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On two species of the genus *Petrolisthes*
(Anomura, Porcellanidae) from Japan^{1,2)}

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Re-examining the crab-shaped anomura in the collections of the Zoological Laboratory, Kyushu University, we found that the following two species, *Petrolisthes amakusensis* sp. nov. and *Petrolisthes carinipes* (Heller), are perhaps new to the fauna of Japan, so far as we know. *P. amakusensis* has been overlooked, because it inhabits with *P. coccineus* (Owen) and the external appearance also resembles *P. coccineus*. *P. carinipes* is a rare species and was collected from Okinawa-jima, the Ryukyu Islands. This species has hitherto reported from the Red Sea and India.

We wish to express our thanks to Dr. T. A. Uchida and Mr. H. Minei of our laboratory for the collection of specimens.

Petrolisthes amakusensis sp. nov.

(Figs. 1-3)

Types. Holotype: Male, Zoological Laboratory, Kyushu University (ZLKU) Cat. No. 12866, Shiroyazaki, Tomioka, Amakusa, Kyushu, Japan, June 14, 1965, collected by Dr. T. A. Uchida. Paratypes: 1 ovig. female, ZLKU Cat. No. 12852; 1 male, ZLKU Cat. No. 12856, Akaiwa, Tomioka, Amakusa, Kyushu, Japan, July 28, 1965, collected by the authors.

Diagnosis. Carapace a little longer than broad, or nearly as long as broad, rostrum included. An acute epibranchial spine present, but supra-ocular spine absent. Carpus of the chelipeds armed with 3 or 4 teeth on its anterior margin; the outer margin of the palm armed with 4 to 8 spines, and ornamented with plumose hairs. Anterior margin of the merus of the ambulatory legs not armed with spine, but only the carpus of the first pair armed with one spine at the upper distal end, that of the second and third pairs with no spine.

¹⁾ Revision of the porcellanid crabs from Japan and adjacent waters, no. 1.

²⁾ Contributions from the Zoological Laboratory, Faculty of Agriculture, Kyushu University, No. 346.

Description of holotype. The carapace is a little longer than broad; the dorsal surface is ornamented with red colour-pattern, and furnished with minute transverse granular striae bearing microscopical short setae on the anterior half and the sides, but their setae are irregularly scattered on the centre part of the posterior half (Figs. 1, 2). The front is triangular, somewhat deflexed, with the apex rounded, provided with tubercles along its margin, and has a deep, longitudinal, median furrow. The front is separated from the gastric region by a slightly elevated transverse crest which is interrupted in the middle by the median frontal furrow. The gastric region is elevated. The cervical grooves are faint. The post-ocular lobes are undulated. The epibranchial spine is acute, but there is no supra-ocular spine. The carina of the lateral margins extend to nearly the middle of the branchial regions. The surface of the epimera is ornamented with a longitudinal ridge of granules, which is sparsely furnished with long, non-plumose hairs.

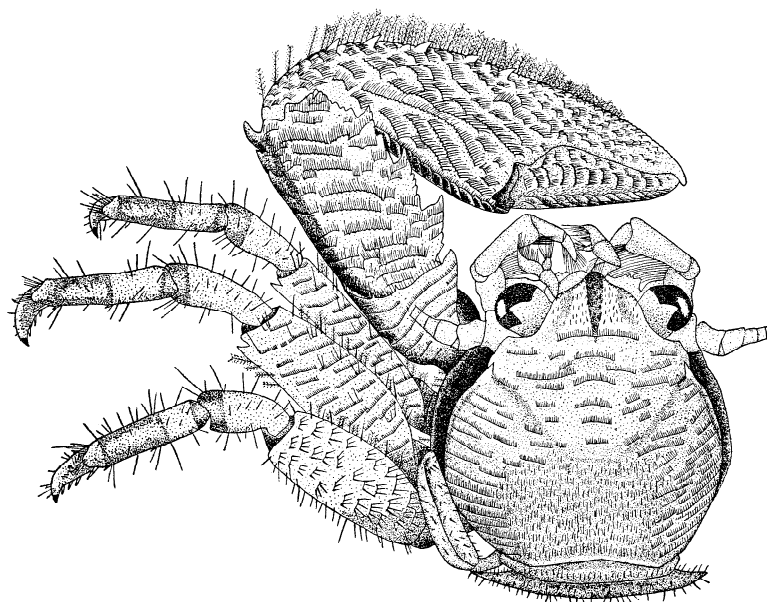


Fig. 1. *Petrolisthes amakusensis* sp. nov. holotype, male, $\times 5.7$.

The basal segment of antennule is longer than broad; its anterior margin is armed with six spinules with the exception of the inmost large broad spine, and two of them are very large, separated from the other four spinules by deep notches (Fig. 3, A). The laminate crest of the second segment of the antenna is much produced, its proximal

part is prolonged into an acute tooth, and has an obtuse lobe at the inner distal end; the third segment is provided with granules on the outer upper surface (Fig. 3, B).

The merus of third maxilliped is triangular, its laminate crest is much produced inwards with the apex pointed, the anterior margin is entire, and furnished with short transverse striae on the ventral surface, which is slightly ornamented with microscopical hairs; the ventral surface of the carpus is furnished with some striae, of which a granulated ridge near its outer margin is ornamented with short hairs, but the others with no hairs (Fig. 3, C). The sternum attaching the third maxilliped is as figured (Fig. 3, D).

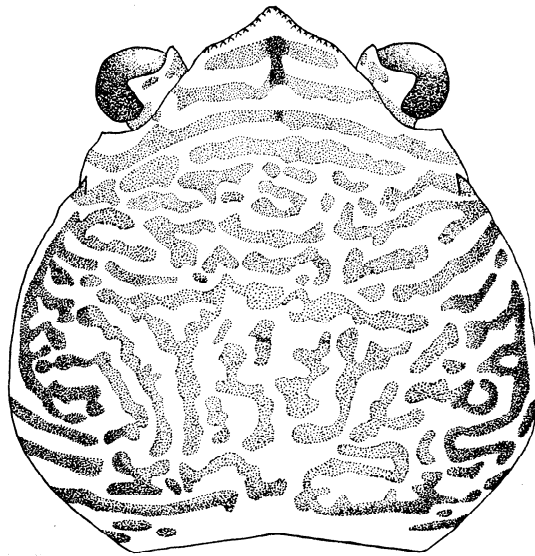


Fig. 2. Red colour-pattern of the carapace of holotype, $\times 9.7$.

The chelipeds are subequal, the entire dorsal surface is ornamented with transverse or oblique squamiform ridges bearing pubescences anteriorly; the ischium is prolonged in an acute tooth at its inner distal end; the merus has a long prominent tooth at the inner distal end, the outer one is prolonged in an acute tooth as in the ischium, and has three small, acute spinules, two of them on the upper distal margin and the other one on the under distal margin. The carpus is about twice as long as wide, and is armed with teeth on the anterior margin (3 on the left, 4 on the right), and the rugose posterior margin is armed with three spines. The outer margin of the palm is covered

with plumose hairs, and armed with spines (5 on the left, 6 on the right); the dactylus (movable finger) is much shorter than the palm, and ornamented with squamiform crests fringing with hairs on the dorsal surface, and both fingers cross each other (Fig. 1).

Ambulatory legs are sparsely hairy; the dorsal surface of the merus is furnished with transverse or oblique lines bearing minute hairs anteriorly, and the anterior margin of the merus is ornamented with setae and plumose hairs, and not armed with spine. The posterior margin of the merus of the first two pairs is armed with an acute spine at the distal end, and that of the third pair is not armed; the carpus of the first pair is armed with one spine at the upper distal end, and that of the second and third pairs is not armed; the posterior margin of the propodus is armed with two spinules and with two similar ones at its distal end. The dactylus is armed with three spinules on the posterior margin. The telson of the abdomen is composed of seven plates (Fig. 3, F).

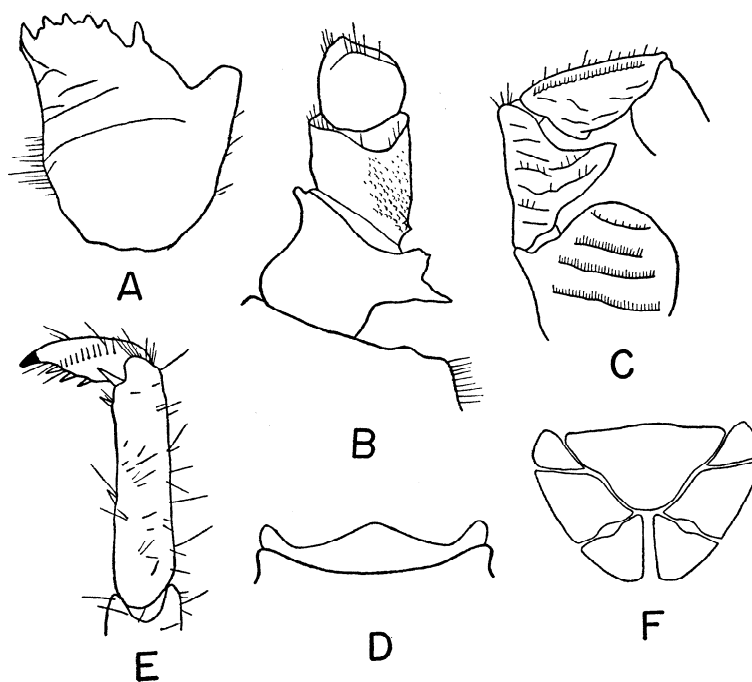


Fig. 3. *Petrolisthes amakusensis* sp. nov. holotype.

A. Basal segment of right antennule, ventral view, $\times 26$, B. left antenna, dorsal view, $\times 26$, C. carpus and merus of third maxilliped of left side, ventral view, $\times 13$, D. sternum attaching third maxilliped, $\times 13$, E. left second ambulatory leg, $\times 13$, F. telson, $\times 13$.

Measurements (in mm).

	Holotype Paratypes		
	♂	♀(ovig.)	♂
Length of carapace including rostrum	6.3	8.0	7.2
Breadth of carapace.....	6.0	8.0	7.0

Colour in life. Ground colour of the body reddish brown, ornamented with deep red colour-pattern; ventral reddish; epimera greenish blue.

Habitat. Under stones in the tidal zone.

Type locality. Tomioka, Amakusa, Kyushu, Japan.

Remarks. At first sight this species resembles *Petrolisthes coccineus* (Owen), but differs from the latter in the following respects. (1) The colour-pattern of the dorsal surface of the carapace. (2) Supra-ocular spine is absent. (3) The merus of the ambulatory legs is not armed with spines. (4) This species is rather small. While this species especially resembles *Petrolisthes fimbriatus* Borradaile in its characters, but is distinguished by the following characters. (1) The shape of the third maxilliped, especially the antennal segment, and the anterior margin of the first antennular segment. (2) In *P. fimbriatus* the carpus of the first pair of the ambulatory legs is not armed with spine at the upper distal end, but in *P. amakusensis* it is armed with one spine. (3) The difference of the arrangement of the hairs and transverse granular striae on the dorsal surface of the carapace. (4) In *P. fimbriatus* the upper distal margin of the merus of the chelipeds is not armed with spinule, but in *P. amakusensis* it is armed with two spinules.

Petrolisthes carinipes (Heller)

(Figs. 4, 5)

Porcellana carinipes Heller, 1861, p. 257, pl. 2, fig. 5. Red Sea (Type locality).

Petrolisthes carinipes: De Man, 1881, p. 104; 1893, p. 299, pl. 7, fig. 5.

Petrolisthes carinipes: Ortmann, 1897, p. 288.

Petrolisthes carinipes: Nobili, 1906, p. 135.

Petrolisthes carinipes: Balss, 1915, p. 8.

Description. Carapace is a little longer than broad; the dorsal surface is pubescent, especially the hollow between the cardiac and intestinal regions and the cervical grooves covered thickly, and ornamented with transverse striae bearing microscopical hairs anteriorly. There are two hairy transverse striae being a short distance behind the front. The front is broad, triangular, with the apex rounded, and has a shallow, broad, longitudinal median furrow, which separated from the gastric region by a slightly elevated transverse stria being interrupted at the middle by the median frontal furrow. The cervical

grooves are faint. The supra-ocular spine is present above the eye, and the epibranchial spine prominent above the third segment of the antenna.

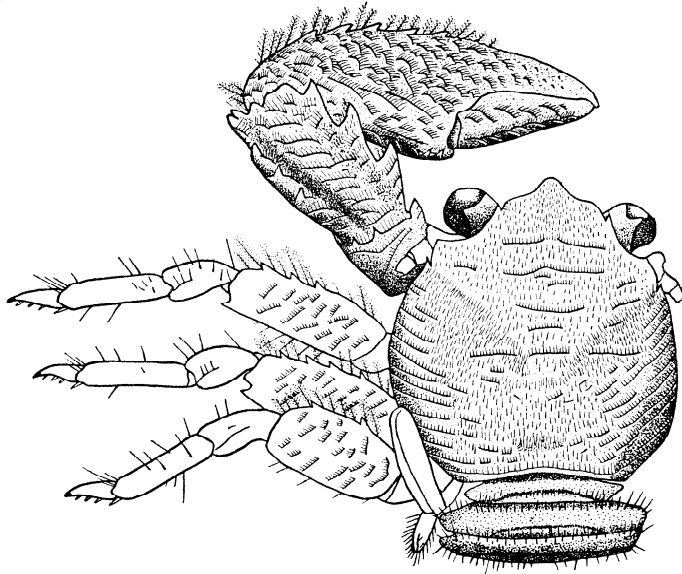


Fig. 4. *Petrolisthes carinipes* (Heller), $\times 8.3$.

Basal segment of the antennule is almost as long as broad; the anterior margin is armed with four spinules with the exception of the inmost large, broad spine (Fig. 5, A). First segment of the antenna is very short and membranous. Second segment is provided with a laminate crest on the anterior margin, its crest is somewhat undulated, and provided with a small lobe at the inner distal part. Third segment projects at the middle of the anterior margin and is somewhat undulated. Fourth segment is cylindrical (Fig. 5, B).

Merus of the third maxillipeds is triangular, the laminate crests are much produced inwards with the apex pointed, its anterior margin is entire, and the ventral surface is furnished with transverse striae bearing microscopical hairs anteriorly; the ventral surface of the carpus is furnished with a longitudinal stria bearing hairs near its outer margin (Fig. 5, C). Sternum attaching the third maxilliped is as figured (Fig. 5, D).

Chelipeds are equal, the dorsal surface is ornamented with transverse or oblique squamiform ridges, these ridges are fringed with pubescences; ischium is prolonged in an acute tooth at its inner distal end; the merus has a long prominent tooth at the inner distal end, the outer one is

prolonged in an acute tooth as in the ischium, and there are three small, acute spinules on the distal margin of the merus, two of them are on the upper distal margin and the other on the under distal margin. Carpus is armed with three teeth on the anterior margin, the rugose posterior margin is armed with four teeth, and the distal tooth of them is prolonged in a bispinose tooth. Palms are provided with a elevated longitudinal ridge, its outer margin is armed with four or five spines, sparsely ornamented with plumose hairs, and the distal part of the inner margin of the palm is provided with two spinules as in *P. coccineus*; the fingers are much shorter than the palm, their tips crossing each other.

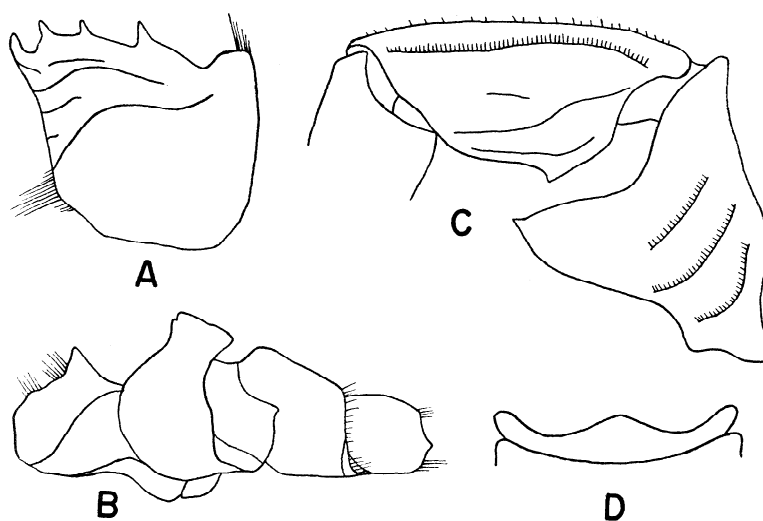


Fig. 5. *Petrolisthes carinipes* (Heller).

A. Basal segment of right antennule, ventral view, $\times 31.6$, B. right antenna, dorsal view, $\times 31.6$, C. carpus and merus of third maxilliped of left side, ventral view, $\times 31.6$, D. sternum attaching third maxilliped, $\times 15.8$.

Ambulatory legs are a little hairy; the dorsal surface of the merus is furnished with transverse or oblique striae bearing minute hairs anteriorly, and the anterior margin of the merus is ornamented with plumose hairs, and armed with a few spines, the posterior margin of the merus of the first two pairs is armed with an acute spine at the distal end, that of the third pair is unarmed; the carpus of the first pair is not armed with spine at the upper distal end, as well as the second and the third pairs; the posterior margin of the propodus is armed with four spinules; dactylus ends in a single claw, with three spinules on the posterior margin. The telson of the ab-

domen is composed of seven plates.

Colour in alcohol. Entire dorsal surface of the body and legs is pale yellow.

Material examined. 1 male, ZLKU Cat. No. 12835, Minatogawa, Okinawa-jima, the Ryukyu Islands, Mar. 19, 1960, collected by Mr. H. Minei.

Measurement (in mm).

Length of carapace including rostrum 4.6

Breadth of carapace 4.5

Remarks. This species is closely related to *Petrolisthes coccineus* (Owen), but it can be easily distinguished from the latter as shown in the Table 1.

Table 1. Showing differences between *P. carinipes* and *P. coccineus*.

Items	<i>P. carinipes</i>	<i>P. coccineus</i>
(1) Size	smaller	larger
(2) Front	broad, its median furrow broad, shallow	rather narrower, its median furrow narrow, deep
(3) Antennular basal segment	as long as broad, its anterior margin armed with 4 spinules	longer than broad, its anterior margin armed with 6 spinules
(4) Antennal 2nd segment	the crest not produced	the crest produced spine and spinules
(5) Posterior margin of the carpus of the chelipeds	armed with 4 teeth	armed with 2 3 teeth
(6) Posterior margin of merus of the ambulatory legs	first two pairs armed with one acute spine at distal end, third pair unarmed	first two pairs armed with two acute spines at distal end, third pair with one spine

This specimen fully agrees with the species *P. carinipes* (Heller) described by Heller (1861), De Man (1881, 1893), and Nobili (1906), but it does not agree with Melin's description (1939). It seems to us that he was in error in identifying his materials from the Bonin (Ogasawara) Islands with this species. Miyake (1943) made Melin's *P. carinipes* a synonym of *P. tomentosus* (Dana). It, however, is not synonym. Melin's *P. carinipes* differs from *P. tomentosus* as shown in the Table 2.

Melin states that *P. pubescens* Stimpson of Balss (1913, p. 30, pl. 1, fig. 2) from Tsushima and Kominato, Japan, belongs to *P. carinipes* (Heller). If this proves to be true, then Melin's *P. carinipes* must bear the name of *P. coccineus*. However, Melin's description does not agree with *P. coccineus*, as shown in the Table 2. There-

Table 2. Differences among the present specimen, Melin's description, and *P. tomentosus*.

Items	Present specimen	Melin's description	<i>P. tomentosus</i>
(1) Supra-ocular spine	present	present	absent
(2) Epibranchial spine	present	absent	present
(3) Upper distal end of the carpus of the first ambulatory legs	not armed with spinules*	armed with one spinule	armed with one spinule
(4) Outer margin of the palm	armed with 4-5 spines	armed with 6-10 spines	armed with about 10 spines
(5) Inner margin of the palm	provided with two spinules	not provided with spinule	not provided with spinule

* De Man (1893, p. 298) states "In *Petrol. caoinipes* the carpopodites of the first pair of ambulatory legs are not armed with the sharp spinule at the anterior margin, which is found in the Indian species, not only in the specimen of Djeddah, but also in the type specimen of Heller, as Koelbel writes."

fore, Melin's specimens belong to another species, probably unnamed form, which is not included in our collections, but we give a new name, i.e. *Petrolisthes melini* nom. nov. for Melin's *P. carinipes*. Here, to avoid confusion let there be clearness with respects to synonym, that is, Balss's *P. pubescens* is a synonym of *P. coccineus* (Owen), while *P. pubescens* Stimpson is also a synonym of *P. tomentosus* (Dana).

Distribution. This species has hitherto been recorded from the Red Sea and India.

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