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ZOOLOGICAL RESULTS OF A TOUR IN THE FAR EAST.

CRUSTACEA DECAPODA AND STOMATOPODA.

By STANLEY KEMP, B.A., F.A.S.B.

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ZOOLOGICAL RESULTS OF A TOUR IN THE FAR EAST.

DECAPOD AND STOMATOPOD CRUSTACEA.

By STANLEY KEMP, B.A., F.A.S.B.,
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The collection of Decapoda and Stomatopoda made by Dr. Annandale during his recent tour is one of very great interest and I am much indebted to him for the opportunity of examining it. It contains ninety-five species and subspecies all of which were obtained in fresh or brackish water.

The chief value of the collection lies in the precise information it affords regarding the environment of the different species. Little attention has been paid to this matter hitherto; when doubts arise as to the habitat of a particular form, the published accounts generally prove valueless and even where the most exact details of the locality are given no reference is as a rule made to the salinity of the water. In consequence, the number of forms which have succeeded in establishing themselves in fresh water has probably been much under-estimated; in the collection under consideration members of no less than twelve genera and subgenera were found living far beyond the reach of tidal influence.

The principal object of Dr. Annandale's tour was the investigation of the faunas of three lakes situated in eastern Asia,—Lake Biwa in Japan, the Tai Hu in the Kiangsu province of China, and the Tale Sap on the east coast of Peninsular Siam; maps and brief descriptions of these are given in the Introduction to this volume. The collection of Crustacea was, however, not restricted to the lakes; specimens were obtained in various parts of Japan, at three localities in China and at a number of places in the Malay Peninsula.

The Japanese collection contains examples of nine species and one subspecies, namely:—

<i>Eriocheir japonicus</i> (de Haan).	<i>Leander paucidens</i> (de Haan).
<i>Sesarma dehaani</i> (Milne-Edwards).	<i>Caridina denticulata</i> (de Haan).
<i>Helice tridens</i> , de Haan.	<i>Paratya compressa</i> (de Haan).
<i>Potamon</i> (<i>Geotelphusa</i>) <i>dehaani</i> (White).	„ „ subsp. <i>improvisa</i> , Kemp.
<i>Palaemon nipponensis</i> , de Haan.	<i>Acetes japonicus</i> , Kishinouye.

Helice tridens and *Acetes japonicus* probably came from water that was slightly brackish; all the remainder were found in pure fresh water. The only Decapods actually found in Lake Biwa are the three prawns *Leander paucidens*, *Caridina denticulata*, and *Paratya compressa*, but the crabs *Eriocheir japonicus* and *Potamon dehaani* are said to enter the lake at times.

Since 1849, when the concluding part of de Haan's magnificent work on Japanese Decapod Crustacea was published, a considerable number of important papers on the same subject have appeared, notable contributions having been made by Doflein, Miss Rathbun, de Man and Balss. The present collection does not in consequence make any striking addition to our knowledge of the non-marine forms, though it has been possible to demonstrate the existence in the main island of Japan of two distinct races of *Xiphocaridina* (more correctly *Paratya*) *compressa*.

Compared with Japan, China is from a carcinological point of view almost unknown and the collections from this country are in consequence of very great interest. Sixteen species were found in three distinct localities, all having been obtained in pure fresh water.

TAI HU LAKE, KIANGSU PROVINCE.

<i>Rhynchoplax introversus</i> , Kemp.	<i>Palaemon nipponensis</i> , de Haan.
<i>Eriocheir sinensis</i> (Milne-Edwards).	„ <i>asperulus</i> , von Martens.
<i>Potamon</i> (<i>Potamon</i>) <i>denticulatum</i> (Milne-Edwards).	<i>Leander modestus</i> , Heller.
	<i>Caridina denticulata</i> , subsp. <i>sinensis</i> , nov.

SHANGHAI AND THE WHANGPOO RIVER.

<i>Tympanomerus deschampsi</i> , Rathbun.	<i>Sesarma dehaani</i> , Milne-Edwards.
<i>Eriocheir sinensis</i> (Milne-Edwards).	<i>Leander annandalei</i> , Kemp.
„ <i>leptognathus</i> , Rathbun.	„ <i>modestus</i> , Heller.
<i>Sesarma intermedium</i> (de Haan).	<i>Palaemonetes sinensis</i> (Sollaud).
	<i>Caridina nilotica</i> subsp. <i>gracilipes</i> , de Man.

THE PEAK, HONGKONG.

<i>Potamon</i> (<i>Potamon</i>) <i>anacoluthon</i> , sp. nov.	<i>Caridina serrata</i> , Stimpson.
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It will be noticed that nine genera are represented in this collection, a very large number when it is remembered that all were found in fresh water. Three species and one subspecies had not previously been described; of these the *Rhynchoplax* is interesting in view of its habitat, while the *Leander* is of considerable importance in that it represents a type intermediate between Henderson's very remarkable *L. tenuipes* and the more normal members of the genus. *Tympanomerus deschampsi*, *Eriocheir leptognathus* and *Palaemonetes sinensis* are species only recently discovered; but our knowledge of *Palaemon asperulus*, *Leander modestus*, and *Caridina serrata* has hitherto rested on descriptions made more than fifty years ago. *Caridina nilotica* subsp. *gracilipes* is recorded far to the north of its previously known range and evidence is brought forward to show that the Chinese form of *Caridina denticulata* differs sufficiently from that found in Japan to warrant subspecific recognition.

The only species in Dr. Annandale's collections common to both China and Japan are *Sesarma dehaani* and *Palaemon nipponensis*.

The collection from the Tale Sap, a lagoon connected with the Gulf of Siam by means of a comparatively narrow channel, contains the largest number of species,

forty-seven forms being represented. At the mouth of the Patalung river and in the inner of the two lakes of which the Tale Sap is composed, the water was fresh at the time when the collection was made and probably remains so throughout the year. In the channel between the two lakes and in the outer lake it was brackish, specific gravities falling between 1.0015 and 1.0085.¹

The following species were obtained in these two regions:—

PATALUNG RIVER AND INNER LAKE OF TALE SAP.

Fresh water.

<i>Paratelphusa</i> (<i>Paratelphusa</i>) <i>germaini</i> (Rathbun).	<i>Palaemon elegans</i> , de Man.
<i>Palaemon carcinus</i> , Fabricius.	<i>Caridina propinqua</i> , de Man.
„ <i>lanchesteri</i> , de Man.	„ <i>gracillima</i> , Lanchester.
	„ <i>nilotica</i> , subsp. <i>macrophora</i> , nov.

OUTER LAKE OF TALE SAP AND CHANNEL BETWEEN LAKES.

Brackish water.

<i>Rhynchoplax exiguus</i> , Kemp.	<i>Dorippe astuta</i> , Fabricius.
<i>Gelasimus annulipes</i> , Latreille.	<i>Clibanarius longitarsis</i> (de Haan).
<i>Dotilla wichmanni</i> , de Man.	<i>Diogenes avarus</i> , Heller.
<i>Camptandrium sexdentatum</i> , Stimpson.	<i>Upogebia</i> (<i>Upogebia</i>) <i>heterocheir</i> , Kemp.
<i>Grapsus strigosus</i> (Herbst).	<i>Palaemon carcinus</i> , Fabricius.
<i>Metopograpsus messor</i> (Forskål).	„ <i>sundaicus</i> (Heller), de Man.
„ <i>maculatus</i> , Milne-Edwards.	<i>Alpheus paludicola</i> , Kemp.
<i>Varuna litterata</i> (Fabricius).	<i>Caridina propinqua</i> , de Man.
<i>Sesarma quadratum</i> (Fabricius).	„ <i>gracillima</i> , Lanchester.
„ <i>haswelli</i> , de Man.	<i>Penaeus indicus</i> , var. <i>merguiensis</i> , de Man.
„ <i>taeniolatum</i> , White.	„ <i>carinatus</i> , Dana.
„ <i>siamense</i> , Rathbun.	<i>Penaeopsis monoceros</i> (Fabricius).
<i>Pilumnus quadridentatus</i> , de Man.	„ <i>affinis</i> (Milne-Edwards).
<i>Scylla serrata</i> (Forskål).	„ <i>brevicornis</i> (Milne-Edwards).
<i>Neptunus pelagicus</i> (Linn.).	<i>Acetes indicus</i> , Milne-Edwards.
<i>Charybdis crucifera</i> (A. Milne-Edwards).	„ <i>japonicus</i> , Kishinouye.
„ <i>affinis</i> , Dana.	<i>Lucifer hanseni</i> , Nobili.
„ <i>callianassa</i> (Herbst).	<i>Squilla scorpio</i> , Latreille.
<i>Ebalia heterochalaza</i> , sp. nov.	„ „ var. <i>immaculata</i> , Kemp.
<i>Philyra sexangula</i> , Alcock.	„ <i>nepa</i> , Latreille (Bigelow).
„ <i>olivacea</i> , Rathbun.	„ <i>interrupta</i> , Kemp.
	<i>Squilla raphidea</i> , Fabricius.

It is probable that a considerable number of the brackish-water forms are merely casual or seasonal immigrants to the lake and do not inhabit it permanently; the fact

¹ Nearly all the species were found in water the specific gravity of which varied from 1.0035 to 1.0085 (corrected).

that the specimens were all collected at one season renders it impossible to determine the precise status of individual species in this respect. It is none the less possible to institute a comparison with the Decapod and Stomatopod fauna of the Chilka Lake on the Orissa coast of the Bay of Bengal. The two lagoons are in many respects closely similar: both are shallow, with a muddy bottom, both are connected with the sea and it is practically certain that in the outer part of the Tale Sap, as in the Chilka Lake, the salinity of the water varies considerably at different times of the year. One essential difference must be noted,—that in no part of the Chilka Lake does the water remain permanently fresh; but this discrepancy may be obviated by considering for comparative purposes only the fauna of the outer lake of the Tale Sap.

Of the forty-one species of Decapods and Stomatopods which we regarded as permanent inhabitants of the Chilka Lake fifteen were found in the Tale Sap, namely:—

<i>Camptandrium sexdentatum</i> , Stimpson.	<i>Alpheus paludicola</i> , Kemp.
<i>Varuna litterata</i> (Fabricius).	<i>Caridina propinqua</i> , de Man.
<i>Scylla serrata</i> (Forskål).	<i>Penaeus carinatus</i> , Dana.
<i>Neptunus pelagicus</i> (Linn.).	<i>Penaeopsis monoceros</i> (Fabricius).
<i>Clibanarius longitarsis</i> (de Haan).	„ <i>affinis</i> (Milne-Edwards).
<i>Diogenes avarus</i> , Heller.	<i>Lucifer hanseni</i> , Nobili.
<i>Upogebia</i> (<i>Upogebia</i>) <i>heterocheir</i> , Kemp.	<i>Squilla scorpio</i> , Latreille.
	<i>Squilla scorpio</i> var. <i>immaculata</i> , Kemp.

The majority of these are species of very wide distribution, found in the open sea as well as in backwaters, and are consequently of little importance for comparative purposes. The occurrence of *Camptandrium sexdentatum*, *Upogebia heterocheir*, *Alpheus paludicola* and *Caridina propinqua* appears, however, to indicate a real relationship between the two faunas; it is also noteworthy that the species of two Oxystome genera found in the Tale Sap are closely allied to those obtained in the Chilka Lake. The fauna of the Tale Sap, like that of the Chilka Lake, has little in common with that of the Gangetic Delta, though the delta occupies a position intermediate between the two lagoons so far as the coast-line is concerned.

The Tale Sap collection is not rich in undescribed species but in a number of cases considerable additions are made to our knowledge of the geographical distribution.

The collection also contains a number of species found about fifty miles to the south-east of the Tale Sap in the Patani river, below the town of Patani in the Siamese Malay States. These specimens belong to sixteen species and were all obtained in water that at the time of their capture was quite fresh; the situation in which they were found was, however, subject to tidal influence and there can be no doubt that all the species are at times brought into contact with brackish water. The following forms were found in the Patani river:—

<i>Varuna litterata</i> (Fabricius).	<i>Leander potamiscus</i> , Kemp.
<i>Pyxidognathus deianira</i> , de Man.	<i>Caridina propinqua</i> , de Man.
<i>Sesarma edwardsi</i> , de Man.	„ <i>brachydactyla</i> , subsp. <i>peninsularis</i> , nov.
„ <i>siamense</i> , Rathbun.	„ <i>gracilirostris</i> , de Man.
<i>Clistocoeloma merguiense</i> , de Man.	„ <i>weberi</i> , subsp. <i>sumatrensis</i> , de Man.
<i>Palaemon carcinus</i> , Fabricius.	„ <i>weberi</i> , subsp. <i>sumatrensis</i> , de Man.
„ <i>sundaicus</i> (Heller), de Man.	<i>Acetes erythraeus</i> , Nobili.
„ <i>lampropus</i> , de Man.	<i>Acetes japonicus</i> , Kishinouye.

A number of these species were also obtained in the Tale Sap. The most interesting are the scarce *Pyxidognathus deianira*, the *Leander* and the subspecies of *Caridina brachydactyla*, a species that in its typical form is known only from Celebes, Flores and Saleyer.

In ditches in the vicinity of the Patani river *Paratelphusa germaini* (Rathbun) was found.

Dr. Annandale also made a small collection at Penang. Six species were obtained on the island, for the most part in a hill stream in the Botanical Gardens, and six at the mouth of the Prai river on the mainland opposite Penang; the latter were found in water of considerable salinity. The species are:—

PENANG ISLAND.

<i>Sesarma</i> sp.	<i>Leander potamiscus</i> , Kemp.
<i>Potamon</i> (<i>Potamon</i>) <i>stoliczkanum</i> (Wood-Mason).	<i>Caridina brachydactyla</i> , subsp. <i>peninsularis</i> , nov. [Man.
<i>Palaemon neglectus</i> , de Man.	<i>Caridina weberi</i> , subsp. <i>sumatrensis</i> , de

MOUTH OF PRAI RIVER.

<i>Metopograpsus maculatus</i> , Milne-Edwards.	<i>Clibanarius padavensis</i> , de Man.
„ <i>quadridentatus</i> , Stimpson.	<i>Leander semmelinki</i> , de Man.
<i>Myomenippe granulosa</i> (A. Milne-Edwards).	<i>Acetes erythraeus</i> , Nobili.

In addition there are single examples of *Paratelphusa* (*Paratelphusa*) *incerta*, Lanchester, from the Singapore Botanical Gardens and of *Sesarma andersoni*, de Man, from Kantan in Trang.

To my account of this extensive collection I have added a description of a very interesting Grapsid (*Sesarma foxi*) presented to the Indian Museum by Mr. B. H. Buxton and obtained at the unusual altitude of 2000 ft. on Langkawi I. off the west coast of the Malay Peninsula. Reference is also made to a Javanese collection of Decapods, comprising six species, kindly obtained for us by the late Dr. W. C. Hosack. All these had already been recorded from the island by Dr. J. G. de Man.

In dealing with certain groups of species concerning which our knowledge was more than ordinarily deficient, I have found it advantageous to work through portions of

the undetermined material lying in the Indian Museum and to present the results concurrently with those derived from Dr. Annandale's collection. The literature of the subject being so widely scattered I have found that a great economy in time is effected by this procedure, and the conclusions reached are, I believe, of much greater value than if either collection had been examined separately. The groups treated in this manner are (i) the Hymenosomatidae, (ii) the species of *Leander* allied to *L. styliferus*, Milne-Edwards, (iii) the Atyid genus *Paratya* (= *Xiphocaridina*) and (iv) the Penaeid genus *Acetes*. On these groups separate reports, including descriptions of a number of the new species, have been already published in Vol. XIII of the *Records of the Indian Museum*.

Dr. Annandale has generously presented a complete set of the specimens he obtained, together with the types of the new species and subspecies to the collection of the Zoological Survey of India (Indian Museum).

Family HYMENOSOMATIDAE.

In the course of his tour Dr. Annandale obtained two species of this interesting family, both apparently new. Descriptions of these forms have been published in Vol. XIII of the *Records of the Indian Museum* in a paper devoted mainly to the elucidation of the Indian representatives of the family. In this paper I have attempted a revision of the genera and have pointed out that the Indian species referred by Alcock to *Hymenicus* should more properly be grouped under Stimpson's *Rhynchoplax*. Dana's *Hymenicus* is in my opinion synonymous with White's *Halicarcinus*.

It is unfortunate that both Dr. Tesch and I should have been occupied with this family at the same time without knowledge of each other's work. Tesch's report on certain crabs obtained by the 'Siboga' Expedition, published only five months after my own paper, also contains a revision of the genera of this family. In the application of *Rhynchoplax* we are, for the most part, in agreement¹; but Tesch retains *Hymenicus* as a distinct genus and in less important details our work shows a number of discrepancies.

Rhynchoplax introversus, Kemp.

1917. *Rhynchoplax introversus*, Kemp, *Rec. Ind. Mus.*, XIII. p. 262, figs. 11a-c.

This species, which is readily distinguished from any other by the peculiar form of the lateral border of the carapace, is based on two specimens obtained in the Tai-Hu lake in China, living in water that is quite fresh at all seasons of the year. The only other Hymenosomatid known from fresh water beyond the reach of all tidal influence is *Halicarcinus lacustris* (Chilton)² which has been recorded from Australia, New Zealand and Norfolk I.

¹ Dr. Tesch places Hess's *H. Kreffii* and Haswell's *H. rostrata* under *Rhynchoplax*. According to my views both these species are to be referred to *Halicarcinus* or, if it really be distinct from the latter, to *Hymenicus*. This is certainly true of Haswell's species of which I have seen specimens.

² Chilton, *Trans. N. Zealand Inst.*, XLIV, p. 128 (1912).

Rhynchoplax exiguus, Kemp.

1917. *Rhynchoplax exiguus*, Kemp, *Rec. Ind. Mus.*, XIII, p. 260, fig. 10.

A very small species without any strongly marked characteristics. Ten specimens were found by Dr. Annandale in the outer part of the Tale Sap, on the mainland opposite the western end of Koh Yaw. They were living in lumps of turf that had fallen into the lake owing to the undermining of the banks. The specific gravity of the water was about 1.00625.

Family OCYPODIDAE.

Subfamily OCYPODINAE.

Genus **Gelasimus**, Latreille.

Gelasimus annulipes, Latreille (Milne-Edwards).

1900. *Gelasimus annulipes*, Alcock, *Journ. Asiat. Soc. Bengal*, LXIX, p. 353.

1915. *Gelasimus annulipes*, Kemp, *Mem. Ind. Mus.*, V, p. 221.

A colony of this abundant species was found by Dr. Annandale at Kaw Deng at the mouth of the Tale Sap. The claws of large males were of a pale dull yellow colour in life. No specimens were observed more than a few hundred yards within the mouth of the lake, the water being practically as salt as that of the Gulf of Siam.

Subfamily SCOPIMERINAE.

Genus **Dotilla**, Stimpson.

Dotilla wichmanni, de Man.

1892. *Dotilla wichmanni*, de Man, in Weber's *Zool. Ergebn. Reise Nederland. Ost-Ind.*, II, p. 308, pl. xviii, fig. 8.

1895. *Dotilla wichmanni*, de Man, *Zool. Jahrb., Syst.*, VIII, p. 577.

1910. *Dotilla wichmanni*, Rathbun, *Dansk. Vid. Selsk. Skrift. (7), Naturvid. og Math.*, V, p. 324.

1918. *Dotilla wichmanni*, Tesch, *Decap. Brachyur. 'Siboga'-Exped.*, I, p. 45.

A large number of specimens were obtained at Kaw Deng at the mouth of the Tale Sap on the opposite side of the channel from Singgora.

The series includes some very fine individuals with carapace nearly 8 mm. in length and consequently much larger than any of de Man's original specimens, none of which exceeded 5 mm. In males between 6 and 8 mm. in length the carapace bears three large angular projections on either side; two of these are situated, one behind the other, on the outer side of the deep groove that borders the lateral margin, while the third, which is more spinose in character and possesses a corneous apex is situated on the side-wall, immediately beneath the small tooth that defines the upper and outer limit of the orbit (text-fig. 1). These projections are not seen in females or small males.

In large males, also, there is a short but high ridge on the inner face of the carpus, situated close to the meral articulation and easily visible in dorsal view. There is no

great difference between large and small specimens in the form of the fingers of the chela, the largest examples possessing merely a low crest in the middle of the dactylus.

De Man compares this species with *D. sulcata* and remarks (p. 311) "Das sternum ist überall glatt und zeigt nicht die für *D. fenestrata* charakteristischen, durchsichtigen stellen; während aber die einzelnen segmenten bei *D. sulcata* leicht convex erscheinen, sind sie bei der neuen Art stark abgeflacht oder leicht concav, sowie deutlich gerändert." On comparing the species with *D. myctiroides* it is, however, evident that the slightly concave areas that occur on each sternal segment and occupy nearly the whole of the space between the legs and the abdomen are true 'tympana' and that so far as the sternum is concerned the difference between *D. wichmanni* and Hilgendorf's *D. fenestrata* rests merely in the number of segments on which 'tympana' are found.

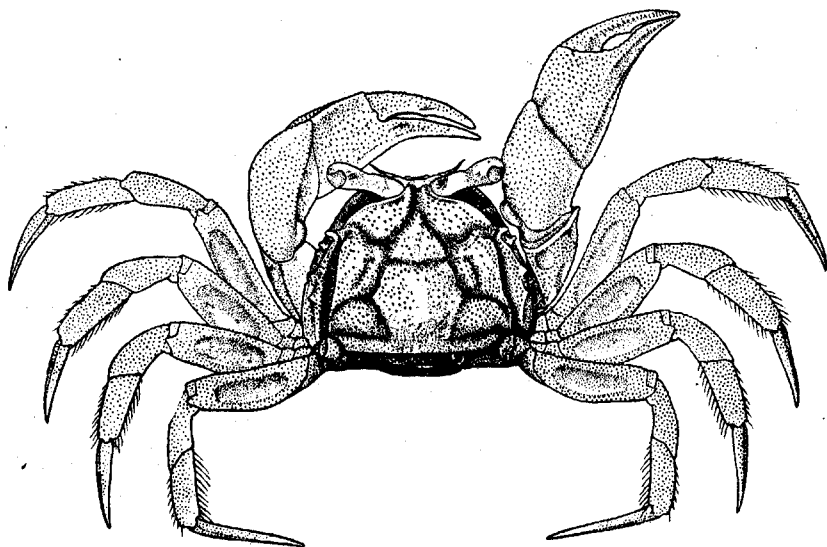


FIG. 1.—*Dotilla wichmanni*, de Man.
Adult male.

Dr. Annandale notes that the 'runs' made by this species are not so carefully constructed and the pellets of sand not so tidily arranged as is the case with the species found living on the western side of the Bay of Bengal.

Dotilla wichmanni has not hitherto been recorded from Indian waters, but has, however, recently been obtained in the Andaman Is. The specimens, none of which are of large size, were found living on the sandy shores of Corbyn's Cove South, not far from Port Blair. The species has been reported from Celebes, Makassar and Atjeh in Sumatra (de Man), the Talaut Is. (Tesch) and from the coast of Koh Kong in the Gulf of Siam (Rathbun).

Genus *Tympanomerus*, Rathbun.

Tympanomerus deschampsi, Rathbun

1914. *Tympanomerus deschampsi*, Rathbun, *Proc. U. S. Nat. Mus.*, XLVI, p. 356, pl. xxxii, pl. xxxiii, fig. 1.

A single female with carapace $9\frac{1}{2}$ mm. in breadth was obtained by Dr. Annandale at the edge of the Whangpoo R., 5 to 10 miles below Shanghai. It was found in a burrow above the water-line in mud which was rapidly hardening. The water in the river at the point where the specimen was taken is quite fresh at all seasons.

The species is readily distinguished from *T. stapletoni*, de Man, by the characters given by Miss Rathbun; it has been recorded from Shanghai, where the type specimens were obtained, and from Korea.

Subfamily MACROPHTHALMINAE.

Genus *Camptandrium*, Stimpson.

Camptandrium sexdentatum, Stimpson.

1907. *Camptandrium sexdentatum*, Stimpson, *Smiths. Misc. Coll.*, XLIX, p. 138, pl. xvii, fig. 4.
 1915. *Camptandrium sexdentatum*, Kemp, *Mem. Ind. Mus.*, V, p. 236, pl. xii, fig. 6.
 1918. *Camptandrium sexdentatum*, Tesch, *Decap. Brachyur. 'Siboga'-Exped.*, I, p. 65, pl. v, fig. 3.

Dr. Tesch has recently redescribed this species. In the account which I published in 1915 I placed the genus in the Grapsidae and in the subfamily Varuninae, being under the impression that it was remotely allied to *Eriocheir*. Dr. Tesch, who has had the advantage of examining an adult male, considers that it belongs to the Ocypodidae and to the subfamily Macrophthalminae and is not distantly related to *Paracleistostoma*. With this view I concur.

Two females of this rare species, with carapace 7.2 and 6.7 mm. in breadth, were found by Dr. Annandale in the Tale Sap. They are a trifle smaller than the dead female found in the Chilka Lake (*v. Kemp, loc. cit.*, text-fig. 13); the sculpture of the carapace is crisper, the transverse ridge on the branchial and cardiac regions being more sharply defined and the antero-lateral teeth more prominent.

The specimens were found in the channel opposite Singgora on a bottom of mud and dead shells at a depth of $4\frac{1}{2}$ metres and in the middle of the outer lake, N. of Koh Yaw, on a bottom of sticky mud at a depth of $2\frac{1}{2}$ metres. The specific gravity of the water in the former locality was 1.00625 and in the latter 1.0035 (corrected).

The species has been recorded from Hong Kong (Stimpson), the Bay of Batavia (Tesch), the Chilka Lake, Orissa (Kemp) and Ennur backwater, Madras (Kemp).

Family GRAPSIDAE.

Subfamily GRAPSINAE.

Genus *Grapsus*, Lamarck.

Grapsus strigosus, (Herbst).

1900. *Grapsus strigosus*, Alcock, *Journ. Asiat. Soc. Bengal*, LXIX, p. 393.

A single dead specimen with carapace 34 mm. in breadth was found at the mouth of the Tale Sap. The species is probably not an inhabitant of the lake.

Genus *Metopograpsus*, Milne-Edwards.*Metopograpsus messor*, (Forskål) Milne-Edwards.

1900. *Metopograpsus messor*, Alcock, *Journ. Asiat. Soc. Bengal*, LXIX, p. 397.
 1918. *Metopograpsus messor*, Tesch, *Decap. Brachyur. 'Siboga'-Exped.*, I, p. 79.

Two dead specimens were found at Kaw Deng at the mouth of the Tale Sap. The carapace of the largest is 20 mm. in breadth.

Metopograpsus maculatus, Milne-Edwards.

1900. *Metopograpsus maculatus*, Alcock, *Journ. Asiat. Soc. Bengal*, LXIX, p. 398.
 1918. *Metopograpsus maculatus*, Tesch, *Decap. Brachyur. 'Siboga'-Exped.*, I, p. 80.

Two examples of this species, including an ovigerous female with carapace 22 mm. in breadth, were obtained at the mouth of the Prai River, on the mainland opposite Penang; they were living under stones on a mud flat exposed at low water. Two others were found under stones on the shore of Koh Yaw in the outer lake of the Tale Sap. The specific gravity of the water at the latter place (corrected) was 1.00625.

Metopograpsus quadridentatus, Stimpson.

1858. *Metopograpsus quadridentatus*, Stimpson, *Proc. Acad. Sci. Philadelphia*, p. 102.
 1883. *Metopograpsus quadridentatus*, de Man, *Notes Leyden Mus.*, V, p. 158.
 1895. *Metopograpsus quadridentatus*, de Man, *Zool. Jahrb., Syst.*, IX, p. 76, fig. 16.
 1901. *Metopograpsus quadridentatus*, Nobili, *Boll. Mus. Torino*, XVI, no. 397, p. 3.
 1907. *Metopograpsus quadridentatus*, Stimpson, *Smiths. Misc. Coll.*, XLIX, p. 115, pl. xvi, fig. 2.
 1910. *Metopograpsus quadridentatus*, Rathbun, *Danske Vid. Selsk. Skrift. (7), naturvid. og math.*, V, p. 325.
 1918. *Metopograpsus quadridentatus*, Tesch, *Decap. Brachyur. 'Siboga'-Exped.*, I, p. 79.

Five specimens were found in company with *M. maculatus* at the mouth of the Prai River near Penang. In the largest example, a male with carapace 20.5 mm. in length and 24.75 mm. in breadth, the chela precisely resembles the figure given by de Man (*loc. cit.*, 1895).

M. quadridentatus has not so far been found in Indian waters. It has been recorded from Macao (Stimpson), Amoy (de Man), 'Malacca' (de Man), Borneo (Nobili) and from the east coast of the Gulf of Siam (Rathbun).

Subfamily VARUNINAE.

Genus *Varuna*, Milne-Edwards.*Varuna litterata* (Fabr.), Milne-Edwards.

1900. *Varuna litterata*, Alcock, *Journ. Asiat. Soc. Bengal*, LXIX, p. 401.
 1915. *Varuna litterata*, Kemp, *Mem. Ind. Mus.*, V, p. 232.

Several specimens were obtained in the outer lake of the Tale Sap, at and near Singgora and at Koh Yaw. They were found in fishermen's nets, under stones on the shore, and in pools and ditches. The specific gravity of the water in which they were taken varied from about 1.004 to 1.0085 (corrected). Crabs of this species were also taken in the Patani River, fifty miles to the south-east of the Tale Sap, in water that was quite fresh, though subject to tidal influence.

Genus *Eriocheir*, de Haan.*Eriocheir japonicus* (de Haan).

1835. *Grapsus (Eriocheir) japonicus*, de Haan, in Siebold's *Fauna Japonica, Crust.*, p. 59, pl. xvii.

This is the common edible crab of the main island of Japan and is sold in large numbers at Kyoto. It is said to be migratory in habit, making its way towards the sea or into lakes after heavy rain. There is a specimen in the Otsu laboratory from the southern end of Lake Biwa, but Dr. Annandale was unable to find examples in the lake in October and November 1915. Young and half-grown specimens were abundant in the main channel of the Yodo River, just above Osaka, at the beginning of December. The species does not appear to have been found in the sea; it has occasionally been recorded from brackish water, but is almost always found in water that is quite fresh.

Four very large specimens obtained in the Kyoto market and said to have come from Echizen province to the north of Lake Biwa yield the following measurements (in mm.):—

	♂	♂	♀	♀
Length of carapace	83	82	67	66
Greatest breadth of carapace	94	91	73	72
Length of chelipede	134	130	76	75
Length of chela	82	82	43	43
Breadth of chela	45	44	22	21
Length of second walking leg	155	151	123	128

In the largest males the whole palm on both outer and inner sides, except for a small area at the proximal end of the lower surface, is thickly covered with woolly hair, which also invests the anterior margin of the carpus and the base of the dactylus. In other males, with carapace about 38 mm. in length, the hair is less abundant; the entire lower surface of the palm is bare, on the inner side there is only a comparatively small patch in the neighbourhood of the finger-cleft and there is very little on the anterior margin of the carpus. In males between 11 and 12 mm. in length the chela is apparently nude, but on close inspection is seen to be largely covered with a fine and very close pubescence. In these smallest individuals the carapace is flatter and its antero-lateral margins are straighter than in adults.

Eriocheir sinensis (Milne-Edwards).

1854. *Eriochirus sinensis*, Milne-Edwards, *Arch. Mus. Hist. nat. Paris*, VII, p. 146, pl. ix, figs. 1-1c.

1880. *Eriocheir sinensis*, Kingsley, *Proc. Acad. Sci. Philadelphia*, p. 210.

The collection contains a large male and female from Moo-Too, Tai Hu, Kiangsu province, China, and a number of young individuals obtained in the Whangpoo River, between Shanghai and Woosung at depths of 5½ to 7½ metres. The carapace of the largest specimen is 54 mm. in length.

In young examples, as in *E. japonicus*, the antero-lateral borders of the carapace are much straighter than in adults and there is less hair on the hands. In a male with carapace 15 mm. in length the hair is restricted to the outer surface of the chela and it is completely absent in all specimens under 12 mm. in length. The four teeth on the front are very sharply pointed in adults, but much blunter in young individuals.

*Eriocheir rectus*¹ (Stimpson) is perhaps merely a synonym of this species. It was described from a specimen 0.92 ins. in length and is chiefly characterised by its straighter lateral margins and blunter frontal lobes, thus closely resembling the young of *E. sinensis*.

Dr. Annandale informs me that this is the common edible crab of Shanghai and is to be found on sale in all the village markets round the Tai Hu, where it is chiefly captured in narrow creeks. Doflein² records the species from Shasi on the Yang-tse-kiang, 1300 kilometres from sea, and also from brackish water in the neighbourhood of Shanghai.

***Eriocheir leptognathus*, Rathbun.**

1914. *Eriocheir leptognathus*, Rathbun, *Proc. U. S. Nat. Mus.*, XLVI, p. 353, pl. xxxiii, figs. 2, 3.

To this species I refer a small male with carapace 9.1 mm. in length and 9.6 mm. in breadth. It agrees on the whole very well with Miss Rathbun's description. The edge of the front is almost straight, only very obscurely trilobed, the postero-lateral margins of the carapace are parallel rather than convergent and the hindmost tooth of the antero-lateral border is extremely small and inconspicuous. The outer surface of the palm is bare, as in the type, but there is a dense patch of woolly hair on the inner side, extending on to the base of both fingers.

The granulate ridge, anteriorly concave, that runs inwards from the hindmost tooth of the antero-lateral margin is well marked; it is finer and less elevated than in *E. japonicus* or *E. sinensis* and in front of it there is no trace of the comparatively deep depression found in those species. There is, moreover, a noticeable distinction in the size of the eyes. If specimens of similar dimensions be compared it will be seen that the cornea is much smaller in *E. leptognathus* than in the two allied species and is decidedly narrower than the basal part of the stalk. The most obvious character in which the species differs from other members of the genus is, however, the presence of only three instead of four teeth on the antero-lateral margin of the carapace; this feature seems to have escaped Miss Rathbun's attention though it is clearly shown in her figure.

The single specimen was found in company with young *E. sinensis* in the Whangpoo River, between Shanghai and Woosung at a depth of 5½ to 7½ metres. It was found in pure fresh water.

The female described by Miss Rathbun was 10.6 mm. in length and 11.6 mm. in breadth and was obtained at Shanghai.

¹ *Eriocheirus rectus*, Stimpson, *Proc. Acad. Nat. Sci., Philadelphia*, X, p. 103 (1858) and *Smiths. Misc. Coll.*, XLIX, p. 125 (1907).

² Doflein, *Abhandl. K. Bayer. Akad. Wiss.*, XXI, p. 665 (1902).

Genus *Pyxidognathus*, A. Milne-Edwards.*Pyxidognathus deianira*, de Man.

1888. *Pyxidognathus deianira*, de Man, *Journ. Linn. Soc. Zool.*, XXII, p. 148, pl. x, figs. 4-6.

Dr. Annandale obtained a single specimen of this scarce species among the roots of a dead palm trunk in the Patani River, below the town of Patani in the Siamese Malay States. The individual is a male with carapace 9 mm. in breadth. Except for the slightly more acute teeth on the antero-lateral margin of the carapace, the specimen bears the closest resemblance to two smaller males, co-types of the species, that are preserved in the Indian Museum.

The species has hitherto been recorded only from Mergui, where it was obtained in mangrove swamps.

Subfamily *SESARMINAE*.Genus *Sesarma*, Say.*Sesarma quadratum* (Fabricius).

1887. *Sesarma quadrata*, de Man, *Zool. Jahrb., Syst.*, II, p. 683, pl. xvii, fig. 2.

1890. *Sesarma quadrata*, de Man, *Notes Leyden Mus.*, XII, p. 99.

1892. *Sesarma quadrata*, de Man, in Weber's *Zool. Ergebn. Reise Niederl. Ost-Ind.*, II, p. 328.

1895. *Sesarma (Parasesarma) quadrata*, de Man, *Zool. Jahrb., Syst.*, IX, p. 182.

1917. *Sesarma (Parasesarma) plicata*, Tesch, *Zool. Meded. Mus. Leiden*, III, p. 187 (syn.).

Several specimens were found at different places in the outer lake of the Tale Sap (Kaw Keoh, Kaw Deng, Koh Yaw and Singgora); they were for the most part found under stones or running on the shore at some distance from the water. All appear to belong to the true *S. quadratum* as redefined by de Man.

Sesarma haswelli, de Man.

1888. *Sesarma haswelli*, de Man, *Journ. Linn. Soc.*, XXII, p. 175.

1917. *Sesarma (Chiromantes) haswelli*, Tesch, *Zool. Meded. Mus. Leiden*, III, p. 158.

A single example of this species, an ovigerous female 16 mm. in breadth, was obtained by Dr. Annandale near Singgora.

Alcock¹ included *S. haswelli*, along with *S. lividum*, A. Milne-Edwards, and *S. dussumieri*, Milne-Edwards, in his synonymy of *S. bidens* (de Haan), being evidently of the opinion that the five forms distinguished by de Man in 1888 in his "section C" (*loc. cit.*, p. 175) were only based on individual variations of a single wide-spread species. De Man in 1902² dissented from Alcock's opinion.

In the Indian Museum are preserved the type of *S. haswelli*, other specimens from Mergui originally determined by de Man as *S. livida*, a large number of examples examined by Alcock and several additional samples obtained in recent years.

On examining this material I find little difficulty in separating it into groups, corresponding to those that de Man and Tesch recognize as distinct species. I have no doubt that Alcock formed a wrong estimate of the variability of the forms included in the *bidens*-group and that it will be necessary to subject the Indian material to a thorough revision.

¹ Alcock, *Journ. Asiat. Soc. Bengal*, LXIX, p. 415.

² De Man, *Abhandl. Senck. naturf. Ges., Frankfurt*, XXV, p. 538 (1902).

It should be noted that the specimens from Mergui, recorded by de Man in 1888 under the name *S. livida*, have since been described by him as a new species—*S. onychophora*.¹

Sesarma andersoni, de Man.

1888. *Sesarma andersoni*, de Man, *Journ. Linn. Soc.*, XXII, p. 172, pl. xii, figs. 1-4.

1917. *Sesarma* (*Parasesarma*) *andersoni*, Tesch, *Zool. Meded. Mus. Leiden*, III, p. 129.

A single specimen, with carapace 8.6 mm. in breadth, was obtained by Dr. Annandale at Kantang in Trang, on the west coast of peninsular Siam. It was caught running on the piers of the landing stage above water-level.

Sesarma edwardsi, de Man.

1888. *Sesarma edwardsi*, de Man, *Journ. Linn. Soc.*, XXII, p. 185, pl. xiii, figs. 1-4.

1917. *Sesarma* (*Sesarma*) *edwardsi*, Tesch, *Zool. Meded. Mus. Leiden*, III, p. 147.

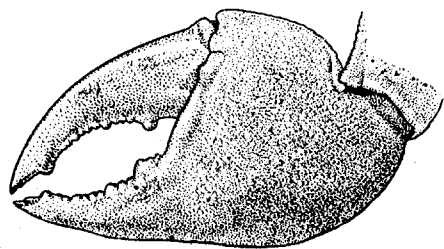
Two males and one female, the largest with carapace 15½ mm. in breadth, were found in the Patani River in the Siamese Malay States. The specimens were obtained in fresh water, but in a locality subject to tidal influence.

Sesarma intermedium (de Haan).

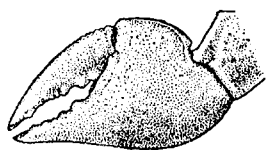
1865. *Sesarma intermedia*, Heller, *Reise 'Novara', Crust.*, p. 64.

1918. *Sesarma* (*Sesarma*) *intermedium*, Tesch, *Zool. Meded. Mus. Leiden*, III, pp. 162, 243.

Two males from Shanghai are referred to this species. The carapace of the larger is 27 mm. in length and 31 mm. in greatest breadth; that of the smaller is 17.5 mm. in length and 20.8 mm. in breadth. In both specimens there is a single well marked tooth on the lateral margin behind the extra-orbital angle, but further back there is scarcely a trace of a rudimentary third lateral tooth, such as has been described in certain *Sesarma* referred to this species.



a.



b.

FIG. 2.—*Sesarma intermedium* (de Haan).

a. Left chela of a specimen 27 mm. in length.

b. Left chela of a specimen 17.5 mm. in length.

The crest on the upper margin of the merus of the chelipedes does not possess a subterminal tooth, as in *S. tetragonum*; the upper surface of the carpus is smooth and its inner margin bears a few small tubercles, but is not toothed. The upper margin of the palm is defined by an obscure and feebly crenulate ridge; its outer surface shows only the slightest traces of rugosity, but bears the oblique longitudinal line referred to by Tesch. The fingers are smooth except for a slight tuberculation on the dorsal surface of the dactylus near its proximal end. In both specimens the fingers gape, meeting only at the tips, the extent of the gape

being very much greater in the larger specimen.

¹ De Man, *Zool. Jahrb., Syst.*, IX, p. 214 (1895), and X, pl. xxxi, fig. 39.

The walking legs are comparatively slender. The merus in the first pair is about two and a half times as long as broad in the larger specimen, about two and a quarter times in the smaller.

In certain respects the two specimens obtained by Dr. Annandale do not entirely agree with the descriptions given by de Man. In the notes published in 1880 he mentions the existence of traces of a third tooth on the lateral margins of the carapace and remarks that the ambulatory legs agree with those of *S. tetragonum*, in which species the merus is greatly expanded, that of the first pair being only twice as long as broad. In 1887 he compared the species with the closely allied *S. sinensis*, Milne-Edwards, distinguishing the latter by the proportionately longer fingers of the chela and more slender meropodites of the walking legs.

Dr. Annandale's specimens seem to some extent intermediate in character between *S. intermedium* and *S. sinensis* as understood by de Man. In the comparative slenderness of the walking legs they incline to *S. sinensis*, in which the merus of the first pair is described as being three times as long as broad (de Man, *loc. cit.*, 1887, p. 670), while in the proportionate length of the fingers of the chelipedes they appear to agree with *S. intermedium*. Outlines of the chelae of the two specimens are shown in text-figs. 2 a, b. The examples agree very closely with de Haan's original figure, in which the meropodites of the legs do not appear to be much expanded, and I have little doubt that my identification is correct.

The specimens recorded by de Man in 1888 from Mergui as *S. intermedia*¹ are unquestionably distinct; de Man has redescribed them under the name *S. moeschii*.²

The larger of the two specimens was obtained by Dr. Arthur Stanley from a creek near Shanghai, the smaller was found dead in a burrow on the banks of the Whangpoo River in the same neighbourhood. Both were from fresh water. The habits of the species appear to resemble those of *S. dehaani* (*infra*).

The species has been recorded from Japan, the Liu-Kiu Is., Shanghai and Hongkong. De Haan's supplementary record from Sourabaya in Java requires confirmation.

Sesarma dehaani, Milne-Edwards.

1917. *Sesarma* (*Holometopus*) *dehaani*, Tesch, *Zool. Meded. Mus. Leiden*, III, pp. 143, 238 (*ubi lit.*).

? 1917. *Sesarma* (*Holometopus*) *neglecta*, Tesch, *ibid.*, pp. 178, 238.

Examination of a limited number of specimens from both China and Japan leads me to believe that de Man's *S. neglecta* is not specifically distinct from *S. dehaani*, though it is possible that the name should be retained in a subspecific sense. *S. neglecta* was described from Shanghai, and *S. dehaani* from Japan, and the differences between the two have recently been summarised by Tesch (*loc. cit.*, p. 145).

The material I have examined consists of a large and small male and two females of medium size from the Yodo R., near Osaka (Yoshida coll.), a large male from

¹ De Man, *Journ. Linn. Soc.*, XXII, p. 182 (1888).

² De Man, in Weber's *Zool. Ergebn. Reise Neiderland, Ost-Ind.*, II, p. 331, pl. xx, fig. 14 (1892).

Yokohama (Berlin Mus.), a large male from Shanghai (Haberer coll.) and three rather small females from the same locality (Annandale coll.).

The carapace in these specimens yields the following measurements (in mm.) :—

LOCALITY.	Sex.	Breadth at extra-orbital angles.	Breadth at base of penultimate legs.	Length.
Yodo R., nr. Osaka ..	♂	31·8	33·3	30·5
„ „ ..	♀	25·9	27·1	24·1
„ „ ..	♀	21·9	22·0	20·2
„ „ ..	♂	19·0	18·4	17·0
Yokohama ..	♂	32·6	33·7	31·0
Shanghai ..	♂	32·0	31·8	29·9
„ ..	♀	19·7	19·5	17·7
„ ..	♀	19·9	19·3	17·4
„ ..	♀	15·9	15·2	13·6

It will be seen that as regards the proportion between length and extra-orbital breadth there is scarcely any difference between Japanese and Chinese specimens; but in large males from Japan the breadth at the base of the penultimate legs is a trifle greater than that at the extra-orbital angles, whereas the reverse is found in the large male from Shanghai. The difference is an extremely small one.

In large Japanese specimens the front is much more deeply excavate in dorsal view than in the large male from Shanghai, but this character is variable in smaller specimens from both localities.

In the large male from Shanghai the outer surface of the palm is obscurely granulate in its lower half, the upper half being nearly smooth. In the large males from Japan it is coarsely tuberculate both above and below. The vertical row of large tubercles on the inner face of the palm in the latter specimens is represented in example from Shanghai by a number of much smaller tubercles not arranged in a definite row.

The collection seems to indicate that while Japanese and Chinese individuals of small or medium size are altogether indistinguishable, large males from the two countries exhibit certain small but possibly constant differences. The material at my disposal is not sufficient to indicate the range of normal variation in adults.

The specimens from Japan were presented by Dr. S. Yoshida; they were obtained

in fresh water in the R. Yodo, above Osaka, where they run about on the piers of landing stages and on embankments at the edge of the river.

In the neighbourhood of Shanghai Dr. Annandale found the species common, along with *S. intermedia*; though found in fresh water it apparently does not penetrate so far inland as the Tai Hu. The banks of all the small freshwater creeks at Shanghai and ponds in the same neighbourhood are full of its burrows and large numbers of crabs may be seen in warm weather running on the mud. In winter they stay inside the burrows, only appearing in exceptionally warm sunny weather. None were seen in December at places where they were stated by residents to be common in summer, but young specimens were obtained by digging in embankments near the Whangpoo River; probably the burrows of the adults were much deeper.

Sesarma taeniolatum, White.

1900. *Sesarma taeniolatum*, Alcock, *Journ. Asiat. Soc. Bengal*, LXIX, p. 419.

Numerous specimens, the largest an ovigerous female with carapace $34\frac{1}{2}$ mm. in breadth between the outer orbital angles, were obtained by Dr. Annandale in the outer part of the Tale Sap. The ovigerous female was dug from a large and not very deep burrow at the edge of a small freshwater stream near the point where it entered the lake on Koh Yaw. Others were taken on fishing stakes and the piers of a landing stage above the water-line.

It is probable that the female recorded from Singgora by Lanchester¹ under the name *Sesarma lafondi*, Jacq. and Lucas,² was in reality an example of this species.

Sesarma siamense, Rathbun.

1910. *Sesarma (Chiromantes) siamense*, Rathbun, *Danske Vid. Selsk. Skrift. (7), naturvid. og math.*, V, p. 328, text-figs. II a-c.

Five specimens are in the collection, the largest a full-grown male with carapace 10.2 mm. in length and 11.3 mm. in breadth at the outer orbital angles. The epibranchial tooth is bluntly rounded in all the specimens and behind it rudimentary traces of a second tooth are usually visible. The large male has six sharp spinules on the upper edge of the dactylus; in the females there are four, five or six. The striae on the upper surface of the palm bear a close resemblance to Miss Rathbun's figure, but the very short distal stria that runs backwards from the dactylar articulation is only visible in one female.

The specimens were found among the roots of dead palm trees at Kaw Deng near the mouth of the Tale Sap, on fishermen's stakes opposite Koh Yaw in the same neighbourhood and in the Patani River, south-east of the Tale Sap, in the Siamese Malay States. The water in the first two localities was brackish, its specific gravity varying from 1.004 to 1.0085 (corrected); in the Patani River it was quite fresh when the specimens were taken, though probably brackish under certain conditions of tide.

¹ Lanchester, *Proc. Zool. Soc. London*, 1901, p. 550.

² Vide Tesch, *Zool. Meded. Mus. Leiden*, III, p. 164, pl. xv (1917).

S. siamense was described by Miss Rathbun from the eastern side of the Gulf of Siam, from Koh Kong, Koh Kut and Koh Chick.

***Sesarma foxi*, sp. nov.**

I take this opportunity of describing a very interesting species of *Sesarma* obtained in 1914 by Mr. B. H. Buxton at a height of 2000 ft. on Gunong Raya, in Langkawi I., N. of Penang. Species of this typically estuarine genus have seldom been recorded from considerable altitudes, though a number have been taken on land some distance from the coast-line. The following list, so far as I am aware, comprises all species of the genus that have been recorded from definite heights above sea-level.

Sesarma maculata, de Man. Halmahera, 2000 ft.

"*Sesarma maculata*," Lanchester (? de Man). Bukit Besar, near Patani, Siamese Malay States, 2500 and 3500 ft.

Sesarma trapezoidea, Guérin. Halmahera, 2500 ft.

Sesarma thelxinöe, de Man. Andamans, 800 ft.

Sesarma sp. (*vide infra*, p. 240). Penang, 1200 ft.

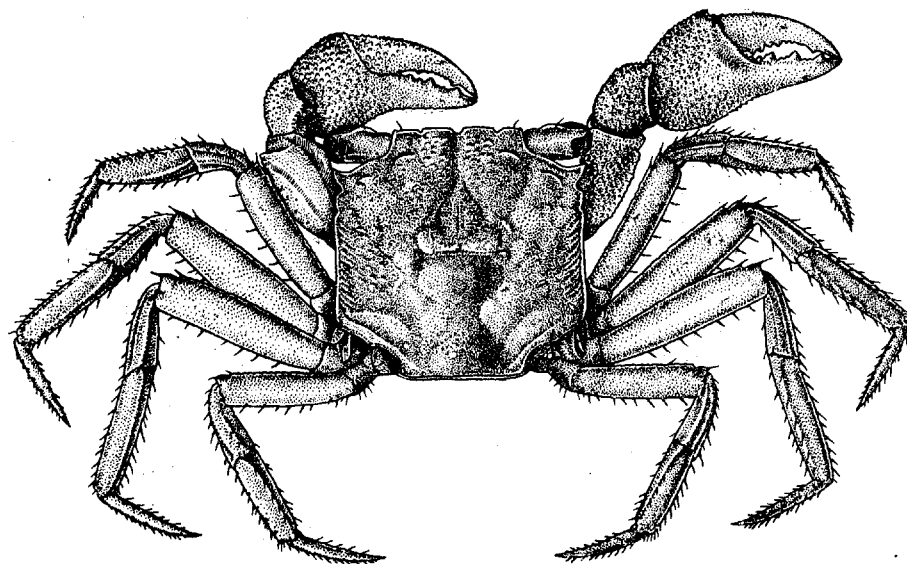


FIG. 3.—*Sesarma foxi*, sp. nov.

It appears probable that in these places the *Sesarma* have been able to adopt a strictly terrestrial mode of life and to ascend to considerable altitudes owing to the damp climate that prevails; in the Andamans the entire absence of competitors in the form of Potamonidae is doubtless an important factor.

The carapace in *S. foxi* is exactly quadrilateral, its length being precisely, or almost precisely, equal to its breadth; the lateral margins are strictly parallel, the breadth at the base of the third pair of legs being equal to that at the outer orbital angle. The carapace is slightly convex fore and aft and from side to side and is everywhere distinctly rugose and faintly pitted. A trifoliate gastric areola is distinct and behind it there is a slight prominence on the cardiac region; these areas are a little smoother

than the rest of the carapace. The front is abruptly and vertically deflexed and is not visible in dorsal view. When viewed obliquely, the edge is seen to be produced to two broadly rounded lobes on either side of a median excavation. The four post-frontal lobes are sharp-edged and present a straight transverse line; those of the inner pair are broader than those of the outer and are separated by a deep mid-dorsal groove that extends to the anterior end of the gastric region. Behind the outermost post-frontal lobes on a level with the inner angle of the orbit there is a small but distinct elevation. The superior margin of the orbit is oblique and sinuous; the outer orbital tooth is sharp and rather broad, but does not extend so far outwards as the end of the cornea. There are two small epibranchial teeth, both obtuse and inconspicuous; the breadth between the foremost pair is a trifle less than that between the outer orbital angles. The lateral margin of the carapace is defined on either side by a sharp ridge, and the postero-lateral surface, though indistinctly rugose, bears no oblique striae, except for one, of considerable length, immediately over the bases of the last two pairs of legs.

The chelipedes much resemble those of *S. sylvicola*, de Man. The upper border of the merus ends in a subrectangular, subterminal lobe; the inner and outer margins are denticulate, the former being slightly produced near the distal end. The inner surface bears two longitudinal rows of hairs and the outer surface is furnished with a number of conspicuous granules. The upper surface of the carpus is strongly rugose; on its inner margin there are numerous denticles, but no outstanding tooth. The chela, in its general form, almost precisely resembles that of *S. sylvicola*. The palm is swollen and strongly tubercular externally, the tubercles being, however, confined to its proximal three-quarters, being absent in the neighbourhood of the finger-cleft, where there is a perfectly smooth, conspicuous depression (text-fig. 4). The tubercles are most closely packed on the upper border and from those which are scattered irregularly over the lower surface a single series, composed of four or five, extends on to the base of the fixed finger. The inner surface much resembles the outer, being similarly tuberculate and having a similar depression near the base of the fingers. It shows no distinct transverse row of tubercles. The fixed finger, except for the few tubercles at the proximal end of its lower margin, is smooth. The dactylus is nearly twice the length of the upper border of the palm; at its proximal end there are numerous small tubercles which extend in a single row a little beyond the middle of its length. In lateral view from six to eight tubercles are visible. There are occasional short, dark brown hairs on the carpus, palm, and at the base of the dactylus.

The walking legs are exceptionally slender. The merus in each pair bears a prominent subterminal tooth on its anterior margin; the segment in the penultimate pair is little less than four times as long as broad. The dactylus in the first three

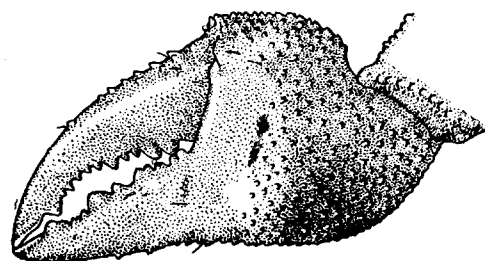


FIG. 4.—*Sesarma foxi*, sp. nov.
External view of left chela of male.

pairs is about five-sixths the length of the propodus, that of the last pair is longer, almost equal to the length of the propodus. On all the legs there are conspicuous slender spinules, not very thickly set, on the carpus, propodus and dactylus; each spinule is dark brown basally and white distally.

The abdomen of the male is broad and closely resembles that of *S. sylvicola*.

In colour the carapace of the specimens is of a very dull reddish brown; the chelipedes are pale yellow suffused with pale red on the carpus and palm; the walking legs are deep brown with a fine mottling and dark chromatophores are thickly sprinkled on the abdomen.

The species is described from two males which yield the following measurements (in mm):—

Length of carapace	9.8	9.7
Breadth of carapace between outer orbital angles	..	9.8	9.8
Breadth of carapace at base of 3rd walking legs	..	9.8	9.8
Breadth of front..	5.0	5.0
Length of penultimate walking legs	22.0	21.5
Length of merus of penultimate walking legs	..	7.5	7.3
Breadth of merus of penultimate walking legs	..	2.0	1.9

The species differs from all the allied forms described by de Man in his Report on Max Weber's expedition to the Dutch East Indies in the shape of the carapace, which is not wider behind than in front; it is allied to *S. sylvicola*, from Sumatra, but in addition to the form of the carapace, differs in the tuberculation of the chelae, in the blunter epibranchial teeth and more slender merus of the walking legs. It is also closely related to *S. ocyпода*, Nobili¹, from Sumatra, from which it differs in the form of the carapace, in the number of denticles on the dactylus of the chela and in the proportions of the meropodites of the walking legs. Its nearest ally, however, is perhaps *S. aranea*, Nobili,² from Nias, in which the carapace is described as "perfettamente quadrato"; this species is smoother than *S. foxi*, the tuberculation on the outer face of the chela is obsolete inferiorly and the merus of the walking legs is less slender.

The specimens obtained by Mr. Buxton, the types of the species, were found on Gunong Raya in Langkawi I, at a height of 2000 ft. They were collected in moist places under stones or rotten wood at some distance from any stream. At Mr. Buxton's request I have named the species after Mr. Fox of Langkawi I.

The types of the species are in the Indian Museum, where they bear the number 9457/10.

Sesarma sp. ?

I do not venture to name three small specimens of *Sesarma* obtained by Dr. Annandale on Penang Hill in the island of Penang at a height of 1200 ft. The specimens are all young; the carapace of the largest is only 7.5 mm. in length and its chelae do not appear to have assumed their adult form.

¹ Nobili, *Ann. Mus. Civ. Genova* (2), XX, p. 513.

² Nobili, *ibid.*, p. 510.

Though the two forms are clearly allied there are many conspicuous differences between these young individuals and *S. foxi*. The carapace is decidedly broader than long and its lateral margins are posteriorly divergent. The orbital tooth is narrower, the first epibranchial tooth more prominent and a strong ridge runs obliquely inwards and backwards from the rudimentary second epibranchial tooth. The walking legs are much stouter, the merus of the penultimate pair being scarcely more than two and a half times as long as broad.

It is possible that these are young examples of the form described by Lanchester from "Lacom" and Bukit Besar as *Sesarma maculata*, de Man, but they differ noticeably from de Man's description, especially in the form of the penultimate segment of the male abdomen. It appears to me exceedingly improbable that the true *S. maculata*, which was described from Flores, can occur in the Malay Peninsula.

Sesarma politum, de Man.

1888. *Sesarma polita*, de Man, *Journ. Linn. Soc.*, XX, p. 189, pl. xiii, figs. 7-9.

Three specimens were found at the mouth of the Tale Sap on the shores of Kaw Deng. The largest is a female with carapace 21.5 mm. in length. In the smallest the carapace is only 7.5 mm. long and the second epibranchial tooth is undeveloped.

Genus **Helice**, de Haan.

Helice tridens, de Haan.

1894. *Helice tridens*, Ortmann, *Zool. Jahrb. Syst.*, VII, p. 727.

A single male, with carapace 26 mm. in breadth, was presented to Dr. Annandale by Prof. S. Yoshida. It was obtained in brackish water near Osaka in Japan.

Genus **Clistocoeloma**, A. Milne-Edwards.

Clistocoeloma merguiense, de Man.

1900. *Clistocoeloma merguiense*, Alcock, *Journ. Asiat. Soc. Bengal*, LXIX, p. 429.

Two specimens, a male and a female, were obtained by Dr. Annandale in fresh water near the mouth of the Patani River in the Siamese Malay States. The carapace of the male is 8.3 mm. in length and 9.4 mm. in breadth; that of the female is 9.9 mm. in length and 11.8 mm. in breadth. The specimens were found in burrows in wet mud, under the trunk of a dead palm tree.

Family POTAMONIDAE.

In determining the ten species of river-crabs in the present collection I have followed the classification proposed by Alcock in 1910.¹ Alcock divides the family into two groups, the Potamoninae and the Gecarcinucinae, mainly on characters drawn from the structure of the mandibular palp. In the former subfamily the terminal segment of the palp is "simple, sometimes thickened at the base for the attachment of a bunch of hairs," whereas in the latter it is "cut into two lobes which em-

¹ Alcock, *Cat. Indian Decap. Crust.*, I, fasc. ii, p. 17 (1910).

brace the incisor-process of the mandible." Calman,¹ whose notes on the point will be read with much interest, has since shown that in certain crabs from Madagascar the form of the palp is in some degree intermediate in character, though it is still quite clear that the species in question belong to the Potamoninae. My own experience with Indo-pacific species tallies with that of Alcock: the distinction between the two groups is absolute and the structure of the palp can easily be made out without dissection.

Even if it should be shown in course of time that the two groups intergrade in certain countries, necessitating some nomenclatorial changes in Alcock's system, the character will none the less retain considerable systematic importance and there is no doubt that it will prove a very essential factor in all problems connected with the distribution of the family.

Alcock's classification is unfortunately attended by some inconvenience. Prior to 1910, the date when his memoir was published, the structure of the mandibular palp is never mentioned in specific descriptions, with the result that it is frequently impossible to refer a species to its correct genus without actual examination of specimens. A case in point has occurred among the species in the present collection. *Potamon* (*Geotelphusa*) *dehaani* (White) from Japan bears a very close external resemblance to the Javanese crab originally described as *Geotelphusa kuhli*, so much so that de Man, when instituting the latter species, compared it in detail with the former. The two species have, however, no real affinity; that from Japan is a true *Geotelphusa*, belonging to the Potamoninae, whereas the Javanese form is a *Paratetelphusa*, belonging to the subfamily Gecarcinucinae and to Alcock's subgenus *Liotetelphusa*.

It is to be hoped that in all future work on the Potamonidae note will be made of the structure of the mandibular palp.

Subfamily POTAMONINAE.

Genus **Potamon**, Savigny.

1910. *Potamon*, Alcock, *Cat. Indian Decap. Crust.*, I, fasc. ii, p. 18.

Subgenus **Potamon**, Ortmann.

Potamon (**Potamon**) **denticulatum** (Milne-Edwards).

1904. *Potamon* (*Potamon*) *denticulatus*, Rathbun, *Nouv. Arch. Mus. Paris* (4), VI, p. 260, pl. ix, fig. 6.

Fourteen specimens of this species, the largest a female with carapace 49 mm. in breadth, were collected by Dr. Annandale in the Tai Hu, in the Kiangsu province of China. They were obtained from a Chinese fishing boat with examples of *Eriocheir sinensis* and were said to have been caught in a creek opening into the lake.

Potamon (**Potamon**) **granulatum** (de Man).

1904. *Potamon* (*Potamon*) *granulatus*, Rathbun, *Nouv. Arch. Mus. Paris* (4), VI, p. 274.

An adult female and four young specimens, of which only one is a male, were obtained by the late Dr. W. C. Hossack in Java.

¹ Calman, *Proc. Zool. Soc. London*, 1913, pp. 922-925.

As in the case of the female recorded by Nobili,¹ the granulation of the carapace appears to be rather less pronounced than in the large male described by de Man,² though it is far more conspicuous than in any allied species. The extreme development shown in de Man's figures is doubtless to be found only in adult males.

As de Man has pointed out, the crest of the antero-lateral border is decidedly shorter than in related forms: in this respect a marked difference exists between *P. granulatum* and *P. andersonianum* (Wood-Mason). In the specimens in the present collection, however, the granules on this border are more numerous than is indicated by de Man; they are never less than ten in number and are very irregular in their size and distribution.

Potamon larnaudii (A. Milne-Edwards), as Miss Rathbun has shown, is readily distinguished by the greater breadth of the mesogastric area.

The specimens examined were found in the Government Quinine Gardens at Tijnproean at an altitude of 5600 ft. The carapace of the large female is 41 mm. in breadth and 32 mm. in length. The species has hitherto been recorded only from Tijibodas.

Potamon (Potamon) stoliczkanum (Wood-Mason).

1910. *Potamon (Potamon) stoliczkanum*, Alcock, *Cat. Ind. Decap. Crust.*, I, fasc. ii, p. 53.

Two small males were obtained by Dr. Annandale in the Botanical Gardens at Penang; they were found under stones in a rapid running stream.

There is apparently some variation in the form of the epigastric and post-orbital crests. Those of the larger example do not form an absolutely transverse line, but are a trifle more advanced in the middle than at the sides. In the smaller individual the line formed by the crests is more nearly transverse, almost as much so as in the types.

In the larger individual the carapace is 21 mm. in length and 26 mm. in breadth, the length of the second walking leg being nearly 47 mm.

P. stoliczkanum has only been recorded from Penang (Wood-Mason) and "Lacom" (Lanchester). The specimens recorded by de Man from Mergui, under the name *Telphusa stoliczkana*, have been referred to *P. thagatense*, Rathbun.

Potamon (Potamon) anacoluthon, sp. nov.

The carapace is longer than in most species of the genus, the breadth being only about one and one fifth times the length. The upper surface is slightly convex fore and aft and from side to side. The usual H-shaped groove is conspicuous, but otherwise the carapace is almost wholly without distinction of regions. The middle portion of the cervical groove is indicated by a broad and very shallow depression and between this depression and the antero-lateral limits of the H-shaped groove there is, in both the specimens examined, a small flattened tubercle standing in the middle of a shallow pit. The entire surface, though it has a shiny appearance when dried, is coarsely and evenly punctate, the punctae being sometimes connected by exceedingly

¹ Nobili, *Ann. Mus. Civ. Genova* (2), XX, p. 500 (1900).

² De Man, in Weber's *Zool. Ergebn. Reise Nied. Ost-Ind.*, II, p. 290, pl. xvi, fig. 5 (1892).

fine grooves, to be seen only under a strong lens. The epigastric crests are prominent; their anterior edges are strongly and irregularly rugose and they are separated in the middle by a deep groove which, however, does not extend backwards behind them. The protogastric or post-orbital crests are practically obsolete, being represented merely by a slight roughened declivity separated by a faint transverse depression from the upper orbital margin. Internally the crests are on a line with, and only indistinctly separated from, those on the epigastric region; from this point they slope backwards on either side, completely disappearing before reaching the lateral margin. The upper border of the orbit is practically smooth; the lower margin is beaded and there is a distinct sinus beneath the outer orbital angle. The front is faintly emarginate in the middle and its breadth is contained about two and two-thirds times in that of the carapace. The edge is very finely crenulate and the upper

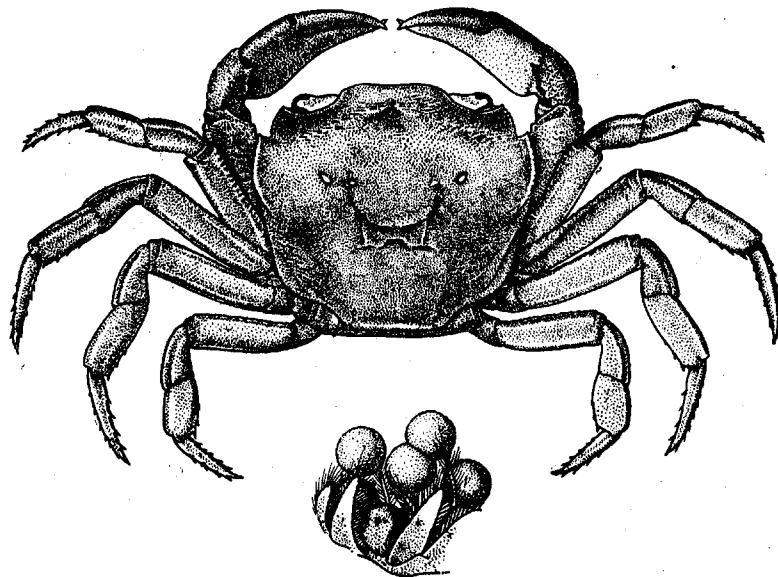


FIG. 5.—*Potamon (Potamon) anacoluthon*, sp. nov.

Male, 17.8 mm. in breadth of carapace, and eggs of female drawn to same scale.

surface finely rugose. The epibranchial tooth is very strong and is situated at some distance from the outer orbital angle; the surface in its vicinity is distinctly roughened. The level of the carapace in front of the epibranchial tooth is the same as that behind it. The margin between the tooth and the outer orbital angle is beaded; behind the tooth it is finely denticulate. The postero-lateral walls bear a few fine oblique striae; the lower surface, on either side of the buccal cavern, is covered with short rugae from which small setae arise.

The ischium of the outer maxillipedes is traversed longitudinally in its middle by a fine and deep groove; it bears very large punctae, especially near the antero-internal angle. The merus is much broader than long, with raised outer and inner borders and with its antero-external angle rounded off. The basal portion of the exopod reaches to the middle of the merus; the flagellum is very long.

The chelipedes of the male are scarcely longer than the breadth of the carapace. The upper edge of the merus is granular and terminates in a blunt and obscure sub-terminal lobe. Both inferior margins are granular and the outer surface bears numbers of small rugae arranged transversely. The carpus is rugose above; the internal tooth is very strong and behind and beneath its apex there are one or two conspicuous tubercles. The chela is slender, the depth of the palm being only about one and a half times the length of the upper border. The outer surface is slightly rugose proximally and bears numerous punctae, some of which form a conspicuous, median, longitudinal row. The fingers are nearly twice the length of the upper border of the palm; they are strongly fluted and pitted and meet throughout their length when the claw is closed, the tips crossing each other.

The second walking legs, which are the longest, are about one and three quarters the length of the carapace.

The abdomen of the male is very broad and is irregularly pitted. The segments increase successively in length, that of the sixth being only one third its basal breadth; the seventh segment is simply triangular, with a slightly sinuous proximal border, and its length is contained about one and three quarter times in its basal breadth. In the female the last abdominal segment is still more broadly triangular, its length being scarcely more than one half its basal breadth. The eggs are extremely large, each being from 2.0 to 2.5 mm. in diameter (text-fig. 5).

The species is described from two specimens, a male and a female, the latter ovigerous, but lacking the chelae. In the male the carapace is 14.6 mm. in length and 17.8 mm. in breadth; in the female it is 17.3 mm. in length and 19.9 mm. in breadth. The female in life was dull olive brown with bright red eggs; the male was of a distinctly blue shade of grey, a colour that has not apparently altered after nine months' preservation in spirit.

P. anacoluthon appears in some measure to form a link between the subgenera *Potamon* and *Geotelphusa*, agreeing with the former in the presence of a strong epi-branchial tooth and with the latter in the almost complete suppression of the post-orbital crests. It does not seem to possess close affinities with any species hitherto described.

The two specimens, types of the species, were found by Dr. Annandale on the Peak at Hongkong, under large stones at the edge of a small stream at an altitude of 1000 ft. They are preserved in the Indian Museum and bear the number 9475/10.

Potamon (Geotelphusa) dehaani (White).

1905. *Potamon (Potamonautes*¹) *dehaanii*, Rathbun, *Nouv. Arch. Mus. Paris* (4), VII, p. 204, pl. xviii, fig. 4.

1907. *Geotelphusa Dehaani*, Stimpson, *Smiths. Misc. Coll.*, XLIX, p. 112 (*nec. syn.*).

1916. *Potamon (Geotelphusa) Dehaanii*, Parisi, *Atti Soc. Ital. Sci. Nat.*, LV, p. 163.

The collection contains numerous specimens from Japan. The species was common in hill streams, in ponds and in irrigation channels in the country round Lake

¹ Presumably a clerical error for *Geotelphusa*, but repeated in a footnote under Stimpson's record.

Biwa. It is said to enter the lake itself, but Dr. Annandale could find no specimens there. In wet weather it often travels a considerable distance from water and one individual was found in the streets of Otsu. The precise localities of the specimens are (i) from hill streams and garden paths near Otsu; (ii) from irrigation channels at Hikone on the western shore of L. Biwa; (iii) from hill streams above Sakamoto on the eastern shore of L. Biwa; (iv) from a small lake at Komatsu on the same shore of the lake.

In the largest male, a specimen with carapace 30 mm. in breadth, the right chela is enormously enlarged, 31.5 mm. in length, with very widely gaping fingers.

Subfamily *GECARCINUCINAE*.

Genus *Paratelphusa*, Milne-Edwards.

1910. *Paratelphusa*, Alcock, *Cat. Indian Decap. Crust.*, I, fasc. ii, p. 70.

Subgenus *Paratelphusa*, Wood-Mason.

Paratelphusa (Paratelphusa) tridentata, Milne-Edwards.

1905. *Potamon (Paratelphusa) tridentatus*, Rathbun, *Nouv. Arch. Mus. Paris* (4), VII, p. 234, pl. xi, fig. 2.

A number of distinct species were at one time confounded under this name: the series so labelled in the Indian Museum collection contains, in addition to the true *P. tridentata*, examples of *P. convexa*, de Man, *P. maculata*, de Man and *P. oxygona*, Nobili. In determining this material I have derived much assistance from de Man's papers, particularly that published in 1879,¹ as well as from Miss Rathbun's key and full references to the literature.

The specimens of *P. tridentata* in the present collection are five in number, all collected by the late Dr. W. C. Hossack in Java. There are three males and a female from Buitenzorg Gardens, alt. 300 ft., and one female from Garoet, alt. 3000 ft. The carapace of the largest individual, a female, is 42 mm. in breadth.

The species is recorded from Borneo, Java, Sumatra and the neighbouring islands.

Paratelphusa (Paratelphusa) convexa, de Man.

1905. *Potamon (Paratelphusa) convexus*, Rathbun, *Nouv. Arch. Mus. Paris* (4), VII, p. 237.

Three specimens were obtained by Dr. Hossack in Java in company with examples of the preceding species. A male and female with carapace respectively 27 and 28.5 mm. in breadth were found in Buitenzorg Gardens and a female of similar size at Garoet. The specimen from the latter locality differs from the others in colour, being rather closely mottled with deep purple on a dull olive ground.

P. convexa is known from Timor, New Guinea, Borneo, Java and Nias.

¹ De Man, *Notes Roy. Zool. Mus. Leyden*, I, p. 61 (1879).

Paratelphusa (Paratelphusa) incerta (Lanchester).

1905. *Potamon (Paratelphusa) incertus*, Rathbun, *Nouv. Arch. Mus. Paris* (4), VII, p. 238
(*ubi syn.*).

Of this species Dr. Annandale obtained a single fine male, with carapace 55 mm. in breadth, in the Botanical Gardens at Singapore. It was found on a wet day in a rubber plantation, sitting at the edge of a burrow in the bank of an irrigation channel.

Paratelphusa incerta is very closely related to the Sumatran *P. maculata*, de Man; but, so far as I am able to judge from the examination of a single specimen, is not merely a variety of that species as suggested by Nobili.¹ Compared with a series of *P. maculata* from Deli in Sumatra, the following differences are apparent:—

(i). The carapace is broader and shorter: measured in the middle line the distance from the edge of the front to the cervical suture is conspicuously less than half the greatest breadth of the carapace. In *P. maculata* these two measurements are exactly the same.

(ii). An imaginary line joining the tips of the posterior epibranchial teeth is situated rather further forwards than in *P. maculata*.

(iii). The lateral extremities of the post-orbital crests reach a point only a little in front of the middle of the foremost epibranchial tooth and are thus situated further backwards than in the allied form.

(iv). The external orbital angle is rather more obtuse and the two epibranchial teeth project outwards more strongly. The distance between the extra-orbital angle and the first lateral tooth is only a little greater than that between the first and second lateral teeth.

P. incerta is known only from Singapore and was originally described by Lanchester from a specimen found in the Botanical Gardens. The individual recorded by Lanchester from Borneo² has been referred by Miss Rathbun³ to Nobili's *P. oxygona*.

Paratelphusa (Paratelphusa) germaini (Rathbun).

1901. *Potamon (Paratelphusa) sinense*, Lanchester, *Proc. Zool. Soc. London*, p. 545.
1905. *Potamon (Paratelphusa) germaini*, Rathbun, *Nouv. Arch. Mus. Paris* (4), VII, p. 246,
(*ubi cet. syn.*), pl. xi, fig. 9.
1906. *Potamon (Paratelphusa) sex-punctatum*, Lanchester, *Fasciculi Malayenses, Zool.*, III,
p. 129, fig. 2.

Dr. Annandale found this species in abundance in ditches and ponds and at the edge of the Tale Sap at Lampam, where the water of the lake is quite fresh. It was common also at Singgora, but apparently does not enter the brackish outer portions of the lake though it occurs in ditches containing water that is slightly saline. It was also common in ditches at Patani and in pools on the sand near the sea.

In a very old male, much overgrown with alga, the carapace is 56 mm. in breadth

¹ Nobili, *Boll. Mus. Zool. Torino*, XVI, no. 397, p. 8 (1901).

² Lanchester, *Ann. Mag. Nat. Hist.* (7), VI, p. 255, pl. xii, fig. 2 (1900).

³ Rathbun, *loc. cit.*, p. 239.

and 44 mm. in length; the chela is 64 mm. in length with very widely gaping fingers. Adults are invariably of a rich reddish crimson colour, stains of which not infrequently occur on the sternum. The six punctae described by Lanchester in his account of *P. sexdentatum* are visible in most of the specimens and four of them are often rendered conspicuous by their colouration, which is pale yellow and contrasts sharply with that of the general surface. Young individuals are of a dull olive brown tint.

There can be little doubt that the synonymy given above is correct. *P. germaini* is recorded by Miss Rathbun from many localities in French Indo-China and Siam and also from the islands off the west coast of the Malay Peninsula and (doubtfully perhaps) from Japan. It is evidently the common river crab of the country round the Tale Sap, from which it was recorded by Lanchester under the name *Potamon* (*Paratelphusa*) *sinense*.

Subgenus **Liotelphusa**, Alcock.

1910. *Liotelphusa*, Alcock, *Cat. Indian Decap. Crust.*, I, fasc. ii, p. 109.

Joest. ***Paratelphusa* (*Liotelphusa*) *kuhli*** (de Man).

1883. *Geotelphusa Kuhlii*, de Man, *Notes Leyden Mus.*, V, p. 154.

1892. *Geotelphusa Kuhlii*, de Man, in Weber's *Zool. Ergebn Reise. Nied. Ost-Ind.*, II, p. 288, pl. xv, figs. 3a-c, pl. xvi, fig. 3.

1905. *Potamon* (*Geotelphusa*) *kuhlii*, Rathbun, *Nowv. Arch. Mus. Paris* (4), VII, p. 208.

Other references are supplied by Miss Rathbun. Hitherto the species has invariably been referred to *Geotelphusa*; in general appearance it bears a very close resemblance to *Potamon* (*Geotelphusa*) *dehaani* (White), and it has been compared in detail with that species by de Man. Examination of the mandibular palp shows, however, that in spite their external similarity there is no close affinity between the two forms. In *P. (G.) dehaani* the terminal segment of the palp is simple, the species belonging to Alcock's subfamily Potamoninae. In "*Geotelphusa*" *kuhli* the terminal segment is formed of two lobes which embrace the incisor-process of the mandible; the species will therefore find a place in the subfamily Gecarcinucinae of Alcock's classification and must be referred to the genus *Paratelphusa* and the subgenus *Liotelphusa*. It is by no means distantly related to *P. (L.) levis* (Wood-Mason).

Paratelphusa kuhli is represented in the collection by a series of more than thirty specimens of all ages. In her key to the species of the subgenus *Geotelphusa*, Miss Rathbun lays stress on the presence in this species of a rudimentary epibranchial tooth. The use of this character is, however, likely to prove misleading, for the tooth is entirely absent in a number of the specimens in the present collection, while in all the others only the faintest traces of its presence can be detected.

The specimens were found by the late Dr. W. C. Hossack in the Government Quinine Gardens at Tijnproean in Java at an altitude of 5600 ft. The species is only known from Java.

Family XANTHIDAE.

Subfamily MENIPPINAE.

Genus *Myomenippe*, Hilgendorf.*Myomenippe granulosa* (A. Milne-Edwards).

1898. *Menippe* (*Myomenippe*) *granulosa*, Alcock, *Journ. Asiat. Soc. Bengal*, LXVII, p. 179.

Two small specimens, the largest with carapace 18.5 mm. in breadth, were found at the mouth of the Prai River, opposite Penang, on mud flats left bare at low tide.

Subfamily PILUMNINAE.

Genus *Pilumnus*, Leach.*Pilumnus quadridentatus*, de Man.

1888. *Pilumnus seminudus*, de Man, *Journ. Linn. Soc.*, XXII, p. 65.

1895. *Pilumnus* (*Parapilumnus*) *quadridentatus*, de Man, *Zool. Jahrb. Syst.*, VIII, p. 537 and IX, pl. xiii, fig. 6.

1906. *Pilumnus quadridentatus*, Nobili, *Ann. Sci. nat., Zool.* (9), IV, p. 278.

A male and an ovigerous female, 9.3 mm. and 8.8 mm. in breadth respectively, were found in dead shells of *Balanus* on fishing stakes in the channel off Singgora at the mouth of the Tale Sap. A very young individual, with carapace only 5 mm. in breadth, was also found among mangrove roots near Koh Yaw.

In addition to the long hairs on the upper surface of the front and to those which extend inwards in a curved line from the last tooth of the antero-lateral margin, there are two conspicuous setose areas on the gastric region. These are situated further forwards than in de Man's figure and each is oval in outline and is produced externally forwards and outwards towards the middle of the orbital margin (text-fig. 6). In a specimen from Mergui, one of those identified by de Man in 1888 as *P. seminudus*, Miers, I can find no trace of these patches; but they are easily removed in cleaning the carapace and leave practically no trace of their existence.

The granulation of the outer surface of the palms of the chelipedes is conspicuous in all the specimens, the larger granules being arranged in longitudinal rows. De Man notes that in very large males the granules almost completely disappear.

In all other respects the specimens agree very closely with de Man's detailed description. The species is evidently closely allied to *P. malardi*, de Man,¹ a form also found in dead *Balanus* shells, but differs in the shape of the front and the form of the teeth on the antero-lateral margin.

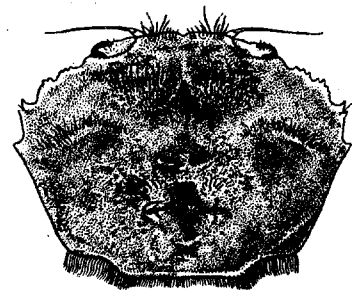


FIG. 6.—*Pilumnus quadridentatus*, de Man.
Carapace.

¹ De Man, *Bull. Soc. Zool. France*, XXXIX, p. 330 (1914)

Family PORTUNIDAE.

Subfamily PORTUNINAE.

Genus *Scylla*, de Haan.

Scylla serrata (Forskål), de Haan.

1899. *Scylla serrata*, Alcock, *Journ. Asiat. Soc. Bengal*, LXVIII, p. 27.

This species is the common edible crab of the Malay Peninsula. Dr. Annandale found it abundant in the outer part of the Tale Sap and young specimens were observed in ditches of brackish water and in mangrove swamps.

Genus *Neptunus*, de Haan.

Neptunus pelagicus (Linn.).

1899. *Neptunus pelagicus*, Alcock, *Journ. Asiat. Soc. Bengal*, LXVIII, p. 34.

Very abundant in the outer part of the Tale Sap. Young specimens were taken in the channel opposite Singgora and round Koh Yaw in from 3 to 4½ metres, usually among dead shells.

Genus *Charybdis*, de Haan.

Charybdis crucifera (A. Milne-Edwards).

1899. *Charybdis (Goniosoma) crucifera*, Alcock, *Journ. Asiat. Soc. Bengal*, LXVIII, p. 51.

Common at Singgora. Many dead specimens were seen at the edge of the lake.

Charybdis affinis, Dana.

1899. *Charybdis (Goniosoma) affinis*, Alcock, *Journ. Asiat. Soc. Bengal*, LXVIII, p. 56.

Two large specimens, with carapace 67 mm. and 51 mm. in breadth, are in the collection. They are considerably larger than any other examples in the Museum and differ from Alcock's description in the almost complete absence of the transverse ridge on the cardiac region of the carapace. This character, which is used by Alcock in his key to the Indian species of the genus, is evidently not valid in the case of very large specimens.

The specimens were taken in fishing nets at Singgora.

Charybdis callianassa (Herbst), A. Milne-Edwards.

1899. *Charybdis (Goniosoma) callianassa*, Alcock, *Journ. Asiat. Soc. Bengal*, LXVIII, p. 57.

Found with the preceding at Singgora.

Tribe OXYSTOMATA.

Family LEUCOSIIDAE.

Subfamily LEUCOSIINAE.

Genus *Ebalia*, Leach.

Ebalia heterochalaza, sp. nov.

The carapace is sharply polygonal in outline and is broader than long in the proportion of 14 to 13. The lateral and posterior margins are coarsely granulate and

the postero-lateral border is divided into thirds by two clusters of enlarged and prominent tubercles (text-fig. 7). The grooves and depressed portions of the carapace are smooth and the elevated parts tubercular. The sculpture of the dorsum is much as in *E. diadumena*, Alcock, but the grooves are not so deep. The elevations on the gastro-cardiac, intestinal and branchial regions are coarsely granulate and in the middle of the two former are several very large upstanding tubercles of a pearly appearance and of a size much greater than those on any other part of the carapace. The gastro-cardiac and intestinal elevations are imperfectly separated from one another by a transverse furrow; the granules on them are very dissimilar in size. The front is deeply hollowed in the middle line; its antero-lateral portions bear numerous fine denticles. The anterior margin is practically straight, the edge of the epistome being visible in dorsal view. The hepatic facet is well defined; its lower border is excavate posteriorly and is edged with exceptionally large tubercles. Its upper margin is defined by smaller tubercles which form a cluster near the middle of its length. The posterior limit of the facet is marked on either side by a large tubercle and the margins between these tubercles and those that define the widest portion of the carapace are straight and posteriorly divergent. The posterior margin is narrow, slightly sinuous, a little prominent at the middle point and with protruding lateral angles. The lower surface of the carapace, on either side of the outer maxillipedes, is conspicuously granular.

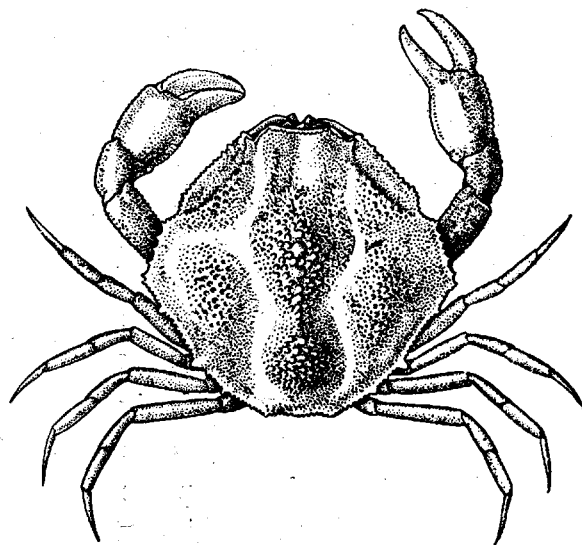


FIG. 7.—*Ebalia heterochalaza*, sp. nov.

The cornea of the eye is scarcely visible in dorsal view; the orbits are in open communication with the antennular fossae. The margin of the epistome bears two sharp processes separated by a median emargination.

The endopod of the outer maxillipedes is very narrow; the merus is almost exactly the same length as the inner border of the ischium. The exopod is only a trifle shorter than the endopod and has a strong outward bulge; it is conspicuously granular and its outer margin is very strongly curved.

The chelipedes in the male are scarcely longer than the carapace. The merus is trigonal with granular edges; it is covered with minute granules on its lower side and with a few near the base of its upper surface. There are minute granules on the carpus. The upper edge of the palm is roughened and on its lower surface are two finely beaded lines that extend from its base to the tip of the fixed finger. The uppermost of these lines is better defined than the lower and the space between them is smooth. The fingers are heavy and meet only in the distal half of their lengths, where they

are provided with teeth; both fingers are obscurely grooved and there are minute asperities on the upper surface of the dactylus.

The walking legs are smooth and slender; in those of the last pair the dactylus is fully one and a half times the length of the propodus.

The sternum of the male is granular throughout, the granules being very large and vesiculous opposite the bases of the chelipedes. The abdomen of the male consists of four pieces, a transverse basal portion, perhaps partially fused with that which follows, and three distal pieces, the two last being each about half the length of that which precedes them. The basal breadth of the penultimate portion is scarcely less than half its length; there is no median tubercle. The middle parts of all except the ultimate portion are closely covered with minute granules.

The species is described from two males with carapace respectively 5.2 and 4.6 mm. in length.

Ebalia heterochalaza appears to be nearly allied to *E. granulata* (Rüppell), re-described by Nobili in 1906,¹ the latter form differs, however, in the granulation of the carapace; the front and orbital margins are smooth and there are enlarged granules on the branchial regions similar in size to those in the middle line. The front in *E. granulata* is also conspicuously bilobed, there are no granules on the third maxillipedes or on the sternum and there is a large tubercle on the penultimate segment of the male abdomen. The last character affords a distinction between *E. heterochalaza* and *E. abdominalis*,² in which also the chelipedes are much longer and do not possess longitudinal granular ridges on the lower surface of the palm. From *E. diadumena*, Alcock,³ it differs conspicuously in the shallower sculpture of the carapace and in the presence of a well-defined hepatic facet.

The specimens were found at a depth of about 4½ metres, on a bottom composed of soft mud with many dead shells, just inside the mouth of the Tale Sap, near Singora. They were obtained in water of low salinity, its specific gravity being about 1.004 (corrected).

The two specimens, types of the species, are registered under no. 9426/10 in the Indian Museum books.

Genus *Philyra*, Leach.

Philyra sexangula, Alcock.

1896. *Philyra sexangula*, Alcock, *Journ. Asiat. Soc. Bengal*, LXV, p. 241, pl. vii, fig. 2 and (1899) *Illust. Zool. 'Investigator' Crust.*, pl. xxix, figs. 6, 6a.
1900. *Philyra sexangula*, Lanchester, *Proc. Zool. Soc. London*, p. 765.

A very small male, with carapace only 3.2 mm. in length, was obtained by Dr. Annandale. The sculpture in this individual is more clean-cut than in the larger specimens recorded by Alcock. The outline of the carapace is much more sharply angular,

¹ Nobili, *Ann. Sci. nat., Zool.* (9), IV, p. 155, pl. ix, fig. 1 (1906).

² Nobili, *ibid.*, p. 157, pl. ix, fig. 2 (1906).

³ Alcock, *Journ. Asiat. Soc. Bengal*, LXV, p. 187, pl. vii, fig. 4 (1896).

the oblique carinae on the branchial regions are exceedingly strong and in the middle line are five large blunt tubercles of which only traces remain in adults. The chelipedes have the same proportional length as in older examples, but are practically devoid of granules.

The specimen was found in the same locality as *Ebalia heterochalaza*, in water of specific gravity 1.004.

The species was hitherto known from the Godaveri Coast and Persian Gulf (Alcock), from the Matlah river in the Gangetic Delta, whence a large female, 9.5 mm. in length, was obtained a few years ago by Dr. J. T. Jenkins, and from Singapore (Lanchester).

Philyra olivacea, Rathbun.

1909. *Philyra olivacea*, Rathbun, *Proc. Biol. Soc. Washington*, XXII, p. 108.

1910. *Philyra olivacea*, Rathbun, *Danske Vid. Selsk. Skrift. (7), nat. og math.*, V, p. 312, pl. ii, fig. 17, and text-fig. 4.

Two specimens, both males, are in the collection; in most respects they agree well with Miss Rathbun's description. The posterior margin of the carapace, described as trilobate in the original examples, is merely sinuous with the outer angles prominent. The two oblique lines which run inwards from the postero-lateral margins and converge are exceedingly obscure, though visible in both specimens; they consist merely of a single row of low and widely spaced granules and might easily be overlooked.

There is a considerable difference between the two specimens in the form of the angulation of the lower margin of the hepatic facet. In the smaller specimen it is much the more prominent and is quite pale in colour, the remainder of the carapace being a very dark grey. The larger individual is pale in colour throughout.

The specimens are respectively 9.5 and 8.0 mm. in length. One was taken along with the examples of the two preceding species near Singgora, in water of specific gravity 1.004; the other was found in the bottom of a fishing boat at Patani, far to the south of the Tale Sap, and had probably come from Patani Bay.

The species was previously known only from the Coast of Lem Ngob on the eastern side of the Gulf of Siam.

Family DORIPPIDAE.

Genus *Dorippe*, Fabricius.

Dorippe astuta, Fabricius.

1896. *Dorippe astuta*, Alcock, *Journ. Asiat. Soc. Bengal*, LXV, p. 280.

A specimen with carapace about 11 mm. in length was found dead near the mouth of the Tale Sap and two smaller individuals were taken in the channel opposite Singgora in water of specific gravity 1.004 (corrected). They were found on a bottom of mud and dead shells at a depth of 4½ metres and neither of them carried anything in the last pair of legs. Alcock states on the authority of Giles that it is the custom of this species to carry an inhabited worm-tube.

ZOOLOGY OF THE FAR EAST.

Tribe **PAGURIDEA**.Family **PAGURIDAE**.Subfamily **PAGURINAE**.Genus **Clibanarius**, Dana.**Clibanarius padavensis**, de Man.

1888. *Clibanarius padavensis*, de Man, *Journ. Linn. Soc.*, XXII, p. 242, pl. xvi, fig. 1.

Three specimens were found by Dr. Annandale at the mouth of the Prai River, opposite Penang, on mud-flats exposed at low water. They were living in *Murex* and other marine shells.

Clibanarius longitarsis (de Haan).

1887. *Clibanarius longitarsis*, de Man, *Arch. f. Naturgesch.*, LII, i, p. 441.

This species was very abundant at Kaw Deng and in other localities near the mouth of the Tale Sap. All the larger individuals were inhabiting marine shells, but very small ones were usually found in *Potamides fluviatilis*. Dr. Annandale noted that the legs in living specimens were very deep blue with bright blue longitudinal stripes and that the eyestalks were bright olivaceous brown.

Genus **Diogenes**, Dana.**Diogenes avarus**, Heller.

1905. *Diogenes avarus*, Alcock, *Cat. Indian Decap. Crust.*, II, fasc. i, p. 68, pl. vi, fig. 6.

Two very small specimens, dredged in the outer part of the Tale Sap, opposite Singgora, appear to belong to this species.

Tribe **THALASSINIDEA**.Family **CALLIANASSIDAE**.Subfamily **UPOGEBIINAE**.Genus **Upogebia**, Leach.**Upogebia (Upogebia) heterocheir**, Kemp.

1915. *Upogebia (Upogebia) heterocheir*, Kemp, *Mem. Ind. Mus.*, V, p. 257, pl. xiii, figs. 6, 7.

Two specimens were dredged towards the northern part of the channel connecting the inner and outer parts of the Tale Sap near Pak Payum at depths of $3\frac{1}{2}$ to $5\frac{1}{2}$ metres. They were taken in a thin layer of soft mud overlying a bottom of coarse sand in water of specific gravity 1.0015 (corrected).

One of the specimens is very much damaged; the other is a male approximately 16 mm. in total length. In this specimen the first peraeopods differ from those of the types in the absence of the subterminal tooth on the upper edge of the merus and in the presence of only one tooth on the upper border of the propodus. The extent of

the variation in the number of spinules on the legs is thus rather greater than was gathered from examination of the Indian specimens.

The species has hitherto been found only in the Chilka Lake on the Orissa coast of India, where it was obtained in water ranging in specific gravity from 1.000 to 1.0265.

DECAPODA NATANTIA.

Tribe CARIDEA.

Family PALAEMONIDAE.

Genus *Palaemon*, Fabricius.

Palaemon carcinus, Fabricius.

1890. *Palaemon carcinus*, Ortmann, *Zool. Jahrb., Syst.*, V, p. 700, pl. xlvii, fig. 1.
 1902. *Palaemon (Eupalaemon) carcinus*, de Man, *Abhandl. Senck. naturf. Ges.*, XXV, p. 763.
 1910. *Palaemon carcinus*, Henderson and Matthai, *Rec. Ind. Mus.*, V, p. 281, pl. xv, figs. 1 a-g.
 1914. *Palaemon carcinus*, Cowles, *Philippine Journ. Sci.*, Sect. D, IX, p. 324, pl. i, figs. 1, 1a-j.

The collection contains numerous specimens of this well-known species from the Malay Peninsula. Three males, which doubtless came from the Patalung river where the water is always fresh, were bought in the market at Lampam and a large number of specimens were obtained from fishermen's nets at Singgora in the Tale Sap in water of specific gravity varying from 1.004 to 1.0085.

It is a remarkable fact that all the Singgora specimens, with one exception, are females and that nearly all of them bear eggs. In our investigations on the fauna of the Chilka Lake on the Orissa coast of India, we drew attention to the fact that certain species of *Palaemon*, *P. rudis* and *P. malcolmsoni*, visit the lake each year at the period when its waters are at their freshest in order to liberate their young. In the case of *P. malcolmsoni* this migration is undertaken only by the ovigerous females, whereas in *P. rudis* the males accompany the females.¹

It appears that a similar phenomenon occurs in the Tale Sap in the case of *P. carcinus*. Dr. Annandale found only a single male and very few females without eggs out of many hundreds of specimens examined at Singgora and there can be little doubt that the females migrate to the lake for breeding purposes. The specimens were obtained in January at the beginning of the dry season when the water of the outer part of the lake was probably fresher than at other times.

The specimens agree well with the published descriptions. The rostrum as a rule extends much beyond the antennal scale, but in one male from Lampam, 168 mm. in total length, reaches beyond this point only by some 5 mm. There are from 12 to 15 teeth on the upper border of the rostrum and from 10 to 14 (usually 12 to 14) on the lower border. Nine specimens yield the following measurements (to the nearest mm.):—

¹ Kemp, *Mem. Ind. Mus.*, V, p. 203 (1915).

LOCALITY.	Sex.	Total length.	Length of carapace.	Length of 2nd peraeopod.	SECOND PERAEOPOD : LENGTH OF				
					Ischium.	Merus.	Carpus.	Palm.	Dactylus.
Lampam	♂	174	42	132	23	25	29	28	25
"	♀	168	46	140	23	26	29	32	29
"	♂	156	39	115	21	22	26	24	20
Singgora	♂	173	46	205	28	44	48	48	37
"	♀	199	53	166	29	33	37	35	29
"	♀	175	42	117	23	23	30	22	16
"	♀	148	34	88	18	18	23	16	12
"	♀	139	32	80	16	15	20	14	11
"	♀	128	29	73	14	14	20	12	10

There are also in the collection two very small individuals, 43 and 46 mm. in total length, that I consider to be young examples of this species. They were obtained in the Patani river, below the town of Patani in the Siamese Malay States.

In the Indian Museum collections I have not been able to find any specimens of *P. carcinus* as small as these; the youngest, which are from Garia, near Calcutta, being 65 and 69 mm. in total length.

In the larger of the Patani river specimens the rostrum extends beyond the antennal scale by about one-quarter its length, and bears 12 teeth above and 10 below. In the smaller individual the rostrum reaches beyond the scale by about one third of its length, and bears 14 teeth above and 11 below. In the young specimens from Garia the rostrum is fully as long as in the smaller Patani individual, and bears 13 or 14 teeth above and 12 or 14 below. The second legs in both Patani specimens reach beyond the end of the scale by the length of the chela—in those from Garia by the chela and fully one-third of the carpus. The segments yield the following measurements (in mm.) :—

LOCALITY.	Sex. ¹	Total length.	Length of carapace.	Length of 2nd peraeopod.	SECOND PERAEOPOD : LENGTH OF				
					Ischium.	Merus.	Carpus.	Palm.	Dactylus.
Garia, nr. Calcutta	♂	69	14.7	39	7.8	8.1	11.0	6.5	4.6
"	?	65	14.0	37	7.6	7.9	10.8	5.8	4.1
Patani river	?	46	9.8	25	5.1	5.2	6.6	3.6	2.4
"	?	43	8.4	19.5	4.2	4.3	5.3	3.1	1.8

¹ In the largest specimen, which is evidently a male, the appendix masculina is represented by a small bud; in the others no trace of it can be detected.

The measurements are closely comparable to those of some adult females, the chief difference being that the dactylus is a little shorter in relation to the palm. De Man¹ records a young male specimen of this species, 65 mm. in total length, in which the carpus of the second legs was 9 mm. in length, the palm $4\frac{1}{2}$ mm. and the fingers $2\frac{3}{4}$ mm.

The telson tip in the Patani individuals differs conspicuously from that of adults, the inner pair of subterminal spinules extending beyond the apex by more than half their length. The specimens from Garia represent an intermediate stage, the spinules just reaching the apex.

Lanchester, in his account of the Crustacea of the "Skeat Expedition,"² refers to a specimen, 43 mm. in length, under the name *P. carcinus* var. *lamarrei*. This individual is doubtless a young *P. carcinus*, Milne-Edward's *P. lamarrei* being, as de Man has shown,³ quite distinct from the Fabrician species.

Palaemon carcinus is evidently an abundant species and has a distribution extending from India to New Guinea and the Philippines.

Palaemon lanchesteri, de Man.

1901. *Palaemon paucidens*, Lanchester, *Proc. Zool. Soc. London*, p. 568, pl. xxxiii, fig. 4 (not *P. paucidens*, Hilgendorf, *Sitz-ber. Ges. naturf. Freunde, Berlin*, Jahrg. 1893, p. 155).

1911. *Palaemon* (*Eupalaemon*) *Lanchesteri*, de Man (*nom. nov.* for *P. paucidens*, Lanchester nec Hilgendorf), *Notes Leyden Mus.*, XXXIII, p. 264, footnote.

Lanchester, when describing this species, noted that notwithstanding the presence of ovigerous females it might eventually prove to be merely the young of *P. idae*. In my opinion there can be no doubt that the species is valid, its nearest relative being apparently *P. lamarrei*, Milne-Edwards. In both species the secondary sexual characters seem never to be strongly developed and the second peraeopods differ little, if at all, in their proportions from those of the young.

I have little to add to Lanchester's description. The rostrum in its length and dentition agrees with his account. The posterior tooth of the dorsal series is situated on the carapace, the second being as a rule immediately over the orbit; the distance between the first and second is generally not greater than that between the second and third. The apex is nearly always bifid.

The second legs are rather shorter than indicated by Lanchester, those of ovigerous females reaching beyond the scales by scarcely more than the length of the chela, those of males by the chela and not more than one third of the carpus (for measurements see table on p. 258). The apex of the telson is sharply pointed, the inner pair of subterminal spinules extending beyond the tip by more than half their length. The eggs are large, about 1.05 mm. in length and 0.78 mm. in breadth.

Sixteen large specimens and a number of young individuals were obtained by Dr. Annandale at the inner end of the Tale Sap in ponds and ditches of fresh water near Lampam. Lanchester records the species from Singora, but Dr. Annandale obtained no evidence that it enters the lake at that place.

¹ De Man, *Notes Leyden Mus.*, I, p. 165 (1879).

² Lanchester, *Proc. Zool. Soc. London*, 1901, p. 565.

³ De Man, *Rec. Ind. Mus.*, II, p. 222, pl. xix, fig. 4 (1908).

Sex.	Total length.	Length of carapace.	Length of 2nd peraeopod.	SECOND PERAEPOD: LENGTH OF				
				Ischium.	Merus.	Carpus.	Palm.	Dactylus.
♀ ovig.	41	8.8	18.8	3.9	4.3	6.2	2.2	1.7
♀	38.5	8.2	17.9	3.7	3.7	6.0	2.0	1.6
♂	35	6.7	14.6	3.0	3.3	4.7	1.7	1.2
♂	34.5	6.4	14.2	2.9	3.1	4.8	1.6	1.2

Palaemon nipponensis, de Haan.

1890. *Palaemon nipponensis*, Ortmann, *Zool. Jahrb., Syst.*, V, p. 715.

1902. *Bithynis nipponensis*, Rathbun, *Proc. U.S. Nat. Mus.*, XXVI, p. 53.

1914. *Palaemon nipponensis*, Balas, *Abhandl. math.-phys. Klasse K. Bayer. Akad. Wiss., Suppl.* Bd. II, Abh. 10, p. 59.

The synonymy has been dealt with by Ortmann; more recent references are supplied by Balss.

A number of specimens which show a considerable amount of variation are referred to this species; they were obtained in China and Japan and the largest, which is from the former country, is only 90 mm. in total length. Miss Rathbun has remarked the close relation that exists between *P. nipponensis* and *P. longipes* and has noted certain points of distinction, but the use of these characters has not enabled me to separate the collection into two groups.

In Japanese specimens from 70 to 85 mm. in length the fingers of the second peraeopods are always shorter than the palm, varying from three quarters to nine tenths of its length; the carpus in specimens with longer fingers is usually more slender, about seven and a half times as long as its distal breadth, while in those with shorter fingers the carpus is generally stouter, hardly more than six times its distal breadth. Distinctions based on these grounds break down entirely when a number of specimens are compared. The upper edge of the rostrum is comparatively straight and in nearly all cases bears 12 or more teeth. I can find no differences in the hairiness or tothing of the fingers of the large chela.

In young Japanese specimens from 40 to 50 mm. in length the degree of variation in the proportions of the chela of the second legs is even greater than in adults, the fingers being a little longer than, equal to, or only three-quarters the length of the palm. The dorsal teeth on the rostrum are as numerous as in adults, whereas, according to Balss, there are only 7 or 8 in young *P. longipes*.

A Palaemonid from Sagami Bay, about 55 mm. in length, received in exchange from the Munich Museum and determined by Balss as *P. longipes*, differs in a conspicuous manner from all the specimens in Dr. Annandale's collection. The rostrum is shorter and more strongly arched above, the carapace is thickly covered with minute

spinules, the second legs are proportionately longer and much stouter with the carpus shorter than the palm.¹

The Japanese specimens were obtained in the Yodo river, about one mile above the town of Osaka and in the lagoon at Kasumi-ga-ura. The Chinese examples were caught in the Tai Hu lake.

***Palaemon asperulus*, von Martens.**

1868. *Palaemon asperulus*, von Martens, *Arch. für Naturgesch.*, Jahrg. XXXIV, i, p. 43, pl. i, fig. 5.

1890. *Palaemon asperulus*, Ortmann, *Zool. Jahrb., Syst.*, V, p. 708.

This species, which apparently has not been recorded² since it was originally described by von Martens in 1868, is represented in Dr. Annandale's collection by ten specimens, obtained in the Tai Hu.

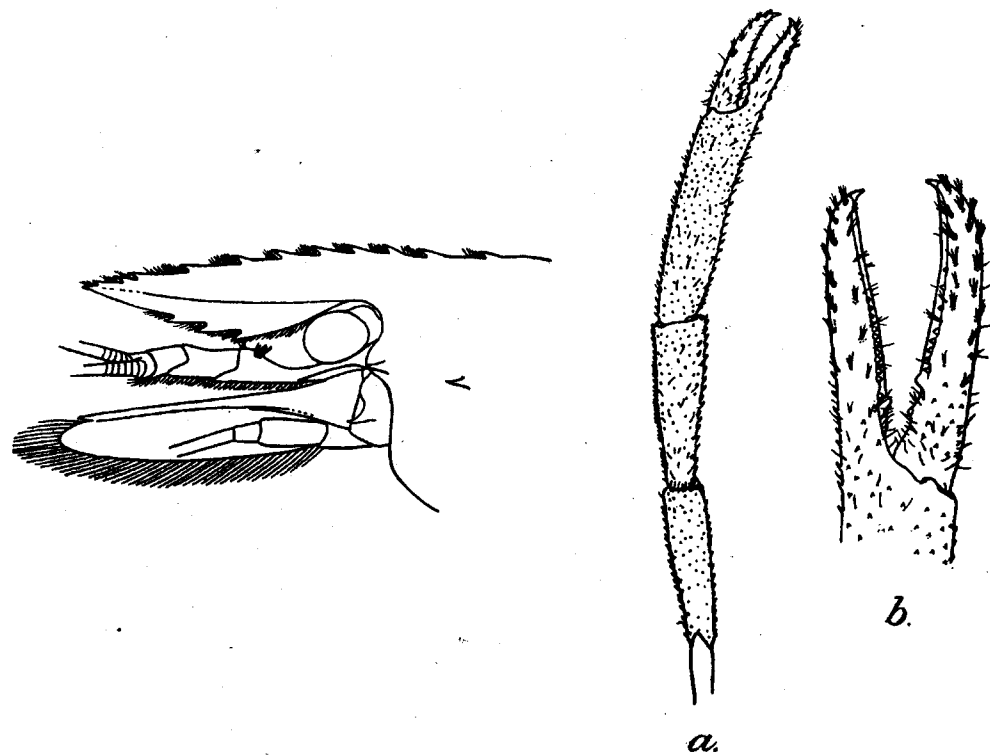


FIG. 8.—*Palaemon asperulus*, von Martens.

Anterior part of carapace, rostrum, etc.

(a) Second peraeopod.

(b) Fingers of same further enlarged.

The largest male is rather smaller than von Marten's type and is 75 mm. in length; in this individual, however, the second peraeopods are noticeably smaller than in one only 63 mm. long.

In the three largest specimens there are a few minute asperities on the carapace behind the eye and below the hepatic spine; the others are almost or quite smooth.

¹ In this respect the specimen differs from the published descriptions of large males of the species.

² The specimen which de Man referred to *P. asperulus* in 1904 is apparently a different species (see p. 261).

The rostrum reaches almost to the tip of the antennal scale in adults (text-fig. 8) ; in the young it is a trifle longer. The upper margin is straight or very slightly convex and bears from 8 to 11 teeth¹; the hindmost is rather widely separated from the next of the series and the posterior two or three are placed on the carapace behind the level of the orbit. On the lower border there are 2 or 3 large teeth.

The accessory ramus of the outer antennular flagellum is longer than the peduncle.

The second peraeopods (text-figs. 8a, b) are equal and in well developed males reach beyond the end of the antennal scale by the chela and at least half the length of the carpus; in the largest individual, however, they are proportionately shorter, reaching beyond the same point only by three quarters the length of the chela. Five specimens yield the following measurements:—

Sex.	Total length.	Length of carapace.	Length of 2nd peraeopod.	SECOND PERAEPOD: LENGTH OF				
				Ischium.	Merus.	Carpus.	Palm.	Dactylus.
♂	75	22.4	42.0	7.0	8.4	9.3	9.6	5.6
♂	63	18.1	52.5	8.4	9.5	10.9	13.3	8.6
♂	57	16.1	50.5	7.7	9.3	10.4	13.4	8.3
♀	49	13.2	38.5	5.9	7.2	8.4	9.2	6.2
♀	43	11.2	30.7	5.5	5.5	7.1	7.0	4.4

It will be noticed that the carpus is decidedly shorter than the propodus in all the larger specimens. In those below 45 mm. in length the proportions are, however, different, the carpus being almost as long, or even (as in the specimen measured) a shade longer than the palm.

In the male 63 mm. in length the carpus is 2.7 mm. in breadth at the distal end, the segment thus being about four times as long as broad. In all the larger specimens the segments bear minute asperities, specially noticeable on the inner and under surfaces of the carpus and propodus where they tend to form longitudinal rows. The fingers bear few hairs; on their inner margins there is a fine ridge extending from the base to the tip; there is a single small tooth at the base of the fixed finger and two in a similar position on the dactylus.

The telson is produced to a sharp apical point which is, however, exceeded by the innermost of the two pairs of terminal spinules.

The specimens collected by Dr. Annandale were found not far from Shanghai, the locality from which von Martens described the species. There is thus little doubt that they represent the true *P. asperulus*.

¹ The rostral formulae in ten specimens are,—8/2, 9/2, 9/3, 9/3, 10/3, 10/3, 10/3, 10/3, 11/3, 11/3.

The female, 45 mm. in length, from South Hu-peh, referred by de Man¹ to *Palaemon* (*Parapalaemon*?) *asperulus*, is without doubt different. In none of Dr. Annandale's specimens can I find any trace of carinae on the first abdominal somite and the peraeopods differ conspicuously from de Man's account. In the case of the Hu-peh specimen the merus of the second leg is 5.2 mm. in length, the carpus 6.4 mm., the palm 7.5 mm. and the fingers 5.5 mm., proportions which differ slightly from those of Shanghai individuals. In the latter specimens, moreover, there is no trace of a longitudinal ridge on the outer side of the merus and carpus. The last three peraeopods are also much stouter in the Hu-peh specimen, the merus of the third pair being only five times, and the propodus seven times as long as broad. In Dr. Annandale's examples the merus of this limb is six and a half times and the propodus about nine times as long as broad.

The specimens were deeply pigmented in life, but without any characteristic markings. They were taken from small basket traps set among weeds in and at the mouths of narrow creeks opening into the Tai Hu. They were found along with *Palaemon nipponensis* and *Leander modestus*, but were much less abundant than either of those species.

***Palaemon sundaicus* (Heller?), de Man.**

1862. *Palaemon sundaicus*, Heller, *Sitz.-ber. Akad. Wiss. Wien*, XIV, p. 415, pl. ii, figs. 38, 39.
 1892. *Palaemon* (*Eupalaemon*) *sundaicus*, de Man, in *Weber's Zool. Ergebn. Reise Niederland. Ost-Ind.*, II, p. 437, pl. xxvi, fig. 35.
 1897. *Palaemon* (*Eupalaemon*) *sundaicus*, de Man, *Zool. Jahrb., Syst.*, IX, p. 779 and X, pl. xxxvii, fig. 71 (1898).
 1914. *Palaemon sundaicus*, Cowles, *Philippine Journ. Sci.*, Sect. D, IX, p. 355, pl. ii, figs. 3, 3a-f.

To this species I refer a number of rather small specimens in which the chelipedes (after nine months' preservation in alcohol) are deeply mottled with purplish brown. They almost certainly belong to the same species as those with identical colour markings described by de Man and Cowles (*loc. cit.* 1897 and 1914).

De Man has described two varieties of *P. sundaicus* from Atjeh and Batavia, distinguishing the latter under the name var. *bataviana*. Dr. Annandale's specimens agree most nearly with the typical form.

Of the twelve specimens in the collection, ten have 10 or 11 (usually 11) teeth on the upper edge of the rostrum and 5 to 7 (usually 6) on the lower edge. One specimen has 13 dorsal teeth and 6 ventral and one which has clearly suffered injury—the antennal scale on one side being only half its normal size—has 14 teeth above and 11 below. In all cases there are three teeth on the carapace behind the orbital notch. Towards the apex the rostrum is always rather strongly upturned, reaching beyond the antennal scale by a proportion varying from one tenth to one fifth of its length. The carapace is smooth throughout.

The second peraeopods are slender and in the larger specimens reach beyond the scale by rather more than the chela and carpus. The merus, carpus and

¹ De Man, *Trans. Linn. Soc., Zool.* (2), IX, p. 293, pl. xviii, figs. 2-8 (1904).

palm are thickly covered with small spinules which are larger on the inner and under sides of the carpus and palm where they tend to form longitudinal rows. These spinules are visible even in the smallest individuals. In the larger males and the oldest female the fingers are thickly clothed with hair. There are two small teeth on the inner margin of the dactylus near its proximal end and one similar tooth which fits between them on the fixed finger.

Seven specimens yield the following measurements :—

Sex.	Total length.	Length of carapace.	Length of 2nd peraeopod.	SECOND PERAEOPOD : LENGTH OF				
				Ischium	Merus.	Carpus.	Palm.	Dactylus.
♂	76	17.5	77	12.1	15.2	23.0	15.2	10.7
♂	71	17.3	61.5	10.4	11.5	16.8	12.1	8.3
♂	53	11.3	42.5	8.0	8.0	12.4	6.5	6.4
♂	43	9.1	32.0	6.0	6.2	8.5	4.7	4.8
♀	76	21.3	67	12.4	14.0	18.6	11.7	8.1
♀	57	13.5	49	8.8	9.2	14.2	8.7	6.3
♂	82	21.7	121	16.8	23.0	40.5	32.0	11.6

It is doubtful if the last of these specimens, which is separately referred to below, is correctly referred to *P. sundaicus*. The measurements of the remainder tend to show that in the course of growth the palm increases considerably in length in proportion to the merus and fingers. In young males it is much shorter than the merus and little if at all longer than the fingers, whereas in large males it is equal to or a little longer than the merus and almost one and a half times as long as the fingers.

In the male 76 mm. in length the carpus is 2.5 mm. in breadth at its distal end and the palm 2.4 mm., the segments being respectively about nine times and six and a third times as long as broad. In the female of the same length these measurements are 2.3 mm. and 2.5 mm., the carpus being eight times and the palm six and two thirds times as long as wide.

If the figures tabulated above are analysed and compared with those given in other descriptions, certain small differences are evident; these, however, do not appear to be sufficiently well marked to afford any basis for the foundation of a subspecies. In the males from the Tale Sap, for instance, the merus and carpus seem proportionately a trifle longer and the palm and dactylus a little shorter than in those described by de Man as *P. sundaicus* var.¹ and the same features may be detected if the Tale Sap females are compared with de Man's typical *P. sundaicus* from the Java Sea.²

¹ De Man, *loc. cit.*, 1897, p. 783.

² De Man, *loc. cit.*, 1897, p. 782.

The large male, the last of those included in the table of measurements, is referred to *P. sundaicus* with very considerable doubt, but is perhaps merely an abnormality. Both legs of the second pair are detached and only one is complete. The rostrum resembles that of the other specimens, extending a little beyond the scale, with an upturned apex and with 10 teeth above and 5 below. The second peraeopod shows very faint traces of mottling, but is proportionately much longer than in the other specimens and exhibits great differences in the relative lengths of the segments. The dactylus is proportionately much shorter and the carpus and palm longer. Cowles (*loc. cit.*) has given the measurements of a number of Philippine specimens of *P. sundaicus* of sizes comparable with this male; but in all of them the fingers are considerably more than half the length of the palm, whereas in Dr. Annandale's specimen they are little more than one third the length.

The specimens in the collection were found in the Tale Sap near Singgora and in pools and ditches in the vicinity; they were obtained in water of specific gravity varying from 1.004 to 1.0085. There are also a few small individuals from the Patani river in the Siamese Malay States. These were found in fresh water, but in a locality subject to tidal influence. Dr. Annandale notes that, in addition to the tortoise-shell-like mottlings on the chelipedes, living specimens showed a small dark spot on each side of each abdominal somite.

Specimens which I regard as specifically identical with those obtained by Dr. Annandale are recorded by de Man from Java, Flores and Celebes and by Cowles from the Philippines. Most other records appear somewhat doubtful.

Henderson and Matthai¹ regard *P. sundaicus* as a synonym of *P. idae*, but I am not at present prepared to follow them in this view. The specimens I have examined seem to differ conspicuously in the form of the rostrum from any of those which they have recorded from S. India under the latter name. *P. sundaicus* was described by Heller from a very young specimen and its true identity is still uncertain. The notes made by Koelbel on the type and published by de Man² have led the latter author³ and Coutière⁴ to suggest the possibility of its identity with von Martens' *P. dispar* and this view seems to have more to recommend it than that adopted by Henderson and Matthai. If proved it will, however, have unfortunate consequences, for *P. dispar* must then be known as *P. sundaicus*, while a new name will probably be necessary for the form described above.

De Man (*loc. cit.*, 1897) has also suggested that Heller's *P. sundaicus* may be specifically identical with Dana's *P. equidens* from Singapore. But Dana's species was described from a mutilated specimen which, apparently, is not now in existence. It is exceedingly improbable that the species will ever be recognised with certainty and it is best that it should be altogether ignored in future work.

¹ Henderson and Matthai, *Rec. Ind. Mus.*, V., p. 285 (1910).

² De Man, *loc. cit.*, 1892, p. 437.

³ De Man, *loc. cit.*, 1897, p. 781.

⁴ Coutière, *Ann. Sci. nat., Zool.* (8), XII, p. 335 (1901).

***Palaemon elegans*, de Man.**

1892. *Palaemon (Eupalaemon) elegans*, de Man, in *Weber's Zool. Ergebn. Reise Niederländ Ost.-Ind.*, II, p. 440, pl. xxvi, fig. 36.
1903. *Palaemon (Eupalaemon) elegans*, de Man, *Abhandl. Senck. naturf. Ges., Frankfurt*, XXV, p. 764.

The specimens in the collection are from Patalung in Lower Siam. They agree closely with the original description and also with an adult male from Buitenzorg determined by de Man and preserved in the Indian Museum: there are, however, slight differences in the form of the rostrum.

In Javanese specimens the upper edge of the rostrum is usually convex and at the apex is straight or directed a little downwards. In those from Patalung the upper edge is usually a trifle sinuous and the apex is straight, or (more particularly in young males and females) directed a little upwards. The teeth on the upper edge vary in number from 9 to 13,¹ with 2 or 3 situated on the carapace, thus agreeing exactly with de Man's account. On the lower edge, however, there are from 4 to 6 teeth (usually 4 or 5),² whereas in Javanese specimens there are only 2 or 3 and rarely 4.

The spinules on the carapace of the male, except in the case of the largest specimen, are restricted to the lateral walls and to the region in the vicinity of the hepatic spine.

The identity of the Patalung specimens with *P. elegans* is proved beyond doubt by the form of the chelae of the adult male which agree in every particular with those of the specimen from Buitenzorg referred to above. The fingers are clothed with hair in their basal two-thirds, with teeth at their proximal end exactly as described by de Man, while the movable finger bears distally the characteristic double row of tubercles. Seven specimens yield the following measurements:—

Sex.	Total length.	Length of carapace.	Length of 2nd peraeopod.	SECOND PERAEPOD: LENGTH OF				
				Ischium.	Merus.	Carpus.	Palm.	Dactylus.
♂	61	16.5	8	9.9	16.7	23.5	18.5	15.6
♂	57	15.7	71.5	10.4	14.0	19.7	13.4	14.0
			54	8.0	11.4	13.7	10.8	9.4
♂	58	14.3	65	9.4	13.0	19.1	13.5	11.6
♂	60	14.2	43	7.1	8.5	11.7	7.9	7.7
♂	49	12.2	37.7	6.5	7.7	9.7	7.3	6.5
♀ ovig.	47	11.3	31.5	5.4	5.7	8.8	5.1	4.3
♀ ovig.	40	9.7	24.5	4.7	4.9	6.6	3.9	3.5

¹ Of twenty-three specimens two have 9 dorsal teeth, seven have 10, nine have 11, four have 12 and one has 13.

² Of twenty-three specimens twelve have 4 ventral teeth, ten have 5 and one has 6.

The eggs are very large, about 1.5 mm. in length and 1.15 mm. in breadth. One specimen is parasitised by a Bopyrid.

It appears to me probable that the six larger specimens recorded by Lanchester from the Tale Sap under the name *Palaemon nipponensis*¹ are in reality examples of this species. De Man has noted the great resemblance that exists between the two forms and judging from Dr. Annandale's collection *P. nipponensis* does not occur in Lower Siam. The rostrum in Lanchester's larger specimens bears 10 or 11 teeth above and 4, 5 or 6 below, agreeing with the individuals described above. Lanchester's smaller examples with 6, 7 or 8 teeth on the upper border of the rostrum and 3, 4 or 5 below, probably belong to some other species; in young *P. elegans* that I have examined the rostral formula is the same as in adults.

Dr. Annandale's specimens of *P. elegans* were obtained at Lampam in Patalung in fresh water. They were found in the Patalung river and in ponds and ditches in the vicinity. In the Tale Sap itself the species was not found. *P. elegans* is recorded by de Man from Buitenzorg and Sinagar in Java.

Palaemon neglectus, de Man.

1888. *Palaemon acutirostris*, de Man (*nec* Dana), *Journ. Linn. Soc.*, XXII, p. 280, pl. xviii, fig. 7.
 1891. *Palaemon acutirostris* (de Man *nec* Dana), *Ortmann, Zool. Jarhb., Syst.*, V, p. 707.
 1892. *Palaemon (Eupalaemon) equidens*, de Man (*nec* Dana), in *Weber's Zool. Ergebn. Reise Niederländ. Ost-Ind.*, II, p. 453, pl. xxvi, fig. 37 (*not the synonymy*).
 1906. *Palaemon (Eupalaemon) neglectus*, de Man, *Notes Leyden Mus.*, XXVI p. 201, pl. xv, fig. 6.

To this species belong a number of specimens obtained by Dr. Annandale in the Botanical Gardens at Penang.

The rostrum is a little shorter than the antennal scales; its upper margin is straight or a little convex near the base and is a trifle upturned at the tip. On the dorsal edge there are from 11 to 13 teeth (usually 12),² of which the three hindmost are placed on the carapace, the fourth being immediately above the posterior limit of the orbit. On the lower edge there are 4 or 5 teeth (nearly always 4).³

The largest male, a specimen 88 mm. in total length, bears a great number of very small spinules on the carapace; but these are absent in all the other examples. Six specimens yield the measurements shown on the next page.

The proportions of the segments of the second peraeopods are rather variable. In males the carpus is usually shorter than the merus or equal in length with it, whereas in females it is a little longer than the merus. In the larger claw of the largest male the fingers are a little longer than the carpus; in all other cases they are decidedly shorter. In males the chelipedes are always stout; in the larger limb of the male 88 mm. in total length the merus is 4.7 mm. thick at its distal end and the carpus 5.0 mm.; the palm is very slightly flattened, being 5.4 mm. in breadth and 4.9 mm. in thickness.

¹ Lanchester, *Proc. Zool. Soc. London*, 1901, p. 566.

² Of fifteen specimens three have 11 dorsal teeth, nine have 12, two have 13 and one abnormal individual has 9.

³ Of fifteen specimens fourteen have 4 ventral teeth and one has 5.

ZOOLOGY OF THE FAR EAST.

Sex.	Total length.	Length of carapace.	Length of 2nd peraeopod.	SECOND PERAEPOD : LENGTH OF				
				Ischium.	Merus.	Carpus.	Palm.	Dactylus.
♂	88	25.6	84	10.8	16.1	15.5	23.5	15.8
			72	10.4	14.9	13.8	17.9	12.3
♂	72	19.5	54	8.3	10.4	10.2	13.2	9.5
			44	7.7	8.8	8.8	9.6	7.3
♂	66	17.5	45.5	7.5	9.1	8.7	11.1	7.2
			37.5	6.6	7.9	7.9	8.2	5.8
♂	75 ¹	20.5	50.5	8.1	11.0	10.3	12.4	7.8
			43	7.6	9.3	8.7	9.4	6.6
♀	53	13.1	32.5	5.6	6.6	7.1	7.3	5.1
			30	5.2	6.5	6.8	6.4	4.8
♀	43	11.0	28.5	4.9	5.7	6.0	5.7	4.5
			25	4.5	5.0	6.0	4.7	3.9

The spinules on the chelipedes agree closely with de Man's description. On the outer surface of the carpus there is a comparatively broad longitudinal smooth line which separates the closely packed small spinules of the upper surface from the very much larger and more sparsely distributed spinules of the lower surface.

In the largest male there are on both chelae five teeth on the fixed finger and four on the dactylus; in the smaller individuals they are less numerous, two or three on each finger. The anterior tooth on the dactylus is placed a little behind its middle point, the foremost on the fixed finger being posterior to it. These two teeth are larger than any of the others and the margin behind each of them is distinctly concave.

The synonymy of *P. neglectus* has been dealt with by de Man. In the Indian Museum there are two of the specimens which he recorded from Mergui in 1888 under the name *P. acutirostris*. These appear to be specifically identical with those described above, but unfortunately all the chelipedes are missing except one, which is small.

The specimens obtained by Dr. Annandale were found in a rapid running stream in the Botanical Gardens at Penang. All of them, in life, bore a small black spot on each side of the abdomen at the junction of the 1st and 2nd, 2nd and 3rd, 4th and 5th and 5th and 6th abdominal somites. No spot occurred at the junction of the 3rd and 4th somites. In the smaller individuals there was a dark slanting line near the posterior margin of the carapace and another, similar to it, not far from the anterior

¹ Both chelipedes detached.

margin, the two sometimes being joined together to form an N-shaped figure. In the largest male the carapace was olivaceous green, marbled and streaked and without definite markings. The chelipedes in this specimen were blackish externally and pale olive internally, the fingers being black with white tips. In smaller individuals the chelipedes were olive, with white fingers and with two scarlet bars on the chela. The first of these was situated at the proximal end of the palm and the second at the base of the fingers. The walking legs bore alternate pale and dark bars.

Palaemon neglectus has hitherto been recorded from King I. and Elphinstone I. in the Mergui Archipelago and from Deli on the E. coast of Sumatra.

Palaemon pilimanus, de Man.

1891. *Palaemon pilimanus*, Ortmann, *Zool. Jahrb., Syst.*, V, p. 735, pl. xlvii, fig. 9.
 1892. *Palaemon (Macrobrachium) pilimanus*, de Man, in Weber's *Zool. Ergebn. Reise Nied. Ost-Ind.*, II, p. 471, pls. xxvii and xxviii, figs. 44, a-i.
 1900. *Palaemon (Macrobrachium) pilimanus*, Borradaile, *Proc. Zool. Soc. London*, p. 93.
 1901. *Palaemon pilimanus*, Lanchester, *Proc. Zool. Soc. London*, p. 567.

A large number of specimens collected in Java by the late Dr. W. C. Hossack belong to this variable species; they agree with de Man's description and with three Javanese specimens determined by de Man and preserved in the Indian Museum.

About sixty specimens, including one ovigerous female, were obtained in the Government Quinine Gardens at Tijnproean, at an altitude of 5600 ft., while two others were found at Garoet at an altitude of about 3000 ft. The ovigerous female is 45 mm. in total length and the largest male 59 mm.

The species is known from Java, Sumatra and Borneo and on the continent of Asia from Aring in Kelantan and the Belimbing River.

Palaemon lampropus, de Man.

1892. *Palaemon (Macrobrachium) lampropus*, de Man, in Weber's *Zool. Ergebn. Reise Nied. Ost-Ind.*, II, p. 493, pl. xxix, figs. 49a-c.
 1901. *Palaemon lampropus*, Lanchester, *Proc. Zool. Soc. London*, p. 568.
 1902. *Palaemon lampropus*, Schenkel, *Verh. naturf. Ges. Basel*, XIII, p. 511.

Fifteen specimens were obtained by Dr. Annandale in the Patani River, below the town of Patani in the Siamese Malay States. The series agrees very well with de Man's account, but the rostrum is longer than in the large male that he described in detail, reaching to, or even a little beyond the apex of the scale. There are from 15 to 18 teeth on the upper border of the rostrum¹ of which 3 or 4 (usually 4) are situated on the carapace behind the orbit. On the lower margin there are 3 or 4 teeth, usually 4.

The specimens are small, the largest being only about 45 mm. in length; the chelipedes in several individuals are equal and in no case do they reach beyond the antennal scale by more than the length of the chela. In their form, however, and in the dentition of the fingers they are in precise agreement with de Man's description.

¹ Of fifteen specimens two have 15 dorsal teeth, six have 16, five have 17 and two have 18.

The series includes several ovigerous females, each bearing a great number of very small eggs.

Palaemon lampropus is known to occur in Celebes and Timor and has been recorded by Lanchester from Aring in Kelantan. The number of dorsal teeth on the rostrum in Lanchester's specimens (12 or 13) is considerably lower than in any of those found by Dr. Annandale.

Genus **Leander**, Desmarest.

In a recent paper in the *Records of the Indian Museum* I have revised the section of this genus that comprises Milne-Edward's *Leander styliferus* and related forms. This paper contains descriptions and figures of three of the five species obtained by Dr. Annandale in the course of his tour.

Leander annandalei, Kemp.

1917. *Leander annandalei*, Kemp, *Rec. Ind. Mus.*, XIII, p. 211, text-figs. 1-4.

This remarkable species is based on a single individual dredged in the Whangpoo River, between Shanghai and Woosung, at a depth of $5\frac{1}{2}$ to $7\frac{1}{2}$ metres. It was found in pure fresh water.

Leander annandalei is particularly interesting in that it forms a link between *L. tenuipes*, Henderson, in which the last three pairs of legs are excessively long and filiform, and more normally constituted species of the genus.

Leander modestus, Heller.

1917. *Leander modestus*, Kemp, *Rec. Ind. Mus.*, XIII, p. 221, pl. ix, fig. 1.

From material obtained by Dr. Annandale at Shanghai I have been able to draw up a fresh description of this species, which was hitherto known only from the account given by Heller more than fifty years ago.

The species is common at the margins of the Tai Hu Lake and is caught in large numbers in basket traps set among weeds. A few individuals were dredged from a bare muddy bottom in the middle of the lake and others were obtained in the Whangpoo River between Shanghai and Woosung at depths of $5\frac{1}{2}$ to $7\frac{1}{2}$ metres. Young examples are common in ditches and ponds in the neighbourhood of Shanghai. All the specimens were obtained in pure fresh water.

In redescribing this species I unaccountably omitted to notice that Henderson in 1893 recorded *Leander modestus* from Madras. I have recently obtained from this locality specimens of a form which is without doubt identical with that examined by him. The specimens are, in my opinion, to be referred to *L. semmelinki*, a species which in many respects bears a close resemblance to *L. modestus*.

Leander semmelinki, de Man.

1881. *Leander semmelinkii*, de Man, *Notes Leyden Mus.*, III, p. 137.

1890. *Leander semmelinkii*, Ortmann, *Zool. Jahrb., Syst.*, V, p. 517.

1893. *Leander modestus*, Henderson (*nec* Heller), *Trans. Linn. Soc., Zool.* (2), V, p. 441.

1903. *Leander semmelinkii*, Nobili, *Boll. Mus. Torino*, XVIII, no. 455, p. 8.