11.24.4., male of 19 x 25 mm

D. Carapace.


C


D


A

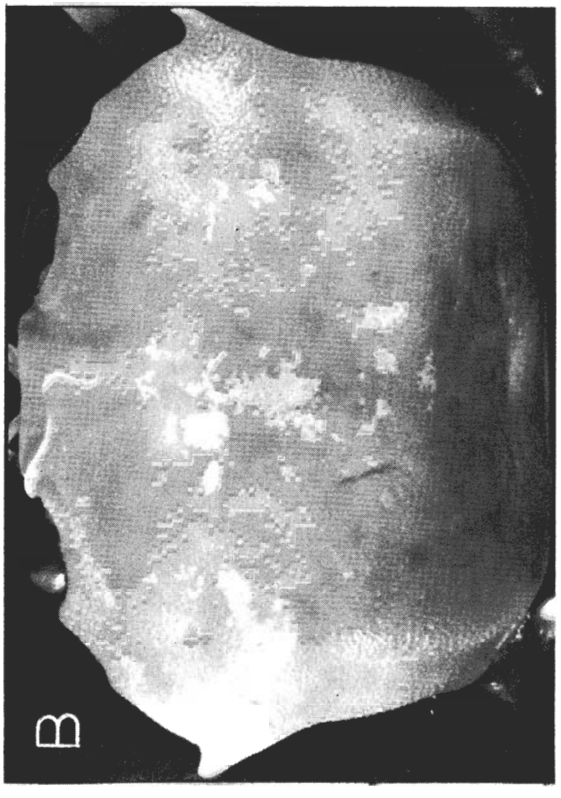

B

PLATE XVI

Carcinoplax confragosa ? Rathbun, Ng. 711, female of 9 x 10 mm

A. Dorsal view.

Eucrate alcocki Serène,

Type, ION. 9688, male of 20 x 25 mm

B. Dorsal view.

ION. 41144, juvenile female of 8 x 6.5 mm

C. Dorsal view.

Neopilumnoplax heterochir (Studer), Nt. 694, female of 9 x 11 mm

D. Dorsal view.