

NEW SPECIES OF JAPANESE CRABS FROM THE COLLECTION OF HIS MAJESTY THE EMPEROR OF JAPAN

BY

TUNE SAKAI

Faculty of Liberal Arts and Education, Yokohama National University, Japan

The seasonal research on marine animals at Sagami Bay has been continued by His Majesty the Emperor of Japan for the last fifteen years or more. The main purpose of His Majesty's research was to inquire into, and to collect specimens of Hydroid animals, which is the main subject of His study; besides Hydroids, however, a lot of specimens of various other marine animals have been obtained and accumulated in His laboratory. Thus the publications on Nudibranchia of Sagami Bay (1949), its Supplementary Reports (1955) and Tunicata of Sagami Bay (1953) have been issued under the supervision of the Imperial Household.

The specimens of crabs thus collected are also vast in number, including many new or rare species. The study of these specimens has been entrusted to the author and it is hoped that a monograph on the crabs of Sagami Bay with coloured illustrations will be issued in the near future. The author would like to take the present opportunity to publish a description of the new species, in accordance with the Emperor's wish.

Many specimens of crabs have been contributed to the Emperor's laboratory through the author by local carcinologists or collectors for comparison with the Emperor's specimens. Among such material some new or rare species are also included and are described herewith.

In this paper I will describe fifteen of the new species — seven of which were collected by the Emperor himself — listed as follows:

LEUCOSIIDAE

- Leucosia sagamiensis* sp. nov.
- Randallia trituberculata* sp. nov.
- R. pustuloides* sp. nov.
- R. granuloides* sp. nov.
- Parilia major* sp. nov.
- P. tuberculata* sp. nov.
- Cryptocnemus kamekii* sp. nov.

CALAPPIDAE

- Matuta curtispina* sp. nov.

MAJIDAE

- Eurynome orientalis* sp. nov.

XANTHIDAE

- Xanthias maculata* sp. nov.
- Lybia batagumoana* sp. nov.

PORTUNIDAE

Podophthalmus minabensis sp. nov.

PINNOTHERIDAE

Pinnotheres laquei sp. nov.

HOMOLIDAE

Paromola macrochira sp. nov.*Homola (Moloha) acutispina* sp. nov.

In the course of study of these species, the author had occasion to visit the following American and European Museums in order to examine the type specimens of related species and to consult the necessary literature: Bernice P. Bishop Museum, Hawaii; Allan Hancock Foundation, Los Angeles; Smithsonian Institution, Washington, D. C.; British Museum (Natural History), London; Muséum d'Histoire Naturelle, Paris; Rijksmuseum van Natuurlijke Historie, Leiden; Zoölogisch Museum, Amsterdam and Universitetets Zoologiske Museum, Copenhagen. The author's sincerest acknowledgements are due to the Directors and staff of these Museums for their kindness in facilitating the author's study.

The author is also much indebted to Dr. C. H. Edmondson (Hawaii), Dr. John S. Garth (Los Angeles), Dr. F. A. Chace (Washington, D. C.), Dr. I. Gordon (London), Dr. J. Forest and Mme. D. Guinot-Dumortier (Paris), Dr. L. B. Holthuis and Dr. H. Boschma (Leiden), Dr. J. H. Stock (Amsterdam), and Dr. T. Wolff (Copenhagen), for their courtesy and cooperation during the author's round trip.

***Leucosia sagamiensis* sp. nov.** (text-fig. 1 a, b, pl. III fig. 1)

1 ♂ (holotype), off the coast of Hayama, 30 m deep, coll. by His Majesty.

1 ♀, off the coast of Shimabara Peninsula, Nagasaki, sent by Mr. M. Matsuo of the Nagasaki Secondary School.

DESCRIPTION. A small species with its front short and robust, without any post-orbital constriction. The carapace is broader than long. The antero-lateral border, which is shorter than the postero-lateral one, has two obtuse, lobular projections. Behind the anterior lobe, which is median in position, the thoracic sinus is deeply marked. The other lobe is situated at the lateral angle and is outlined with small studded tubercles. Just behind this lateral angle, the lateral border is also lined with such tubercles, which are covered with short black hairs. There is a shallow notch between this hairy border and the true postero-lateral border, which is about 1.2 times as long as the hairy border, and is rapidly converging posteriorly. There are no distinct ocelli or coloured markings on the carapace, the colour being brownish blue with indistinct pale stripes. The anterior end of the exognath of the external maxillipeds is somewhat bulbous, but it is not so remarkable as in *Lissomorpha haswelli* Ward (1933), which is perhaps most akin to this species.

The chelipeds are rather short and robust. The arm is compressed and bears on its anterior border about ten studded tubercles, of which the two or three median ones are very large; its proximal upper surface is marked with a cluster of six or seven small tubercles arranged in two rows, between which the surface



Fig. 1, *Leucosia sagamiensis* sp. nov., $\times 2.1$. Fig. 2, *Randallia trituberculata* sp. nov., $\times 1.7$. Fig. 3, *Randallia granuloides* sp. nov., $\times 1.25$. Fig. 4, *Randallia pustuloides* sp. nov., natural size. Fig. 5, *Parilia major* sp. nov., $\times 0.5$. Fig. 6, *Parilia tuberculata* sp. nov., $\times 1.1$. Fig. 7, *Matuta curtispina* sp. nov., natural size.

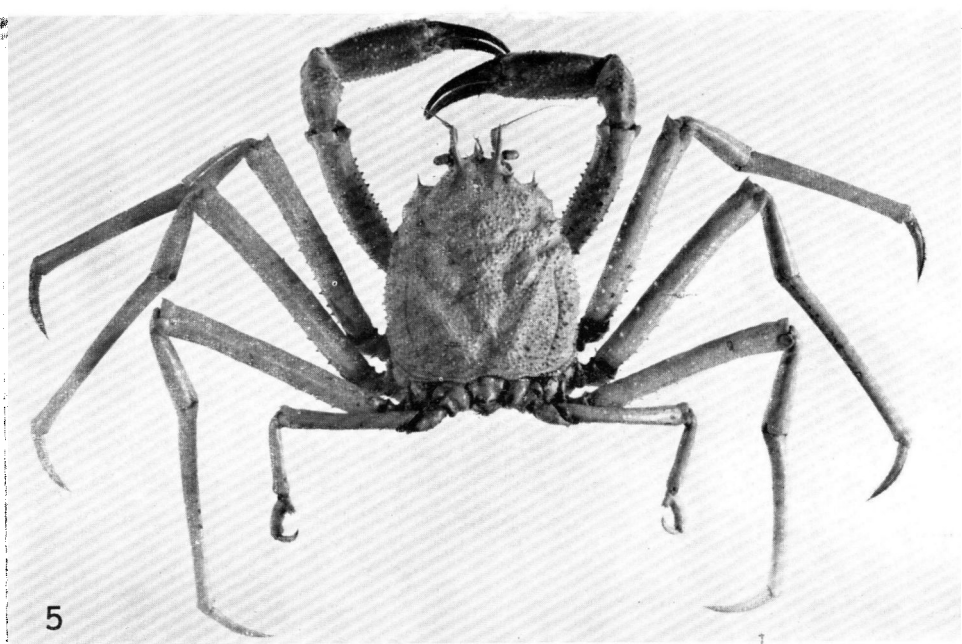
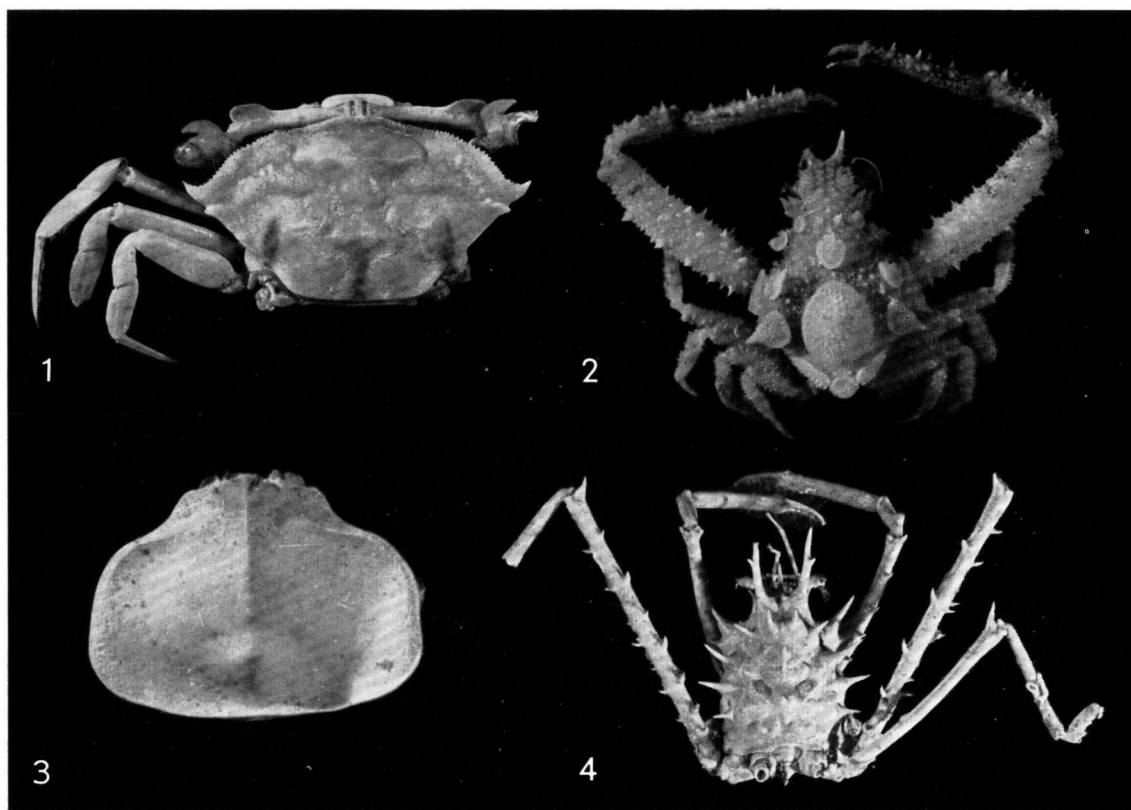


Fig. 1, *Podophthalmus minabensis* sp. nov., $\times 1.3$. Fig. 2, *Erynome orientalis* sp. nov., $\times 4$.
 Fig. 3, *Cryptocnemus kamekii* sp. nov., $\times 5.3$. Fig. 4, *Homola (Moloha) acutispina* sp. nov., $\times 0.7$.
 Fig. 5, *Paromola macrochira* sp. nov., $\times 0.2$.

is thickly covered with a short black tomentum. The posterior border is beset with about 11 or 12 studded tubercles. The outer and inner borders of the palm are

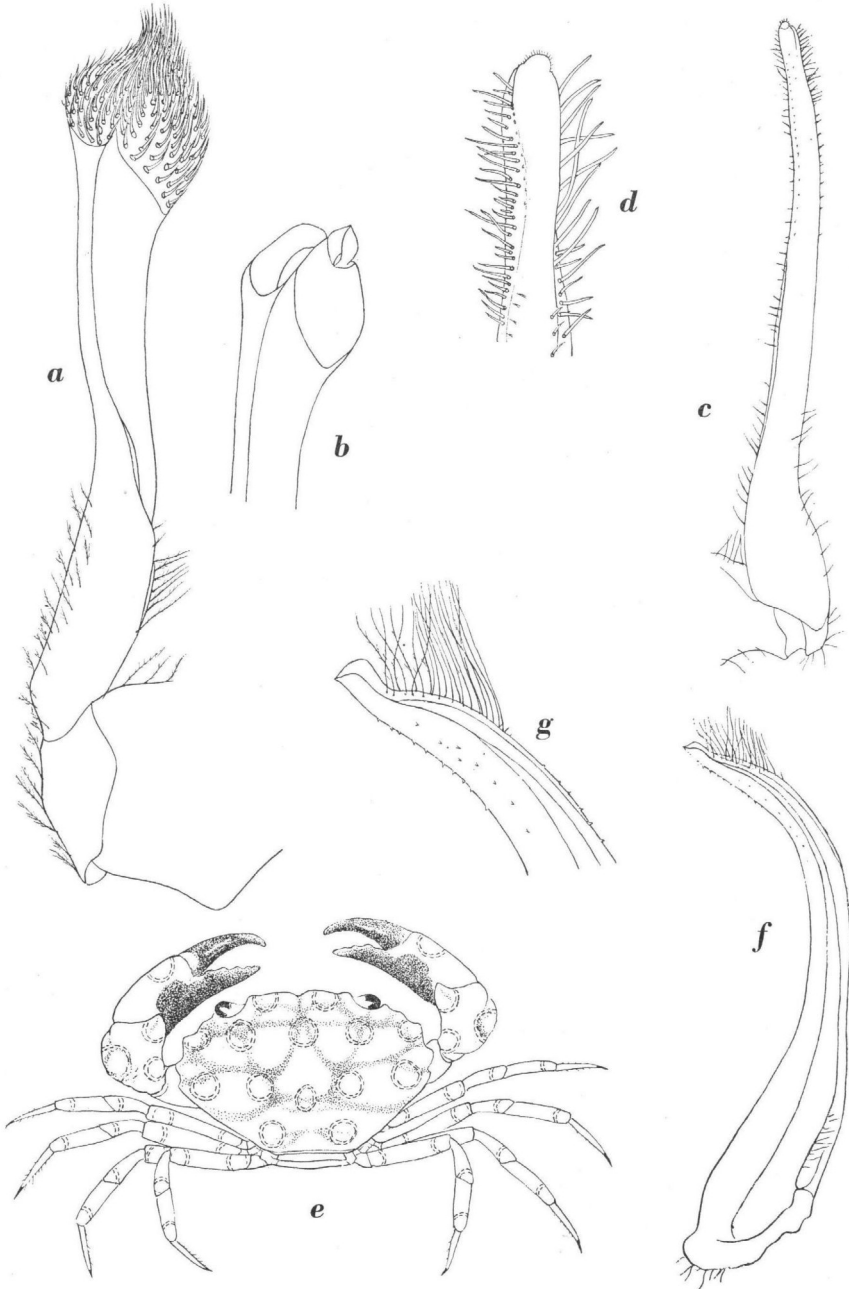


Fig. 1. a, b, *Leucosia sagamiensis* sp. nov. a, first pleopod of holotype; b, apex of same, denuded. c, d, *Eurynome orientalis* sp. nov. c, first pleopod of holotype; d, apex of same. e-g, *Xanthias maculata* sp. nov. e, animal in dorsal aspect, to show positions of colour markings; f, first pleopod of holotype; g, apex of same. a, b, $\times 20$; c, f, $\times 33$; d, g, $\times 67$; e, $\times 4$.

cristate, each crest being indistinctly tuberculated. An extensive hiatus is left between the fingers near the proximal portion. The ambulatory legs are compressed; the merus of each pair has a series of indistinct tubercles along the anterior border and its posterior border is cristate; the anterior border of the carpus and both borders of the propodus are cristate.

MEASUREMENTS. Length of the carapace of the male holotype 13 mm, width of same 12.8 mm.

REMARKS. This new species is most nearly related to *L. elata* A. Milne Edwards (1874) from New Caledonia, the Persian Gulf and Ceylon, in having hairy tubercles on the lateral border of the carapace, but it differs from that species in its broader carapace, shorter neck and much larger tubercles on the anterior border of the merus of the cheliped.

***Randallia trituberculata* sp. nov. (pl. III fig. 2)**

1 ♂ (holotype), Amadaiba, off the coast of Hayama, 70 m deep, coll. by His Majesty.

1 ♀ (allotype) and 2 ♂♂, off Mosaki, near Hayama, 35 m deep, coll. by His Majesty.

5 ♂♂, 6 ♀♀, Tosa Bay, trawl net, coll. by K. Sakai.

DESCRIPTION. The carapace is almost circular in outline, the length being subequal to the breadth. The dorsal surface is moderately convex, uniformly covered with studded granules of different sizes. There is no distinct groove on the dorsal surface, besides that on either side of the intestinal region. The edge of the front is divided into two lobules by a wide but shallow median sinus. There is one tubercle on the subhepatic region, which can be seen in dorsal aspect. There are three tubercles on each lateral border, the middle one of which is smaller than the others. The posterior border is marked with two prominent tubercles, one on either side, and finally there is one tubercle on the intestinal region near the posterior border. Sometimes there is a small or vestigial tubercle on the postero-lateral border near the posterior tubercle.

The external maxilliped has the ischium and merus granulated, but the surface near the inner edge is non-granulated; its exognath is also granulated, the granules in the median line being of good size.

The male abdomen is composed of four parts, the formula being $1 + 2 + R + T$; there is a prominent process near the end of the R-segment. The anterior pleopod of the male is very slender, its apex bent almost at right angles to the long axis.

The chelipeds of the full-grown male are about twice as long as the carapace; the merus and carpus are subcylindrical, and are uniformly covered with small studded granules; the propodus is somewhat compressed and is covered with studded granules which are visible under a lens. The fingers are a little shorter than the palm, the prehensile edges are thin and only indistinctly denticulate, leaving no hiatus between the two when closed.

The ambulatory legs are very slender, the merus, carpus and propodus are only indistinctly granulated along the anterior and posterior borders; the dactylus is thickly fringed with hairs along the superior border.

MEASUREMENTS. Length of the carapace of the male holotype 13 mm, width of same 12.5 mm.

REMARKS. This new species is most closely related to *R. distincta* Rathbun (1906) from the Hawaiian Islands: in the young stage the two species may be confused with each other.

***Randallia pustuloides* sp. nov.** (pl. III fig. 4)

25 ♂♂, 32 ♀♀ (one male and female of which are designated as holotype and allotype respectively), Tosa Bay, trawl net, coll. by K. Sakai.

3 ♂♂, 2 ♀♀, off Kumano Nado, Kii Peninsula, trawl net, coll. by the author.

DESCRIPTION: The carapace is rhomboidal in outline, the length and breadth being subequal and the lateral angle of the carapace is well projecting sideways. The dorsal surface is markedly convex and the regions are well defined by rather deep and narrow grooves. The gastric region is elongate and rhomboidal in outline, its extreme breadth just one-third the breadth of the carapace; some of the tubercles found on this region are of good size and are flat and confluent. The intestinal region is well defined, convex, covered with studded tubercles, one tubercle at the summit of this region is sharp but is not prominent. In *R. pustulosa* Wood-Mason, which may be the nearest kin of this species, the tubercles are not so distinct and a very long spine is situated at the convex portion of the intestinal region, and is posteriorly projecting, its apex curved upwards. Some of the tubercles on the hepatic and branchial regions are also flat and confluent and of good size.

The front is very narrow and bidentate, the median sinus very shallow. The subhepatic ridge is armed with a submedian tubercle which is followed by one or two small tubercles.

The antero-lateral border belonging to the branchial region is armed with about four studded tubercles posterior to the hepatic border. The teeth at the junction of antero-lateral and postero-lateral borders are large and salient and projecting sideways. The postero-lateral border is armed with eight or ten tubercles, the anterior two or three of which are salient as those of the lateral angle, the others are round and high. The posterior border is narrow but is broader than the front, and is thickly covered with tubercles of which one on either side is high and prominent. The under surface of the subhepatic region is also covered with studded tubercles.

The chelipeds are stouter than those of *R. pustulosa*, the merus is rather prismatic, covered with studded small granules, of which those on the anterior and posterior borders are rather high; in the carpus and propodus, the tubercles are small but those on the outer border of the propodus are high. The movable and immovable fingers are compressed and their outer borders are sharply carinate. In the anterior three pairs of ambulatory legs, the merus is smooth but its upper border is furnished with small granules, the carpus bears longitudinal rows of studded tubercles; the propodus is irregularly armed with high tubercles along

the upper border. In the last ambulatory legs, the arm is provided with high tubercles on the upper surface and the posterior border; the carpus and propodus are irregularly studded with high tubercles on their upper surface.

The spinule near the distal surface of the R-segment of the male abdomen is high and acuminate.

MEASUREMENTS. Length of the carapace of the male holotype 37 mm, width of same 43 mm.

REMARKS. The new species is closely related to *R. pustulilabris* Alcock (1896) from which it may be distinguished by the different shape of the antero-lateral teeth and by the different size of the tubercles on the carapace. The new species is also related to *R. pustulosa* Wood-Mason & Alcock (1891), but it has no prominent spine on the intestinal region; in the young stages both species may be difficult to discriminate from each other. "*R. pustulosa*" Doflein (nec Wood-Mason & Alcock) (1904: pl. 14 fig. 6) may be a different species.

***Randallia granuloides* sp. nov. (pl. III fig. 3)**

3 ♂♂, 2 ♀♀ (one male and female of which are designated as holotype and allotype respectively), Tosa Bay, trawl net, coll. by K. Sakai (the author's eldest son — Zoological Institute Kyushu University).

2 ♂♂, 1 ♀, off Kumano Nada, Kii Peninsula, trawl net, coll. by the author.

DESCRIPTION. The nearest relative of this new species is *R. granulata* Miers (1886) from Tongatabu and Fiji, the type of which is in the British Museum and was compared with the present species. The general aspect of the animal is just like that of *R. granulata* but the carapace of the new species is a little narrower than long and the postero-lateral borders are convergent instead of being swollen as in *R. granulata*. The dorsal surface is thickly covered with studded granules, of which those on the middle portion are small and those on the marginal surface are somewhat larger. There is an indistinct or vestigial groove on either side of the gastric and cardiac regions and a more indistinct, transverse one between the gastric and cardiac regions.

The front is narrow, thick and bilobed, its anterior border thickly covered with flat granules. There are no distinct tubercles on the subhepatic and lateral borders; a pair of laminar processes are present, one on either side of the narrow posterior border. The external maxilliped has the ischium, merus, and exognath thickly granulated, but the inner half of the ischium is smooth and glabrous.

The merus, carpus and propodus of the chelipeds are subcylindrical and are thickly covered with studded granules as on the carapace, but the granules on the under surface are very small. The prehensile edges of the fingers are thin, not gaping, and are finely denticulated, six or seven denticles being of good size and sharp. The ambulatory legs are very slender; the merus, carpus and propodus are microscopically granulated. The dactylus of each pair is thickly hirsute on the anterior border.

The abdomen is just like that of *R. pustuloides* but the process near the end of the R-segment is smaller.

MEASUREMENTS. Length of the carapace of the male holotype, measured in the median line, 19 mm, width of same 19 mm.

• ***Parilia major* sp. nov.** (pl. III fig. 5)

3 ♂♂, 2 ♀♀ (one male and female of which are designated as holotype and allotype respectively), Tosa Bay, trawl net, coll. by K. Sakai.

DESCRIPTION. Very near to *P. alcocki* Wood-Mason (1891) from the Indian waters, of which a syntype in the British Museum was compared with the present species.

The carapace is quite circular in outline, the length and breadth being almost equal and its dorsal surface markedly convex and covered with minute granules. The regions are almost indistinct but the cardiac and intestinal regions are very faintly defined on either side by a shallow and indistinct groove, and the intestinal region is somewhat convex posteriorly.

The front is very narrow and sharply bidentate. The lateral border is marked with a tubercle at the junction of the antero-lateral and postero-lateral borders and a rudimentary one just in front of it. The postero-lateral border is also marked with a tubercle near the posterior border. There are two rather salient processes, one on either side of the narrow and deflexed posterior border, and a long, up-curved spine on the intestinal region just above the centre of the posterior margin.

The hepatic region is, contrary to that of *P. alcocki*, not at all inflated, the epistome also does not project much beyond the edge of the front. The exognath of the external maxillipeds is not so broad as in that species, and its distal portion is rather narrow and oblique posteriorly, not forming a typical foliaceous expansion as in that species.

Chelipeds of the male are about 2.9 times as long as the carapace; merus, carpus and propodus are smooth to the naked eye but are uniformly granulated when seen under a lens. The distal portion of the propodus is somewhat compressed, both fingers are also compressed and are uniformly denticulated on the cutting edge. The merus, carpus and propodus of the ambulatory legs are cylindrical, smooth and rather glabrous to the naked eye; the dactylus is fringed with brownish hairs on the anterior and posterior borders.

MEASUREMENTS. Length of the carapace of the male holotype, including the intestinal spine, 60 mm, width of same also 60 mm.

REMARKS. *P. alcocki* Doflein (nec Wood-Mason) may be a different species; the carapace of Doflein's species seems to be circular in outline just as in the new species, but the merus and carpus of the pereopods are spinulated along the posterior border.

***Parilia tuberculata* sp. nov.** (pl. III fig. 6)

2 ♂♂ (one of which is designated as holotype), Tosa Bay, coll. by K. Sakai.

DESCRIPTION. The general aspect of this new species is much like that of *Randallia pustuloides* sp. nov., but the swollen subhepatic region and the inflated

anterior edge of the buccal frame of the new species may easily be distinguished from the corresponding characters of *Randallia*.

The dorsal surface of the carapace is covered with numerous tubercles which are unequal in size, some being of good size and conical and being thickly covered with tiny granules. The large tubercles are: three on the gastric region side by side, one on the anterior surface of the cardiac region, one at the top of the convex intestinal region, one or two on the hepatic region, and finally six or seven on the branchial region. The gastric, cardiac and intestinal regions are separated by rather deep grooves from the hepatic and branchial regions, which are also clearly separated from each other by a branch groove from the former groove. The intestinal region is markedly convex and is crowned with a tubercle at the summit.

The front is obtusely bidentate, the median sinus is very shallow. The subhepatic ridge is inflated and is marked with a large tubercle near the anterior end, followed by a smaller one. On the lateral margin there are four conical tubercles of good size, the first of which is dorsally deviated. One such tubercle occurs on the postero-lateral border and there are two on the posterior border, one on either side.

The exognath of the outer maxilliped is, as is characteristic of *Parilia*, much broader than the endognath and is distally expanded; when tightly folded, the outline of the exognath of each outer maxilliped is elliptical. To accomodate these outer maxillipeds, the edges of the pterygostomian ridges are well inflated and cristate, they can be seen in dorsal aspect on either side of the eyes.

The chelipeds are rather slender, the merus is cylindrical and is uniformly covered with studded granules; the granules on carpus and propodus are much smaller. The fingers are distinctly longer than the propodus and are finely denticulate. In the anterior three pairs of ambulatory legs, the anterior border of the merus, carpus and propodus is furnished with a row of spiniform granules. In the last pair, the merus, carpus and propodus are spinulate both on the anterior and the posterior borders, and some additional spinules occur on the upper surface.

MEASUREMENTS. Length of the carapace of the male holotype 27 mm, width of same 29 mm.

***Cryptocnemus kamekii* sp. nov. (pl. IV fig. 3)**

1 ♀ (holotype), coast of Kameki near Hayama, 25-30 m deep, coll. by His Majesty.

1 ♂, Gokasyo Bay, Ise Bay, coll. by Mr. S. Tanaka of the Matsuzaka Elementary School, Mie Prefecture.

DESCRIPTION. Very near to *C. haddoni* Calman (1900) from the Torres Strait, but, after careful comparison with the type of *C. haddoni* in the British Museum, the present species is designated as new to science.

The carapace is broadly pentagonal in outline, the antero-lateral borders being subparallel in the posterior half; the postero-lateral and posterior borders are confluent with each other, the latter slightly produced in the middle. In *C. haddoni*,

the posterior border is concave. The front is very low and obtusely triangular, the subhepatic regions are inflated, demarcated from the upper hepatic area by an oblique ridge. The middle portion of the carapace is moderately convex, round, and a longitudinal ridge runs from the front down toward the gastric region. The cardiac region is independently convex and its tip is marked with a small tubercle. The marginal surface of the branchial and intestinal regions is very thin but is upturned, forming a lamelliform expansion as in the congeners.

The chelipeds are short and depressed, the merus and carpus are also very short, the propodus is equal to the merus and carpus together and its upper and lower edges are cristate. There is a faint longitudinal ridge in the middle of the outer surface of the carpus and propodus. The fingers are very short, less than half as long as the propodus.

The terminal segment of the male abdomen is sharply pointed.

MEASUREMENTS. Length of the carapace of the female holotype 6.3 mm, width of same 8 mm.

REMARKS. This species resembles *C. holdsworthi* Miers (1877) in the outline of the carapace, but the new species has no oblique ridge running from the centre of the carapace to the postero-lateral angle. From *C. haddoni* Calman (1900), the new species is distinguished by having the posterior border convex instead of concave. The longitudinal ridge of *C. haddoni* is continued toward the intestinal region but that of the new species stops at the gastric region and the cardiac region is independent and convex. From *C. pentagonus* Stimpson (1858) it is distinguished by the different shape of the carapace and by having a longitudinal ridge on the upper surface of the carpus and propodus of the chelipeds.

***Matuta curtispina* sp. nov. (pl. III fig. 7)**

♂ ♂, ♀ ♀ (one male and female of which are designated as holotype and allotype respectively), off the coast of Aichi Prefecture, coll. by the author.

DESCRIPTION. Among the known species of the genus *Matuta*, the new species is related to *M. inermis* Miers (1884) from Melanesia in having the lateral processes of the carapace very small. After careful comparison with the type of *M. inermis* in the British Museum, the present species is designated as new to science.

The carapace is subcircular in the anterior half but is narrowed posteriorly; the dorsal surface is moderately convex, smooth, marked with only six tubercles, of which two are side by side on the anterior gastric region, three are side by side near the middle portion of the carapace — one in the centre of the posterior part of the gastric region and the other on each inner surface of the branchial region — and the sixth is in the centre of the cardiac region.

The front is much broader than the diameter of the orbit; the median frontal projection is very narrow and distinctly bilobed. The antero-lateral borders are finely and uniformly dentate, the lateral process at the junction of antero-lateral and postero-lateral borders is very small but is broad at the base with its apex

obtusely pointed. The postero-lateral border lacks the tubercle present in the other species.

In the cheliped, the merus is marked with two oblique ridges near the distal end; the carpus is smooth and its inner angle is dentiform; the propodus has the upper border cut into three teeth and its lower border has two rows of small tubercles. There is a row of four or five tubercles parallel to the upper border and also a high longitudinal ridge near the middle of the outer surface, the proximal half of this ridge is marked with two indentations. The movable finger has a very broad tooth near the middle portion of the cutting edge, followed by two small teeth. In the ambulatory legs, the merus of the first pair is marked with a small denticle near the distal portion of the anterior border, that of the first to third pairs is armed with four or five spinules on the posterior border.

MEASUREMENTS. Length of the carapace of the male holotype 26.5 mm, width of same, excluding lateral spines, 25 mm.

***Eurynome orientalis* sp. nov.** (text-fig. 1c, d, pl. IV fig. 2)

1 ♂ (holotype), Amadaiba, off Hayama, 75 m deep, coll. by His Majesty.

1 ♂, left branchial region is abnormally swollen by infection of Bopyrid, same data.

DESCRIPTION. Among the known species of the genus *Eurynome*, the new species is closely related to *E. stimpsoni* Miers (1884) from Providence Island, the type of which is in the British Museum and was compared by the author with the present species. No true *Eurynome* has been recorded from Japanese waters; *Eurynome reini* Balss (1924) being now referred to the genus *Choniognathus* Rathbun (1932) (cf. Sakai, 1938 : 273).

The carapace of the new species is more typically pyriform than in *E. stimpsoni*, the constriction behind the post-orbital portion being stronger and the posterior half of the carapace more swollen and rounded in outline. The rostral horns are short, divergent at an angle of about 45° , each horn slender and subcylindrical, not at all flattened as in *E. stimpsoni*, and their outer borders are finely serrated. The supra-orbital eave is also sharply serrated, its posterior end forming a small but acuminate spine; the intercalated spine is also sharp and basally broadened, the post-orbital spine is somewhat arched on its inner and outer borders and its tip is directing obliquely forward. The infra-orbital spine is also sharp and of good size.

The dorsal surface of the carapace shows scattered sharp spinules and bears mushroom-like expansions of various sizes, of which three are in the median line and the others are disposed symmetrically on either side of the carapace. The surface of these expansions is sharply spinulated. Of the three median expansions, the first or the gastric one is small; the second or the cardiac one is very large and ovoid in outline and its centre drawn up into a conical process with a sharply pointed tip; the last one is on the posterior border, its middle portion is small and subglobular, each lateral portion is narrow and extends obliquely forwards along the postero-lateral margin.

There are two spines side by side in front of the gastric expansion, and one small expansion in the rear of the orbital region. The hepatic tubercle is rather small and is laterally projecting. On the branchial region there are three expansions in a group, the anterior one of which is small and is antero-internally pointed, the lateral one is oblong and is on the lateral border and the posterior one is sharp and postero-laterally pointed. The remainder of the dorsal surface of the carapace shows scattered granules of different sizes.

The ventral surface of the carapace is also spinulated; there is a small accessory spine beneath the hepatic expansion. The outer maxilliped has the ischium and merus spinulated, the former has about six spines on the inner border, the latter is produced at the antero-external angle. The antero-external angle of the buccal frame also projects into a spinulated process.

The chelipeds of the male are very long, being about twice the total length of the carapace; the merus is stout and as long as the carapace and is covered with sharp spinules, of which five or six on each anterior and posterior border are of good size and are placed at rather regular intervals. The carpus and propodus are much more slender, the latter being about twice as long as the former; the outer border of both segments is sharply spinulated. Merus, carpus and propodus of ambulatory legs are uniformly covered with sharp spinules; the dactylus is slender and very sharply pointed at the tip.

The anterior pleopod of the male is figured in text-fig. 1c, d.

MEASUREMENTS. Length of the carapace of the male holotype 7 mm, width of same 5.2 mm.

REMARKS. A few remarks about the difference between the new species and the European *E. aspera* (Pennant): — The intercalated spine of the new species is well developed but, according Dr. I. Gordon, that of *E. aspera* is quite rudimentary; it is distinct in juvenile specimens, but in older ones is represented by a minute triangle at the base of the hiatus between the supra-orbital eave and the post-orbital spine (Hartnoll, 1961). The first pleopod of the male of *E. orientalis* is almost straight and its duct opens at the apex. In *E. aspera* this pleopod is curved in a loose "S" shape, and the duct opens at the tip of a down-turned hook a short distance from the actual apex.

***Xanthias maculata* sp. nov. (text-fig. 1 e-g)**

- 1 ♂ (holotype), Okinoyama, off the coast of Jyoga-sima Island, 80 m deep, coll. by His Majesty.
1 ♂, Tosa Bay, sent by Dr. S. Miyake, Kyusyu University.

DESCRIPTION. The nearest relative of this new species may be *X. glabrous* Edmondson (1951) from off Oahu, Hawaii. After careful comparison with the type of *X. glabrous*, at the Bernice P. Bishop Museum, the present species is designated as new to science.

The colour in the fresh specimen is dainty, the carapace having fourteen purplish blue spots or circles fringed with brownish red on a uniformly brownish ground, the chelipeds and ambulatory legs have also such markings on the merus,

carpus and propodus. No mention has been made of such a colour pattern in Edmondson's species.

The carapace closely resembles that of *X. glabrous*, but the breadth in the new species is somewhat smaller, the proportion of length to breadth being 1 : 1.54, instead of 1 : 1.6 as in the Hawaiian species. The areolation of the dorsal surface of the carapace is much like that of the Hawaiian species, the gastric, hepatic and branchial regions being delimited by shallow grooves, but these regions are not so markedly sculptured as in that species. The front is bilobed, each lobe is slightly arched with a rather faint notch at a short distance from the orbit.

The antero-lateral borders consist of five teeth, of which the first, or the outer orbital one, is very small, the second is of moderate size but obtuse, the third and fourth are equally large but obtuse, the last one is very small and indistinct.

In the fresh condition there are fourteen large round circular spots of purplish blue, fringed with brownish red; they are transversely arranged in four rows, i.e., two near the frontal region, five on the level of the third antero-lateral teeth, and again five on the level of the last antero-lateral teeth, and finally one on each side of the intestinal region.

The chelipeds are also marked with similarly coloured spots, of which three are on the carpus and one on the propodus near the articulation with the movable finger. The carpus has a shallow subcircular groove on the upper surface; the propodus has three longitudinal ridges on the outer surface and also a shallow groove near to and parallel with the upper border. The black colour of the immovable finger intrudes deeply on to the inner surface of the propodus. The ambulatory legs are very slender and naked; the merus has two coloured spots, the one proximal and the other distal; the carpus and propodus are also marked with the same colour pattern near the distal portion.

The anterior pleopod of the male is strongly arched as represented in text-fig. 1 f, g. There is a collar-like projection beyond the tip and about twenty-one long setae arranged in three rows along the groove near the distal portion. In the Hawaiian species, according to Edmondson, the male pleopod has the apex divided into two pointed extremities.

MEASUREMENTS. Length of carapace of the male holotype 6 mm, width of same 9.5 mm.

***Lybia hatagumoana* sp. nov. (text-fig. 2 a-d)**

1 ♂ (holotype), Amadaiba, off the coast of Hayama, 85 m deep, coll. by His Majesty, June 1957.

1 ♀ (allotype) and 1 ♂, same locality, coll. by His Majesty, July 1957.

DESCRIPTION. The Xanthoid crabs which have a habit of carrying sea-anemones in both chelipeds number seven species referable to three genera from tropical regions of the Indo-Pacific, namely: *Lybia tessellata* (Latreille, 1812); *L. leptochelis* (Zehntner, 1894); *L. caestifer* (Alcock, 1898); *L. denticulata* Nobili, 1906; *L. plumosa* Barnard, 1947; *Prolybia australiensis* Ward, 1933; *Polydectus cupulifer* Latreille, 1825.

The carapace of the new species is sub-circular in outline, being as long as broad, the dorsal surface is slightly convex. The front is thick and rather wide, its anterior border being one third as broad as the carapace, and it is divided into two lobes by a rather distinct median sinus, each lobe being finely granulated.

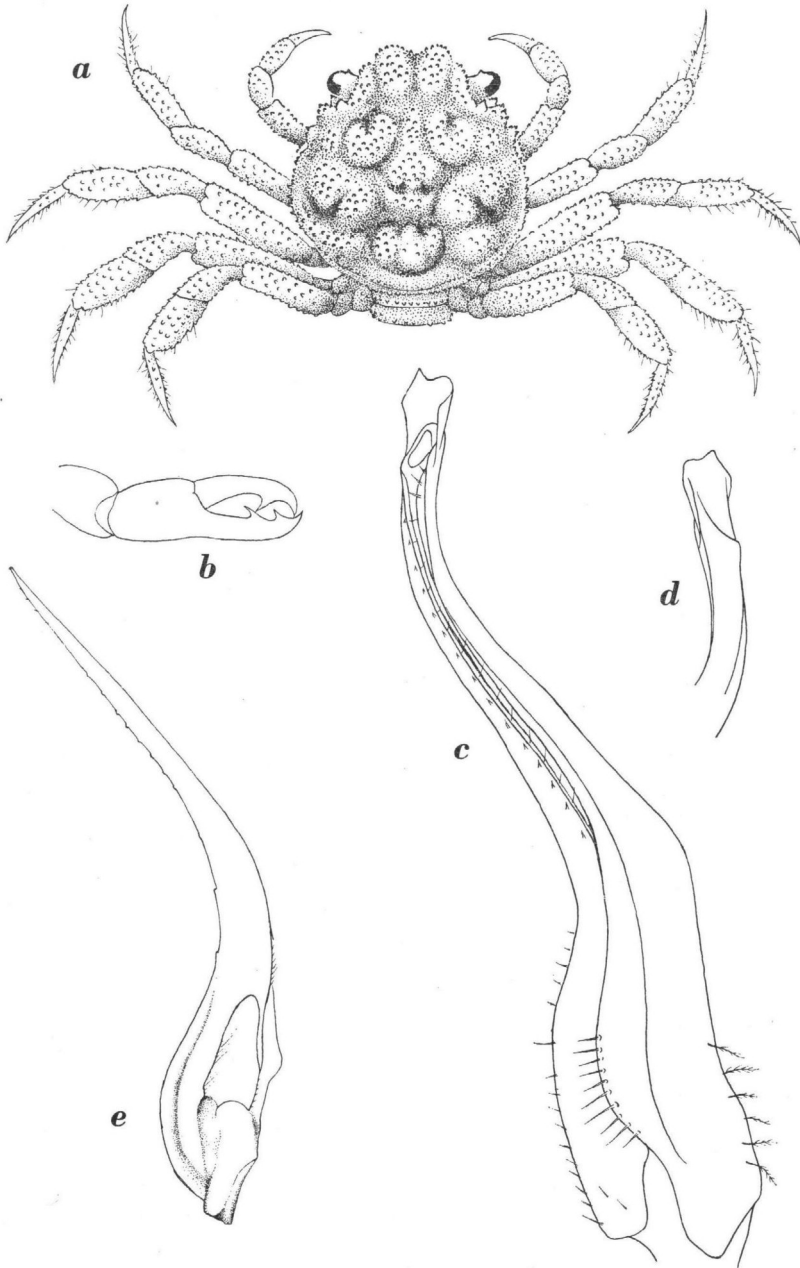


Fig. 2. a-d, *Lybia batagumoana* sp. nov. a, animal in dorsal view; b, chela; c, first pleopod of holotype; d, apex of same. e, *Podophtalmus minabensis* sp. nov., first pleopod of holotype. a, $\times 7.5$; b, $\times 15$; c, d, $\times 56$; e, $\times 8$.

The antero-lateral border has only two lobes, the first or post-orbital one is arched on its outer border and its anterior border is transverse; the second lobe is a little smaller than the first. These lobes are not at all acuminate and are finely granulate; their edges are finely denticulate. The antero-lateral border behind these teeth is also denticulate and is continuous with the postero-lateral one.

The dorsal surface is only slightly convex, and moderately areolated by smooth narrow grooves. Among the areas thus divided, the gastric, intestinal and branchial ones are markedly convex and are covered with studded granules; the branchial region is subdivided into two areas by an oblique shallow groove. The cardiac and hepatic areas are low and only sparingly granulated. The eye-stalk is very thick and short and the cornea is well developed.

The chelipeds are thin and short, each segment is unarmed but uniformly granulate. The fingers are slightly gaping near the proximal half, the movable finger is armed with a sharp spine-like tooth near the distal end, and the immovable finger has two such teeth also near the distal end; these teeth are directed obliquely backward as shown in fig. 2b.

The ambulatory legs are stouter and much longer than the chelipeds; the second and third pairs are subequal, the first and fourth pairs also subequal and somewhat smaller. Each segment is uniformly covered with studded granules which are visible when examined with a lens; the dactylus is very slender and long, its outer and inner borders bear minute spinules and its tip is sharp and curved inward.

The male abdomen consists of seven free segments, the first and second segments are sparingly granulate near the lateral surface. The female abdomen is not much broader than that of the male.

MEASUREMENTS. Male holotype, length of carapace 4.5 mm, width of same 4.2 mm.

REMARKS. The holotype was carrying a tiny sea-anemone in each hand, and the allotype had a tiny nudibranch in one hand.

***Podophthalmus minabensis* sp. nov.** (text-fig. 2c, pl. IV fig. 1)

1 ♂ (holotype), coast of Minabe-Machi, Kii Peninsula, coll. by Mr. Ozaki and the author.

DESCRIPTION. The genus *Podophthalmus* comprises only two species, namely, *P. vigil* (Fabricius) and *P. nacreus* Alcock; the former is known from a wide region in the Indo-Pacific, the latter from Indian and Japanese waters. The new species is therefore the third species of this genus. Although the unique specimen lacks both chelipeds and natatory legs, it may safely be described as a new species.

The outline of the carapace somewhat resembles that of *P. nacreus*, the front being very narrow between the eyestalks and its anterior extremity broad and thick, being "T" shaped, and its upper surface is sulcate. The upper orbital ridge is strongly arched and is finely denticulate. The post-orbital tooth is stout and its tip is directed obliquely forwards; the next tooth is very small and is separated from the former by a small but distinct notch. The lateral border behind this tooth

is strongly convergent backward and the posterior border is almost straight, about one third the greatest breadth of the carapace.

The dorsal surface of the carapace is uneven. Among the grooves delimiting the regions, that defining the proto- and metagastric regions, and that parallel to the upper orbital ridge are deep and distinct. There are two faint transverse ridges side by side on the protogastric and also on the cardiac region, and a short transverse one on the inner anterior surface of each branchial region. There is a rather deep groove extending from the median portion to the second antero-lateral tooth. The posterior half of the carapace is even, but a faint transverse ridge may be seen on the inner surface of the metabranchial region.

The eye-stalk of this species is peculiar; the first segment is markedly flattened with a pterygoid expansion on its anterior distal border. The second or corneal segment is short, having two such expansions, of which one, on the anterior border, is strongly curved outward, and the other, on the posterior border, is curved inward.

The chelipeds and last ambulatory legs are missing. The second ambulatory legs are the longest, the first a little shorter and the third again a little shorter. In each leg the merus is thick in its proximal half, having no subterminal spine or tooth on the anterior border. In the anterior two legs, the propodus and dactylus are fringed with short hairs on the posterior border, but in the third leg, such hairs are worn off.

The male abdomen is just like that of *P. nacreus*, but the terminal segment has the lateral borders somewhat swollen. The anterior male pleopod is as figured in text-fig. 2e.

MEASUREMENTS. Length of the carapace of the female holotype including the rostrum, 20 mm, width of same 33 mm.

***Pinnotheres laquei* sp. nov. (text-fig. 3)**

10 ♀♀ (one of which is designated as holotype) obtained from the body cavity of the brachiopod *Laqueus rubellus* (Sowerby) from the rocky bottom at Amadaiba, off the coast of Hayama, 65-85 m deep, coll. by His Majesty.

DESCRIPTION. A small species, even in the largest female the carapace is less than 4 mm long. The dorsal surface of the carapace is markedly convex and the lateral borders are posteriorly divergent, so that the greatest breadth is on a level with the bases of the second ambulatory legs. The front is not markedly produced beyond the outline of the carapace. The posterior border is rounded, slightly produced posteriorly (text-fig. 3a).

The external maxilliped has the dactylus projecting only slightly beyond the tip of the propodus, its tip is sub-styliform (text-fig. 3b).

The chelipeds are short and somewhat massive, with a narrow hiatus at the base of both fingers. The movable finger bears an obtuse median tooth; the distal half of the cutting edge of the immovable finger forms two sharp cutting edges. The anterior three pairs of ambulatory legs are subequal, the last pair, however,

is not much smaller than the preceding pairs. In the second and third pairs, the carpus is traversed by an oblique row of long feathered hairs, the propodus is also provided with a row of such hairs along the anterior border. The dactyli of all four pairs appear to be uniformly long; but exactly measured, that of the posterior two pairs is a little longer than that of the anterior two pairs. The tip of the dactylus is very sharp and slightly hooked inward.

MEASUREMENTS. Length of the carapace of the female holotype 3.8 mm, width of same 4.2 mm.

***Paromola macrochira* sp. nov.** (pl. IV fig 5).

5 ♂♂, 4 ♀♀ (one male and female of which are designated as holotype and allotype respectively), Tosa Bay, trawl, coll. by K. Sakai.

1 ♂, 2 ♀♀ (juv.), off the coast of Kumano-Nada, Kii Peninsula.

DESCRIPTION. A giant species, related to *P. japonica* Parisi from Japan and also to *P. cuvieri* (Risso) from Atlantic and Mediterranean waters.

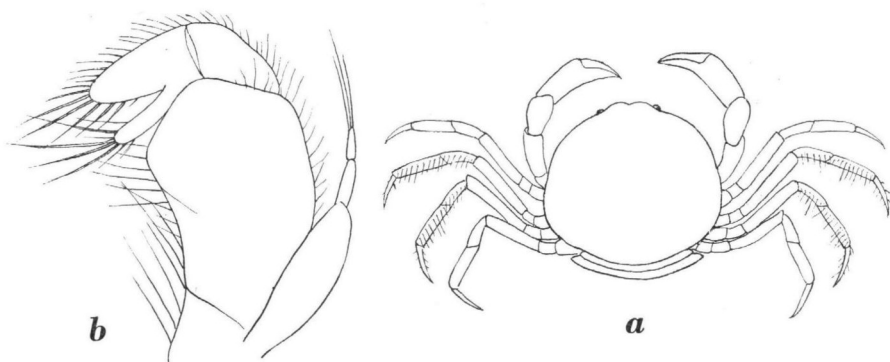


Fig. 3. *Pinnotheres lacquei* sp. nov. a, female holotype in dorsal view; b, external maxilliped of same. a, $\times 5$; b, $\times 38$.

In the full-grown male specimen, the carapace is naked, but in the young specimen the entire body and thoracic legs are covered with long yellowish hairs, which are clustered on the top of the tubercles and spinules. In young specimens of *P. japonica*, the entire body and thoracic legs are also covered with such hairs, but the hairs are shorter and are uniformly distributed over the surface, not restricted to the tubercles or spines.

The dorsal surface of the carapace is thickly covered with tubercles of various sizes; in full-grown specimens the hairs growing on the top of the tubercles are almost obsolescent. On the surface near the lateral border and also on the lateral epibranchial surface, the tubercles are somewhat larger; in *P. japonica*, however, such tubercles and spines are much sharper and, moreover, those on the anterior half of the carapace and also on the lateral epibranchial surface are apparently larger but fewer in number. The rostral spine is short, about $1/13$ the length of

the carapace proper and is almost straight and directed obliquely downward; in *P. japonica*, it is directed forward and turning upward at the tip. The supra-orbital spines are much longer and stouter than the rostral, and are directed obliquely forward, having no accessory spinule on the upper or outer border (but in some specimens, one or two rudimentary spinules may be observed). In *P. japonica* the supra-orbital spine is directed obliquely upward, having an accessory spine of good size. There is a small but distinct spine behind the supra-orbital spine; in *P. japonica* four spines are arranged in a transverse row behind the supra-orbital spine and there is an additional one on either upper hepatic region. The subhepatic region is armed with two spines, of which the upper is small and the lower is of good size. On the lateral border only two spines are present, the anterior one is near the hepatic border and the other in the middle portion.

The chelipeds of the male are stout and very long, the total length being 2.5 times that of the carapace proper, the merus is subcylindrical and is everywhere furnished with studded tubercles; the carpus and propodus are sparingly furnished with rather obtuse tubercles; in *P. japonica*, the merus and propodus are much more densely furnished with sharp spinules. The movable finger has a very stout tooth on the cutting edge near the proximal half.

The anterior three pairs of ambulatory legs are sub-equal. The merus of the first and second pairs is armed with seven or eight spines mainly on the proximal half of the anterior border, and with two rows of nine or ten spinules along the posterior border. In *P. japonica*, the merus of these pairs is much more densely covered with sharper spines and spinules; the remainder of the segments are somewhat flat and without tubercles. The fourth pair of ambulatory legs are thin and short, but they are apparently longer than those of *P. japonica*; the tip of the merus exceeds the middle point of the merus of the third leg in *P. macrochira* but not in *P. japonica*. Merus, carpus and propodus are smooth and not at all spinulate, whereas in *P. japonica* the merus of the fourth pair is spinulate.

In rather young stages the abdomen of the female resembles that of the male, but in full-grown females it is much broader and larger. In both sexes, the first segment is very narrow, and the fifth and sixth segments are the broadest and longest. The female spermathecal openings are ovoid in shape and of good size, while in *P. japonica* they are narrow and slit-like.

MEASUREMENTS. Length of the carapace of the male holotype 152 mm, width of same 120 mm, length of the rostrum 21 mm, that of the preorbital spine 23.5 mm, entire length of the cheliped 370 mm.

***Homola (Moloha) acutispina* sp. nov. (text-fig. 4)**

1 ♂ (holotype), Tosa Bay, trawl net, coll. by K. Sakai.

DESCRIPTION. This new species is closely related to *H. (M.) alcocki* (Stebbing) with which *Paromola major* (Kubo) may be synonymous as pointed out by

Barnard (1950: 342). A specimen of *Latreillopsis alcocki* Stebbing determined by Dr I. Gordon from the "John Murray" collection is in the British Museum and was compared with the Japanese species. The gill formula of *P. major* agrees with that given by Barnard (1950: 341) for *H. (M.) alcocki*.

The arrangement of the long spines on, and marginal spines of, the carapace is just like that of *H. (M.) alcocki*, but the spines are much longer and stouter. The frontal spine is directed forward and its tip directed upward; in *H. (M.) alcocki* it is directed obliquely downward. The preorbital spines are stout and more than half as long as the carapace and are armed with one accessory spine

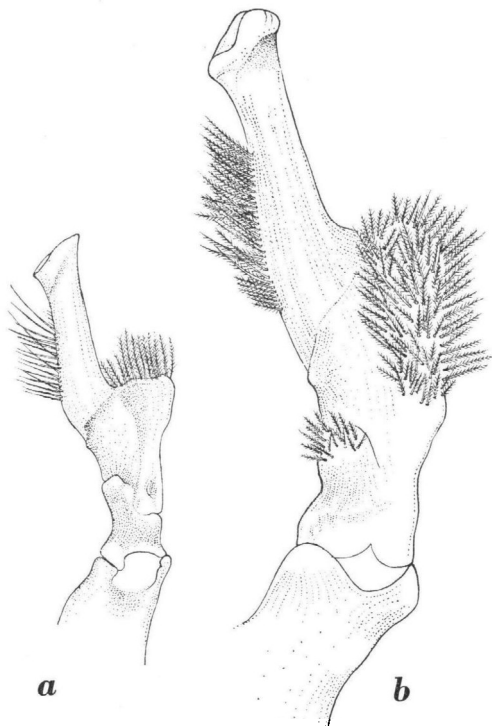


Fig. 4. Second male pleopod. a, *Homola (Moloba) acutispina* sp. nov.; b, *Homola (Moloba) alcocki* Stebbing. a, b, $\times 1.5$.

on their outer border; in *H. (M.) alcocki* they are less than one third the length of the carapace proper.

On the dorsal surface of the carapace there are five spines on the gastric region as in *H. (M.) alcocki*, but they are distinctly longer than those of that species. The cardiac region is armed with two spinules in its centre, but these spinules are closer together than in that species. Three pairs of obtuse ridges radiate from the cardiac region, the anterior pair directed obliquely forward. The hepatic and antero-lateral spines are just the same as those of *H. (M.) alcocki*, but they are longer. Unlike *H. (M.) alcocki*, the dorsal surface has no spinules except one

vestigial tubercle behind the outermost gastric spine and one spinule near the base of the first antero-lateral spine. In *H. (M.) alcocki* the branchial region has at least seven or eight additional spinules.

The chelipeds of the male holotype are slender, the merus, carpus and propodus are smooth, not at all granulated as in *H. (M.) alcocki*; the merus has four spinules on the posterior border and two on the anterior border near the base; the carpus and propodus are unarmed. The segments of the ambulatory legs are subcylindrical and more slender than in *H. (M.) alcocki*. In the anterior three pairs, the merus is armed with five to seven spines on the anterior border in addition to the terminal one, with eight to nine spinules on the posterior border and two or three small ones on the upper surface near the base. Carpus and propodus are unarmed, the dactylus is flat and its anterior and posterior borders are both furnished with a row of stiff hairs. In *H. (M.) alcocki* the spinules of the posterior border of the merus are much more numerous. The merus of the last pair of ambulatory legs is armed with a small spinule near the base of the posterior border; in *H. (M.) alcocki* this segment is unarmed.

On the ventral surface of the carapace, the subhepatic region has only two spines; one long and the other small. In *H. (M.) alcocki* there are one long and three small ones.

The second pleopod of the male may be useful in discriminating these two species, as shown in text-fig. 4.

MEASUREMENTS. Length of carapace, excluding rostral spine 33.5 mm, width of same excluding lateral spine 26.5 mm, length of rostral spine 7 mm, that of pre-orbital spine 18 mm.

RÉSUMÉ

Descriptions préliminaires de quinze espèces nouvelles de crabes des eaux japonaises, dont sept ont été recueillies par Sa Majesté l'Empereur du Japon au cours de Son étude de la Baie de Sagami. Les nouvelles espèces se répartissent comme suit: huit pour les Oxystomata, quatre pour les Brachyrhyncha, deux pour les Dromiacea, et une pour les Oxyrhyncha.

LITERATURE CITED

- ALCOCK, A., 1896. Materials for a Carcinological Fauna of India. No. 2. The Brachyura Oxystomata. J. Asiat. Soc. Bengal, **65**: 134-296, pls. 6-8.
- , 1899. Materials for a Carcinological Fauna of India. No. 4. The Brachyura Cyclometopa. Pt. II. The Families Portunidae, Cancridae and Corystidae. J. Asiat. Soc. Bengal, **68**: 1-104.
- BALSS, H., 1924. Ostasiatische Decapoden. V. Die Oxyrhynchen und Schlussteil. Arch. Naturgesch. Berlin, **90** (A5): 20-84, text-figs. 1, 2, pl. 1.
- BARNARD, K. H., 1950. Descriptive catalogue of South African Decapod Crustacea. Ann. S. Afr. Mus., **38**: 1-837, text-figs. 1-154.
- CALMAN, W. T., 1900. On a collection of Brachyura from Torres Straits. Trans. Linn. Soc. Lond. Zool., (2) **8** (1): 1-50, pls. 1-3.
- DÖFLEIN, F., 1904. Brachyura. Wiss. Ergebn. Deutsch. Tiefsee-Exped. "Valdivia", **7**: i-xiv, 1-314, text-figs. 1-66, pls. 1-59.
- EDMONDSON, C. H., 1951. Some Central Pacific Crustaceans. Occ. Pap. Bernice P. Bishop Mus., **20**: 183-243, text-figs. 1-38.

- HARTNOLL, R. G., 1961. A re-examination of the spider crab *Eurynome* Leach from British waters. *Crustaceana*, **2** (3): 171-182, figs. 1-7.
- KUBO, I., 1936. A new Homoloid Crab from Japan. *J. Imp. Fish. Inst. Tokyo*, **31** (2): 63-68, pl. 17.
- MIERS, E. J., 1877. Notes upon the Oxystomatous Crustacea. *Trans. Linn. Soc. Lond. Zool.*, (2) **1**: 235-249, pls. 38-40.
- , 1884. Crustacea. Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. "Alert" 1881-82: 178-322, 513-575, pls. 18-34, 46-52.
- , 1886. The Brachyura collected by H.M.S. "Challenger". *Challenger Rept. Zool.*, **17**: 1-412, pls. 1-29.
- MILNE EDWARDS, A., 1874. Recherches sur la faune carcinologique de la Nouvelle-Calédonie. Troisième Partie. *Nouv. Arch. Mus. Paris*, **10**: 39-58, pls. 2, 3.
- NOBILI, G., 1906. Mission J. Bonnier et Ch. Pérez (Golfe Persique, 1901). Crustacés Décapodes et Stomatopodes. *Bull. sci. France Belg.*, **40**: 13-159, pls. 2-7.
- PARISI, B., 1915. Decapodi giapponesi del Museo di Milano. II. Dromiacea. *Atti Soc. Ital. Sc. Nat.*, **54**: 102-116, pls. 2, 3.
- RATHBUN, M. J., 1906. The Brachyura and Macrura of the Hawaiian Islands. *Bull. U. S. Comm. Fish.*, **23**: 827-930, text-figs. 1-9, pls. 1-24.
- SAKAI, T., 1938. Studies on the Crabs of Japan. III. Brachygnatha, Oxyrhyncha: 193-364, text-figs. 1-55, pls. 1-41 (Yokendo Co., Tokyo).
- STIMPSON, W., 1907. Report on the Crustacea (Brachyura and Anomura) collected by the North Pacific Exploring Expedition 1853-1856. *Smithsonian Inst. Misc. Coll.*, **49**: 1-240, pls. 1-26.
- WARD, M., 1933. New genera and species of marine Decapoda Brachyura from the coast of New South Wales and Queensland. *Austr. Zool. Sydney*, **7** (5): 377-394, pls. 21-23.
- WOOD-MASON, J., 1891. Natural History Notes from H. M. Marine Survey Steamer "Investigator" ... No. 21. *Ann. Mag. nat. Hist.*, (6) **7**: 186-202, text-fig. 1.
- ZEHTNER, L., 1894. Crustacés de l'Archipel Malais. Voyage de MM. M. Bedot et Ch. Pictet dans l'Archipel Malais. *Rev. Suisse Zool.*, **2** (1): 135-214, pls. 7-9.