

# Some Records of Offshore Crabs (Crustacea, Decapoda, Brachyura) from the Ryukyu Islands

## II. Families Portunidae, Xanthidae, Pilumnidae and Planopilumnidae

Masatsune Takeda and Hironori Komatsu

Department of Zoology, National Museum of Nature and Science  
4–1–1 Amakubo, Tsukuba, Ibaraki 305–0005, Japan

E-mails: takeda@kahaku.go.jp (MT)/ h-komatsu@kahaku.go.jp (HK)

(Received 12 June 2020; accepted 24 June 2020)

**Abstract** In the second part of the studies on offshore crabs collected by the late Mr. Seiji Nagai in the Ryukyu Islands, 25 species of the families Portunidae, Xanthidae, Pilumnidae and Planopilumnidae are recorded. Two species of the Pilumnidae, *Pilumnus hirsutissimus* and *P. ryukyuensis*, are described as new to science. *Actumnus marissinicus* Takeda and Kim, 1977, and *Latopilumnus tuberculosus* (Garth and Kim, 1983) of the family Pilumnidae are new to Japanese waters, and *Portunus (Lupocycloporus) innominatus* (Rathbun, 1909) (Portunidae) and *Platypodia pseudo-granulosa* Serène, 1984 (Xanthidae) replace the former records of *P. (L.) minutus* (Shen, 1937) and *P. granulosa* (Rüppell, 1830) from Japanese waters, respectively. New Japanese names are proposed for the species newly recorded from Japanese waters.

**Key words:** Shallow-water crabs, deep-water crabs, offshore crabs, new species, crabs new to Japanese waters, Ryukyu Islands, West Pacific.

### Introduction

Altogether 22 crab species of the families Cyclodorippidae, Homolidae, Raninidae, Leucosiidae, Inachidae and Parthenopidae were recorded in the previous issue of this Bulletin (Takeda and Komatsu, 2020) as the first part of the studies on the offshore crabs from the Ryukyu Islands in the Nagai Collection deposited at the National Museum of Nature and Science, Tokyo. In this second part, 4 species of the Portunidae, 12 species of the Xanthidae, 8 species of the Pilumnidae and 1 species of the Planopilumnidae were identified. *Portunus (Lupocycloporus) innominatus* (Rathbun, 1909) (Portunidae) replaces *P. (L.) minutus* (Shen, 1937) from Okinawa-jima Island recorded by Marumura and Kosaka (2003), *Platypodia pseudogranulosa* Serène, 1984 (Xanthidae) replaces many previ-

ous records of *P. granulosa* (Rüppell, 1830) from Japanese waters, *Actumnus marissinicus* Takeda and Kim, 1977 (Pilumnidae) replaces *A. obesus* Dana, 1852 recorded from Kyushu, Japan, by Takeda and Miyake (1969). *Latopilumnus tuberculosus* (Garth and Kim, 1983) (Pilumnidae) is recorded as new to Japanese waters, and otherwise two *Pilumnus* species of the family Pilumnidae, *P. hirsutissimus* and *P. ryukyuensis*, are described as new to science.

All the specimens are preserved in the Tsukuba Research Departments of the National Museum of Nature and Science, Tokyo (NSMT). The carapace breadth and length are abbreviated as cb and cl, respectively, and the first male gonopod as G1. The locations of the islands concerned are referred to the map of the Ryukyu Islands given in the first part by Takeda and Komatsu (2020: Fig. 1).

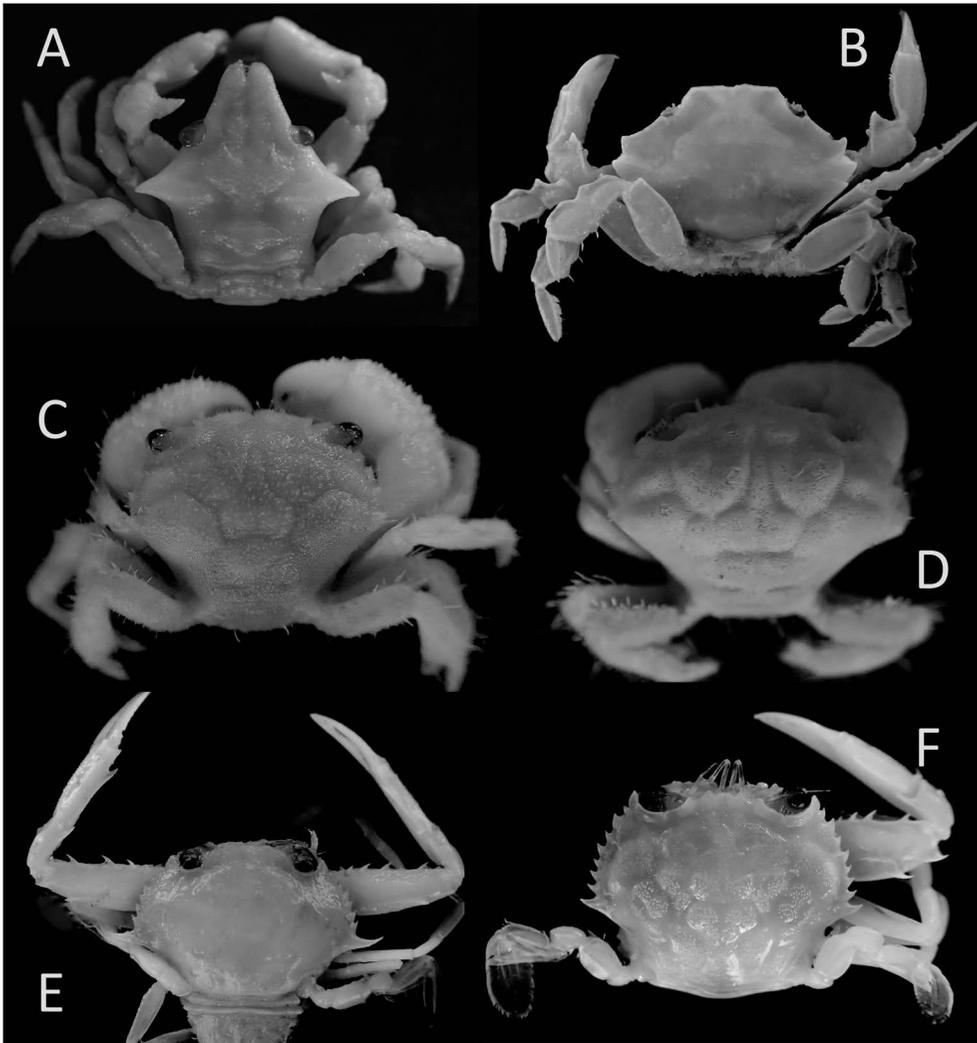


Fig. 1. A: *Eumedonus brevirhynchus* Chia and Ng, 2000, female (NSMT-Cr 27447; cb 9.1 × cl 10.2 mm). B: *Glyptocarcinus politus* Ng and Chia, 1994, female (NSMT-Cr 27430; cb 8.2 × cl 6.1 mm). C: *Actumnus marissinicus* Takeda and Kim, 1977, male infested by a *Sacculina* (NSMT-Cr 27444; cb 6.4 × cl 5.1 mm). D: *Actumnus uformis* Takeda and Komatsu, 2017, ovigerous female (NSMT-Cr 27445; cb 10.6 × cl 6.3 mm). E: *Portunus (Lupocycloporus) innominatus* (Rathbun, 1909), ovigerous female (NSMT-Cr 27425; cb 13.0 with lateral teeth × cl 7.5 mm). F: *Portunus (Achelous) orbitosinus* Rathbun, 1911, female (NSMT-Cr 27423; cb 12.6 × cl 9.8 mm).

### Records of the Species

Family PORTUNIDAE

*Portunus (Achelous) orbitosinus* Rathbun, 1911

[Japanese name: Medama-hime-gazami]

(Fig. 1F)

*Material examined.* Nakagusuku Bay, south-east of Okinawa-jima I., 25 m deep, 7–XII–1990,

1 ♂ (cb 13.4 with lateral teeth × cl 9.8 mm), NSMT-Cr 27422, 1 ♀ (cb 12.6 × cl 9.8 mm), NSMT-Cr 27423.

*Remarks.* According to Ng *et al.* (2008), *Portunus orbitosinus* is one of 22 species referred to the subgenus *Achelous*. This characteristic species described by Rathbun (1911) has been depicted and illustrated in detail based on

the cotype by Gordon (1938, as *Neptunus (Achelous)*). Due to this contribution, it is readily distinguished from the close relative, *P. (A.) granulatus* (H. Milne Edwards, 1834). Later, some important papers were published: Sakai (1939, as *Neptunus (Achelous)*); 1965b, as *Portunus*; 1976, as *Portunus (Cycloachelous)*), Stephenson and Campbell (1959, as *Portunus*), Crosnier (1962, as *Portunus*), Stephenson and Rees (1967, as *Portunus*), Apel and Spiridonov (1998, as *Portunus*), and Vannini and Innocenti (2000, as *Portunus*).

*Distribution.* Widely distributed in the Indo-West Pacific from Japan to Australia and the east coast of Africa, 2–85 m deep. This species is not found in the list of crabs from Nakagusuku Bay made by Takeda *et al.* (2019).

***Portunus (Lupocycloporus) innominatus***

(Rathbun, 1909)

[Japanese name: Hime-tenaga-ibo-gazami]

(Fig. 1E)

*Material examined.* Nakagusuku Bay, south-east of Okinawa-jima I., 25 m deep, 7–XII–1990, 1 ♂ (cb 14.2 with lateral teeth × cl 8.4 mm), NSMT-Cr 27424, 1 ovig. ♀ (cb 13.0 × cl 7.5 mm), NSMT-Cr 27425.

*Remarks.* Marumura and Kosaka (2003) recorded *Portunus (Lupocycloporus) minutus* (Shen, 1937) based on five males and three females from Nakagusuku Bay, Okinawa-jima Island in the list of the Nagai Collection of the Wakayama Prefectural Museum of Natural History. It may be the first record from Japanese waters, but they did not make a comment on the information of the specimens other than the species name and locality.

The present specimens from Nakagusuku Bay agree well with the original description and figures of *Neptunus (Lupocycloporus) minutus* based on an ovigerous female from Singapore. The current name of this species, *Portunus minutus*, was later recorded by Sankarankutty (1961) from the Andaman Islands, Stephenson and Rees (1967) from off the Gulf of Martaban, 29–33 m

deep, Stephenson (1967) from the Gulf of Thailand, and Stephenson (1975) from Timor and north of Sumatra, 6–15 m deep. On the other hand, Spiridonov (1999) identified two female specimens from Ambon, Indonesia, as *P. innominatus* Rathbun, 1909, and doubted the validity of *P. minutus*. According to Spiridonov (1999), the Indonesian specimens differ from *P. minutus* only in the absence of the protogastric ridge and the presence of more prominent median frontal lobe. It is difficult to indicate the difference between the photograph given by Spiridonov (1999) and the specimens from the Ryukyu Islands, so that in this paper the species name is referred to *P. innominatus* which was applied to the specimens from the east coast of India to the Andaman Islands tentatively identified as *Neptunus (Lupocycloporus) gracilimanus* (Stimpson) by Alcock (1899).

*Distribution.* As briefly summarized by Spiridonov (1999) and mentioned above, *P. innominatus* ranges from east coast of India to Indonesia and New Caledonia, and the distribution of *P. minutus* overlaps almost with that of *P. innominatus*. New to Japanese waters as formal record, and not found in the list of crabs from Nakagusuku Bay made by Takeda *et al.* (2019).

***Portunus (Xiphonectes) hastatoides***

Fabricius, 1798

[Japanese name: Hime-gazami]

*Material examined.* Nakagusuku Bay, south-east of Okinawa-jima I., 30 m deep, 1–XII–1990, 1 ♂ (cb 21.1 with lateral teeth × cl 10.7 mm), 1 ovig. ♀ (cb 24.0 × cl 12.0 mm), 2 young ♂♂ (cb 14.8 × cl 7.0 mm; cb 19.8 × cl 9.9 mm), NSMT-Cr 27426.

*Remarks.* This species was well represented by Sakai (1939, as *Neptunus (Helenus)*); 1976, as *Portunus (Xiphonectes)*), Stephenson and Campbell (1959, as *Portunus*), Crosnier (1962, as *Portunus*), Dai and Yang (1991, as *Portunus*), and Apel and Spiridonov (1998, as *Portunus*), and recently recorded from Nakagusuku Bay, Okinawa-jima Island by Takeda *et al.* (2019, as *Por-*

*tunus* (*Xiphonectes*)).

*Distribution.* Widely distributed in the Indo-West Pacific, 7–205 m deep.

***Thalamita picta*** Stimpson, 1858

[Japanese name: Hime-benitsuke]

*Material examined.* West off Kohama-jima I., 25 m deep, 14–III–1990, 1 ♀ (cb 13.5 with lateral teeth × cl 9.2 mm), NSMT-Cr 27427.

*Remarks.* This species was recently recorded, with a photograph, from Nakagusuku Bay, Okinawa-jima Island by Takeda *et al.* (2019). Wee and Ng (1995) gave the detailed line drawings. The carapace surface is covered with soft hairs, and provided with narrow but distinct transverse ridges on each region. Of six frontal lobes, the median two lobes are about half of the submedian lobes, and the lateral lobes are obtuse at tips and slightly narrower than the median lobes. The first three anterolateral teeth of the carapace are subequal, and the fourth (last) tooth is narrower but sharper.

*Distribution.* Geographically distributed to the whole Indo-West Pacific and bathymetrically from rocky shore and coral reef down to about 65 m.

#### Family XANTHIDAE

***Alainodeus nuku*** Davie, 1997

[Japanese name: Daidai-ougi]

*Material examined.* South off Ishigaki-jima I., 90–110 m deep, 10–III–1990, 1 ♂ (cb 7.0 × cl 5.4 mm), NSMT-Cr 27428.

*Remarks.* This species originally reported from French Polynesia by Davie (1997) was recently fully re-described by Komai (2014) based on the specimens from southern Japan.

*Distribution.* French Polynesia—Marquesus Is. and Austral Is., 100–400 m deep; Japan—Izu Is., Ogasawara Is., Ryukyu Is. (Tokara Is., Kerama Is. and Amami-Oshima I.), 30–145 m deep.

***Chlorodiella laevis*** (Dana, 1852)

[Japanese name: Tenaga-ougi]

*Material examined.* South off Ishigaki-jima I., 90–100 m deep, 10–III–1990, 1 ♂ (cb 6.3 × cl 4.5 mm), 1 ♀ (cb 5.6 × cl 4.8 mm), NSMT-Cr 27429.

*Remarks.* This small species is readily identified due to the important contribution by Forest and Guinot (1961), and distinguished from the closest congener, *C. cytherea* (Dana, 1852) by different shape and armature of the carapace anterolateral margin and the G1 distal part; in this species, only the third anterolateral tooth is stronger and sharper than the others, but the second and third teeth are much larger and sharper than the others in *C. cytherea*. The G1 distal part is subtruncated in this species, but strongly recurved toward the base in *C. cytherea*. The G1 is finely figured by Forest and Guinot (1961: Fig. 101a–b) and Serène (1984: Figs. 171–172, as *C. laevis* f. *laevis* and *C. laevis* f. *robusta*), and otherwise schematically by Sankarankutty (1962: Figs. 32–33), Kensley (1970; Fig. 3d), Chen and Lan (1978: Fig. 7 (12–13)), and Dai and Yang (1981: Fig. 170).

*Distribution.* This species is a common inhabitant of coral reef in the whole Indo-West Pacific, but Sakai (1965a) recorded the bathymetric range as 5–20 m in Sagami Bay, and Takeda (1977a) recorded this species at the depths of 20–40 m in the vicinity of Mage-jima Island, south of Kyushu. The bathymetric range was further extended down to 100 m deep.

***Glyptocarcinus politus*** Ng and Chia, 1994

[Japanese name:

Subesube-hiraashi-komachigani]

(Fig. 1B)

*Material examined.* Southeast off Kuroshima I., 120–150 m deep, 15–III–1990; 1 ♀ (cb 8.2 × cl 6.1 mm), NSMT-Cr 27430.

*Remarks.* A male collected together with a female examined at present has been already listed by Marumura and Kosaka (2003) in the

Nagai Collection of the Wakayama Prefectural Museum of Natural History, with a photograph of color in life and a new Japanese name but without comment as a new Japanese record. In the female examined at present, the carapace anterolateral teeth of both sides are somewhat damaged, but there is no problem in the identification because of the quite smooth carapace contrary to the carapace wholly and uniformly covered with small granules and pits forming reticulated pattern in the type species of the genus *Glyptocarcinus*, *G. lophopus* Takeda, 1973. The other remarkable difference between the two species is the sculpture of the intestinal region; in *G. lophopus*, the anterior part of the intestinal region is deeply excavated and only partly overhung by the cardiac fold, with the posterior part separated into two subregions by distinct groove, while in *G. politus*, the anterior part of the intestinal region is deeply excavated and almost completely overhung by the cardiac fold, with the undivided posterior part.

*Distribution.* Previously known from two stations off New Caledonia (Ng and Chia, 1994), and off Kuro-shima Island (Marumura and Kosaka, 2003), with bathymetric records of 120–275 m deep.

***Liomera caelata* (Odhner, 1925)**

[Japanese name: Fukuro-beni-ougi]

*Material examined.* South off Ishigaki-jima I., 90–100 m deep, 10–III–1990, 2 ♀♀ (cb 7.0 × cl 4.5 mm; cb 5.9 × cl 4.0 mm), NSMT-Cr 27431.

*Remarks.* This small species is most characteristic in having the deeply areolated dorsal surface of the carapace, with the U-shaped protogastric region. Recently, Takeda and Komatsu (2018) recorded this species from the Ogasawara Islands, with color in life. The present specimens are considered to be the duplicates of the specimens reported by Marumura and Kosaka (2003) because of the same collecting data.

*Distribution.* Distributed in the west Pacific from Japan southwards to the Torres Straits, and

otherwise known from the Cocos Keeling Islands and Aldabra Island in the east and west Indian Ocean, from coral reef to 100 m deep. The known localities in the Ryukyu Islands are Yoron-jima and Ishigaki-jima Islands, coral reef (Sakai, 1976), Zamami-jima and Ishigaki-jima Islands, 90–100 m deep (Marumura and Kosaka, 2003).

***Lybia caestifera* (Alcock, 1898)**

[Japanese name: Hime-kinchakugani]

*Material examined.* West off Amami-Oshima I., 150 m deep, 2–IV–1989, 1 young ♀ (cb 3.9 × cl 3.5 mm), NSMT-Cr 27432.

*Remarks.* As mentioned by Sakai (1967) and Guinot (1976), the records of *Lybia caestifera* (Alcock, 1898) from Mauritius, the western Indian Ocean by Bouvier (1915) and the Red Sea by Balss (1924) and Klunzinger (1913) are not always reliable. In Japan, this species was first recorded, with a monochromatic photograph, by Kurata (1967), and followed, with a colored illustration, by Sakai (1976). Recently, Takeda and Komatsu (2018) recorded the closely related *L. leptochelis* (Zehntner, 1894) from the Ogasawara Islands, with color in life. Mendoza and Ng (2011) suggested that *L. leptochelis*, *L. pugil* (Alcock, 1898) and this species may be synonyms. The color photograph of the male from the Philippines agrees exactly with the specimen from the Izu Islands given by Kurata (1967) in the color pattern and also in the short and stout second and third ambulatory legs, differing from the male from the Ogasawara Islands, in which the color pattern is much more complex, with a wide white band margined with purplish red at the distal part of each ambulatory merus, carpus and propodus, and the ambulatory legs are slender. The color pattern of a male from Christmas Island in the Indian Ocean recorded by Mendoza *et al.* (2014) as *L. leptochelis* is also similar to the specimens from the Izu Islands and the Philippines mentioned above. As far as the literature concerned, it is concluded at present, the simple color pattern and the stout ambulatory legs are

characteristics of *L. caestifera*, and the complex color pattern and the slender ambulatory legs are those of *L. leptochelis*. The color is completely faded out in the male examined at present, but it is referred to *L. caestifera*, having the short and stout ambulatory legs.

*Distribution.* This species was originally reported from off Sri Lanka, and later definitely recorded from Hawaii and Japan, 8–90 m deep.

***Miersiella cavifrons* Takeda, 1989**

[Japanese name: Amami-tsubu-himeougi]

*Material examined.* South off Ishigaki-jima I., 90–110 m deep, 10–III–1990, 1 ovig. ♀ (cb 5.3 × cl 3.8 mm), 1 ♀ (cb 7.3 × cl 5.3 mm) infested by a bopyrid isopod, NSMT-Cr 27433.

*Remarks.* This species is the second in the genus *Miersiella*, and as noted by Takeda (1989) and Takeda and Komatsu (2018), most remarkably different from the type species, *M. haswelli* (Miers, 1886), in the concave median part of the carapace frontal margin. The fine photographs in life color were given by Mendoza and Ng (2010) and Takeda and Komatsu (2018).

*Distribution.* Japan (Vicinity of Kii Peninsula, Amami-Oshima I. and Ogasawara Is., 40–151 m), the Philippines (Bohol Sea, 25–400 m), and the South China Sea (96–107 m).

***Paraxanthodes cumatodes* (MacGilchrist, 1905)**

[Japanese name: Oohime-ougigani-modoki]

*Material examined.* Southeast off Kuroshima I., 120–150 m deep, 15–III–1990, 1 juv. (cb 6.4 × cl 5.3 mm), NSMT-Cr 27434.

*Remarks.* This specimen generally agrees with the juvenile specimen from the Ogasawara Islands reported by Takeda and Komatsu (2018) as first occurrence in Japanese waters, except for the apparently smaller first anterolateral tooth of the carapace. This species is characteristic in having the carapace with the distinct dorsal regions subdivided by linear furrows and provided with many, short transverse rows of vesicular granules. The ambulatory legs are armed

with prominent tubercles of irregular size and shape on the anterior margins of the meri, carpi and propodi.

*Distribution.* Known from the Ogasawara Islands (52–118 m), Philippines (83–102 m), New Caledonia (65–210 m), the Persian Gulf (95 m), and the Red Sea (168 m).

***Platypodia pseudogranulosa* Serène, 1984**

[Japanese name:

Tsubu-hiraashi-ougigani-modoki]

*Material examined.* West off Kohama-jima I., 25 m deep, 14–III–1900, 1 young ♀ (cb 12.5 × cl 8.6 mm), NSMT-Cr 27435.

*Remarks.* This species, one of the toxic crabs in Japan, has been long known as *Platypodia granulosa* (Rüppell, 1830), but the West Pacific population was distinguished from the Indian Ocean *P. granulosa* by Serène (1984). In the young specimen at hand, the carapace is covered with short hairs more densely than in the adults, and granules larger than those of the adults, but smaller than in the typical *P. granulosa*, and also the carapace dorsal areolation is not so deep. As for the presence or absence of the sharp crest or crested ridge on the upper margin of the cheliped palm, it is noted in the present specimen that the upper margin is wholly granulated and rounded, without any trace of a sharp or granulated crest, differing from the crested upper margin of the palm in *P. granulosa*. Serène (1984) designated a male specimen from Marutea Atoll in the Tuamotu Islands as the holotype of *P. pseudogranulosa*.

*Distribution.* West Pacific from Japan and Wake Island south to the Polynesian islands and Queensland, Australia, from coral reef to shallow water. The scientific name, *Platypodia pseudogranulosa*, was at present newly introduced to the Japanese carcinological fauna instead of *P. granulosa*.

***Platypodia semigranosa*** (Heller, 1861)

[Japanese name: Hime-hiraashi-ougi]

*Material examined.* West off Kohama-jima I., 25 m deep, 14–III–1990, 1 juv. (cb 10.9 × cl 5.7 mm), NSMT-Cr 27436.

*Remarks.* As Rathbun (1906) recorded as “The carapace of small specimens and also the propodites of the ambulatories are very much smoother than in the adult,” the juvenile specimen at hand is also somewhat different from the adult forms in having the smoother carapace and chelipeds with fewer granules. Rathbun (1911) also mentioned that the young specimens (5 mm wide or less) have the dorsal surface of the carapace almost smooth, and that there are only a few low granules near the anterolateral teeth. In the present specimen, otherwise, the carapace anterolateral crest is divided into four angulated lobes peculiar to *Platypodia semigranosa* well characterized with fine figures and photographs by De Man (1902, as *Lophactaea*), Edmondson (1962), Sakai (1976) and Serène (1984).

*Distribution.* Indo-West Pacific from Hawaii and Japan to Madagascar and the Red Sea, coral reef to 144 m deep. In Japan, this species is known from Ishigaki-jima and Taketomi-jima Islands in the Ryukyu Islands (Sakai, 1976), and Chichi-jima Island in the Ogasawara Islands (Marumura and Kosaka, 2003).

***Platypodia tomentosa*** (De Man, 1902)

[Japanese name: Kebuka-hiraashi-ougi]

*Material examined.* West off Kohama-jima I., 25 m deep, 14–III–1990, 1 ♂ (cb 13.7 × cl 10.4 mm), NSMT-Cr 27437.

*Remarks.* This rare species has been first introduced to the Japanese carcinological fauna by Sakai (1983) who studied the specimens from Ise Bay and the Kumanonada Sea, east of the Kii Peninsula, collected by gill-net for lobsters and trawl-net for benthic fishes, and then Marumura (1985) recorded a female specimen obtained from refuse at fishing port of Minabe, southernmost part of the Kii Peninsula. The carapace dor-

sal surface is well isolated to the granulated areolae, with interregional furrows filled thickly with dark-colored short setae; there are bundles of some longer hairs symmetrically arranged. The frontal, supraorbital and anterolateral margins of the carapace, the upper margin of the cheliped palm, and the upper margins of the ambulatory meri, carpi and propodi are strongly crested. The crest of the carapace anterolateral margin is indistinctly subdivided into four parts, with obtuse tips.

*Distribution.* Known from Japan and Indonesian waters, 15–35 m deep. Marumura and Kosaka (2003) recorded four specimens from Kushimoto, western part of the Kii Peninsula, and a male from Kohama-jima Island, the latter of which is without doubt a duplicate specimen obtained from the same haul with the present male.

***Pseudactaea corallina*** (Alcock, 1898)

[Japanese name: Shikaku-awatsubugani]

*Material examined.* West off Kohama-jima I., 25 m deep, 4–III–1990, 2 ♂♂ (cb 14.5 × cl 9.3 mm; cb 12.5 × cl 8.2 mm), NSMT-Cr 27438.

*Remarks.* Takeda (2008) recorded this species from off Amami-Oshima Island based on the specimens collected by the RV *Tansei Maru* in 2004. As revised by Takeda and Marumura (2002), this species, one of three congeneric species of the genus *Pseudactaea*, is characteristic in the ill-defined dorsal surface of the carapace differing remarkably from both of *P. multicristata* (Zehntner, 1894) and *P. multiareolata* Takeda and Marumura, 2002.

*Distribution.* Widely distributed in the Indo-West Pacific from central Japan to Madagascar in the western Indian Ocean through the Philippines, Indonesia and Sri Lanka, 26–158 m deep.

***Pseudactaea multicristata*** (Zehntner, 1894)

[New Japanese name: Mizo-awatsubugani]

*Material examined.* West off Kohama-jima I., 25 m deep, 14–III–1990, 1 young ♀ (cb

7.6 × cl 5.3 mm), NSMT-Cr 27439.

*Remarks.* As remarked by Takeda and Marumura (2002), this species is readily distinguished from *Pseudactaea corallina* (Alcock, 1898) by having the dorsal surface of the carapace deeply sculptured with linear furrows into the ridge-like regions with pearly granules of variable sizes. The anterolateral margin of the carapace is divided into four teeth, the last three of which are angulated at tips; the last tooth is strongly angulated and directed posterolaterally. The chelipeds and ambulatory legs are ornamented with many crests, with an appearance of fine sculpture.

*Distribution.* The records of occurrence are not so many, but widely spread in the wide area of the Indo-West Pacific from Japan to Madagascar through the Philippines, Vietnam and Indonesia without intervening localities. The bathymetric records are from coral reef to 41.5 m deep.

#### Family PILUMNIDAE

##### *Actumnus dorsipes* Stimpson, 1858

[Japanese name: Seashi-ibotegani]

*Material examined.* West of Amami-Oshima I., 200 m deep, IV–1990, 1 ♂ (cb 6.3 × cl 5.4 mm), 1 ovig. ♀ (cb 8.0 × cl 6.0 mm), NSMT-Cr 27440.

North off Okinawa-jima I., 90 m deep, no record of date, 1 ♂ (cb 7.0 × cl 5.5 mm), NSMT-Cr 27441; Off Naha, Okinawa-jima I., 60–70 m deep, 4–XII–1990; 1 ♂ (cb 5.9 × cl 4.6 mm), NSMT-Cr 27442.

South off Ishigaki-jima I., 100 m deep, 10–III–1990, 1 ♂ (cb 5.8 × cl 4.5 mm), NSMT-Cr 27443.

*Remarks.* When Takeda and Komatsu (2017) described a new *Actumnus* species, *A. uformis*, the photographs of some related species were reproduced for comparison. The male specimen of *A. dorsipes* Stimpson, 1858, recorded by Takeda and Komatsu (2017; Fig. 6E–F), has the small, probably regenerated right cheliped, but the deep areolation of the carapace and soft tomentum are well represented, indicating close similarity to *A. uformis* rather than to the other species. In the Nagai's collection are a male and a

female from Shiono-Misaki, southernmost place of the Kii Peninsula, 70 m deep

*Distribution.* According to Takeda and Miyake (1969), this species is known from Japan and off Hong Kong, 18–120 m deep.

##### *Actumnus marissinicus* Takeda and Kim, 1977

[New Japanese name: Shinakai-ibotegani]

(Figs. 1C, 2–3)

*Material examined.* Off Naha, Okinawa-jima I., 60–70 m deep, 14–XII–1990, 1 ♂ infested by a *Sacculina* (cb 6.4 × cl 5.1 mm), NSMT-Cr 27444.

Shikatani Collection: Chinen, Nakagusuku Bay, Okinawa-jima I., 17–VII–1985, 1 ♂ (cb 16.8 × cl 12.5 mm), NSMT-Cr 27466, 1 ♀ (cb 10.5 × cl 7.4 mm), NSMT-Cr 27458, 1 ♀ (cb 12.2 × cl 8.9 mm), NSMT-Cr 27467; 24–II–1986, 1 ♂ (cb 5.8 × cl 4.5 mm), NSMT-Cr 27459; VI–1986, 1 ♀ (cb 14.4 × cl 11.0 mm), NSMT-Cr 27468; 4–VII–1986, 4 ♂ ♂ (cb 6.9 × cl 5.4 mm—cb 13.8 × cl 11.2 mm), 1 ♀ (cb 12.4 × cl 9.5 mm), NSMT-Cr 27461; 6–VIII–1986, 1 ♂ (cb 22.3 × cl 16.7 mm), NSMT-Cr 27469, 1 ♀ (cb 24.7 × cl 17.4 mm), NSMT-Cr 27470, 1 ♀ (cb 22.7 × cl 16.4 mm), NSMT-Cr 27462.

Shikatani Collection: Haneji Bay, Okinawa-jima I., 19–V–1985, 1 ♂ (cb 22.8 × cl 16.6 mm), NSMT-Cr 27463, 1 ♂ (cb 23.3 × cl 17.7 mm), NSMT-Cr 27464.

Nagai Collection: Off Kushimoto, Wakayama Pref., 40–70 m deep, date unknown, 1 ♀ (cb 12.0 × cl 8.8 mm), NSMT-Cr 6370.

*Description.* Carapace strongly convex in both directions typical for *Actumnus*; dorsal surface of carapace distinctly divided into regions by narrow and deep furrows; regions weakly convex dorsally, thickly covered with pearly granules of good size; granules uniformly interspaced with thick, stiff and short setae and sparse longish hairs; regions not disguised with hairs; epigastric, protogastric and mesogastric regions prominent; protogastric region large, with a short, sometimes indistinct incision at anterior outer one third; anterior extension of meso-

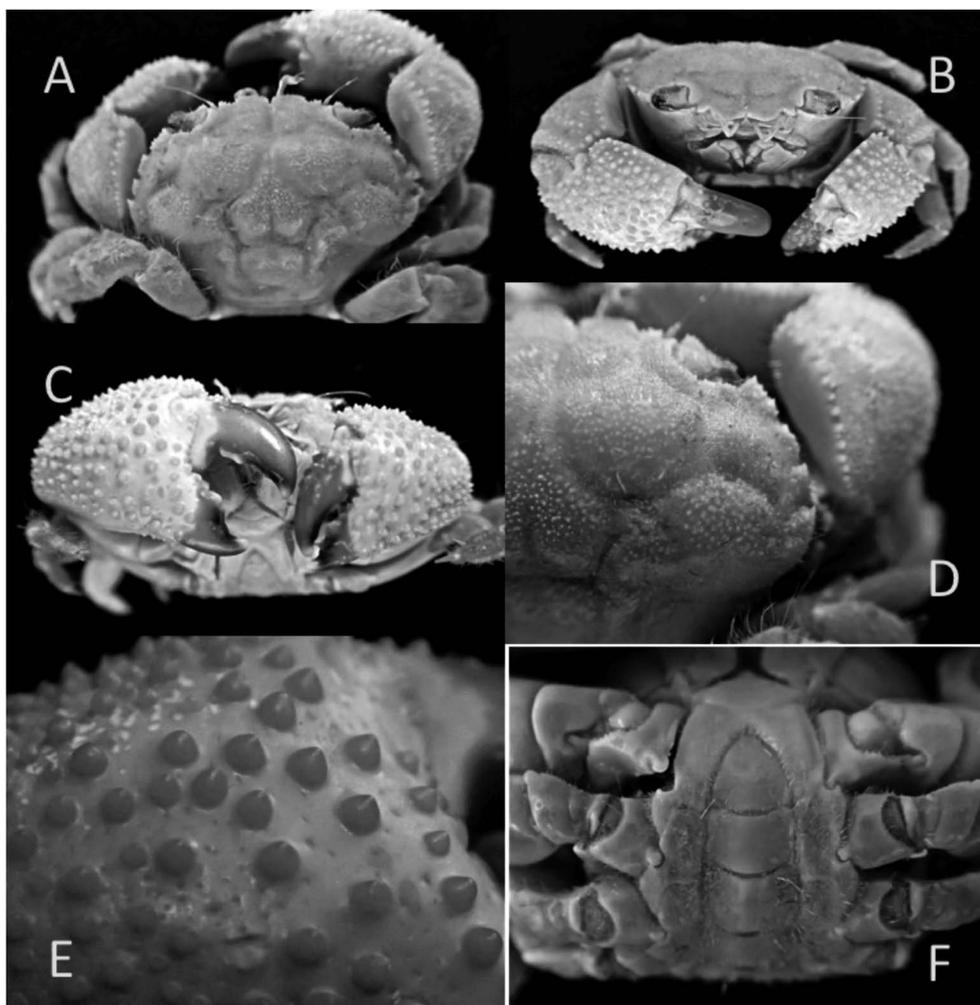


Fig. 2. *Actumnus marissinicus* Takeda and Kim, 1977, male (NSMT-Cr 27464; cb 23.3 × cl 17.7 mm) from Nakagusuku Bay, Okinawa-jima Island. A, B: Carapace and chelipeds in dorsal and frontal views, respectively. C: Both chelae in outer view. D: Carapace anterolateral regions and margin. E: Distal half of outer surface of right palm. F: Abdomen.

gastric region reaches almost to posterior part of epigastric region, slightly exceeding anterior margin of protogastric region; posterior half of mesogastric region divided into two by longitudinal furrow from posterior margin; cardiac region prominent, flattened, slightly narrowing posteriorly, separated indistinctly from intestinal region; anterior branchial region inside of first three anterolateral teeth of carapace entire; posterior branchial region just inside of second and third anterolateral teeth prominent, slightly smaller

than each protogastric region; posterior branchial region between last anterolateral tooth and posterior part of mesogastric region oblique, nearly divided into two; posterolateral dorsal surface of carapace flattened or rather excavated to receive last ambulatory leg.

Front well developed, planiform, directed obliquely downward, divided into two lobes by median deep slit; margin of each lobe truncated or weakly convex forward, fringed regularly with small tuberculate granules, followed laterally at

some intervals from lateral end by triangular lobe directed obliquely outward. Supraorbital margin weakly raised, thickly fringed with microscopical granules, with two small, but distinct notches; external orbital angle thick, but not sharp, completely confluent with first anterolateral tooth or lobe of carapace; next two teeth distinctly lobate, granulated along margins, with a conical granule of good size at each anterior end; last tooth with a conical subacute granule or rather tubercle at anterior end, outer margin weakly convex along general outline of carapace; these anterolateral teeth more or less depressed dorsoventrally, weakly thickened along margins.

Third maxilliped mostly smooth; merus as large as two thirds of ischium, with antero-inner angle sharply angulated; anterior margin weakly concave, forming lower part of efferent orifice for expiratory water; exopod of third maxilliped about half as wide as ischium, extending almost to anterolateral corner of buccal cavern in natural position.

Chelipeds remarkably unequal; merus short, not seen in dorsal view; upper margin thin, armed with tuberculate tooth back and forth of subterminal deep incision; carpus large, poorly granulated on outer surface, truncated to fit with subhepatic and subbranchial surfaces of carapace, with crescent shallow depression along distal margin; inner upper angle and adjacent margins armed with sharp granules, but without high tubercles. Both palms different in size, but similar in granulation; outer surface of rough appearance with conical, obtuse granules of nearly equal size; granules crowded, but not bounded on each other.

Male abdomen narrow throughout. Male first and second gonopods typical for *Actumnus*; distal beak of G1 curved, short, with subterminal line of setae along seam of shaft.

*Remarks.* The male (NSMT-Cr 27444; cb  $6.4 \times$  cl  $5.1$  mm) from off Naha may be not fully developed, although the G1 seems to represent the matured type. It was first identified as *Actumnus obesus* Dana, 1852, following Rathbun (1906), Edmondson (1962), and Takeda and

Miyake (1969). The original description of *A. obesus* is unelaborated, with somewhat schematic figures, but the carapace anterolateral margin was described to be indistinctly divided into four lobes and illustrated to be almost entire. The fine photograph given by Rathbun (1906) is at first glance quite different from the original figure of *A. obesus* in the distinct armature of the carapace anterolateral margin. The specimens dealt with by Edmondson (1962) and Takeda and Miyake (1969) also differ from the original figure of *A. obesus*. In the line drawing given by Boone (1934), in which the specimens from Bali and Tahiti were recorded, the carapace dorsal surface is ill-defined, and the anterolateral margin is granulated and indistinctly lobed or nearly entire.

During this study, in addition to a male from off Naha, nine males and five females from subtidal depths of Nakagusuku and Haneji Bays, east and west coasts of Okinawa-jima Island, and a female from Kushimoto, Wakayama Prefecture, were examined. The offshore crabs other than the pilumnid crabs in the Shikatani Collection were studied and published by Takeda *et al.* (2019). The specimens of the *Actumnus* species in the Shikatani Collection tentatively identified as *A. obesus* on the basis of Takeda and Miyake (1969) are included in this report. The typical specimens have the strongly convex carapace sculptured into regions and covered with stiff short setae and dispersed longish hairs. In the smaller specimens, however, the carapace contour is slightly narrower than the full-grown specimens, the interregional furrows of the carapace dorsal surface are sometimes shallow, with the regions only weakly convex dorsally, and oblique furrow subdividing the posterior branchial region into two is shallow. In the smaller specimens, otherwise, the last anterolateral tooth is more or less tuberculate and not so strongly lobate like in the larger specimens, in which the outer margin of the last anterolateral tooth is developed and weakly convex along the posterior half. These characters are referred to the developmental variation, and the tuberculation of the first to third

anterolateral teeth is also variable individually, but at least the anterolateral tuberculation is quite different from the original figure of *A. obesus*. In the present paper, some specimens of different size are represented to show the variation in the carapace dorsal sculpture and anterolateral armature (Fig. 3).

As mentioned above, the present specimens not referred to *Actumnus obesus* show the rather close similarity to *A. globulus* Heller, 1861, in the general formation of the carapace. However,

in *A. globulus* figured by Heller (1861) and A. Milne-Edwards (1865), the carapace anterolateral margin is divided into four parts, but lobate and not distinctly toothed. The general appearance of the carapace of the present specimens is also somewhat similar to *A. verrucosus* Henderson, 1893 from India, but the protogastric region is peculiarly sculptured and the mesogastric region is distinctly subdivided into three in *A. verrucosus*.

*Actumnus marissinicus* Takeda and Kim, 1977,

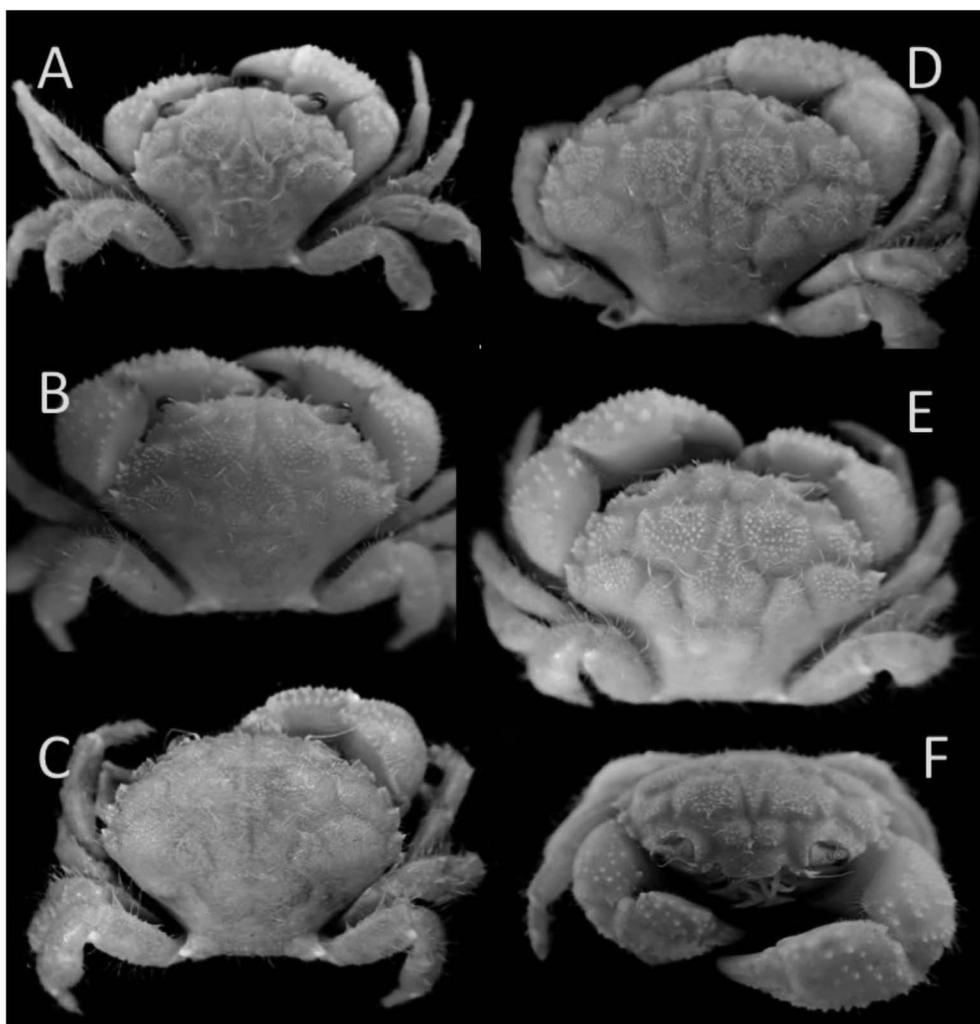


Fig. 3. *Actumnus marissinicus* Takeda and Kim, 1977, from Nakagusuku Bay (A–B, D–F) and Haneji Bay (C), Okinawa-jima Island. A: Female (NSMT-Cr 27458; cb  $10.5 \times$  cl  $7.4$  mm). B: Male (NSMT-Cr 27466; cb  $16.8 \times$  cl  $12.5$  mm). C: Male (NSMT-Cr 27463; cb  $22.8 \times$  cl  $16.6$  mm). D: Female (NSMT-Cr 27470; cb  $24.7 \times$  cl  $17.4$  mm). E–F: Male (NSMT-Cr 27469; cb  $22.3 \times$  cl  $16.7$  mm).

is known only by the original description based on a female from Jeju Island in the south of Korea, and therefore the variation of the carapace dorsal areolae and the armature of anterolateral margin is unknown, but we have come to conclusion on a reasonable basis that the specimens of different sizes from the Ryukyu Islands vary distinctly in the anterolateral armature of the carapace. The comparison with *A. obesus* sensu Takeda and Miyake (1969) is briefly written in the original description as follows: "The new species [*A. marissinicus*] is differentiated from another close congener, *A. obesus* Dana, to which the dorsal areolae are rather similar, in having the smaller granules on the areolae and in that the convexity of the carapace is inclined anteriorly and thus makes the seemingly wider appearance." As recorded above, a female from off Kushimoto, Wakayama Prefecture, identified as *A. marissinicus* is in the collections of the National Museum of Nature and Science, Tokyo, which was donated by the late Mr. S. Nagai. This specimen may be the representative of the first occurrence of *A. marissinicus* in Japanese waters. The record of *A. obesus* based on four specimens from off Minabe, Wakayama Prefecture, was recorded in the list of the Nagai Collection by Marumura and Kosaka (2003). The identification is not always reliable and it is highly probable that *A. obesus* recorded by them is really identifiable to *A. marissinicus*, and therefore *A. obesus* is to be eliminated from the Japanese carcinological fauna.

*Distribution.* Previously known only by a female from Seogwipo, Jeju Island (Kim and Park, 1972, and Kim, 1973, as *A. asper*; Takeda and Kim, 1977, as *A. marissinicus*).

***Actumnus uformis*** Takeda and Komatsu, 2017

[New Japanese name: Fukuro-ibotegani]

(Fig. 1D)

*Material examined.* West off Kohama-jima I., 25 m deep, 14–III–1990, 1 ovig. ♀ (cb  $10.6 \times$  cl 6.3 mm), NSMT-Cr 27445.

Southeast off Kuro-shima I., 120–150 m deep,

15–III–1990, 1 ♂ (cb  $6.0 \times$  cl 4.0 mm), 1 ♀ (cb  $6.8 \times$  cl 5.2 mm), NSMT-Cr 27446.

*Remarks.* These specimens agree well with the recently described species from the Ryukyu Islands by Takeda and Komatsu (2017). The well areolated dorsal surface of the carapace thickly covered with a soft tomentum is close to *Actumnus dorsipes* Stimpson, 1858, but this species is readily distinguished from *A. dorsipes* by having the U-shaped protogastric region.

*Distribution.* Originally reported from the Kerama Islands in the west off Okinawa-jima Island, 53 m deep, and Nakagusuku Bay at the southeast coast of Okinawa-jima Island from refuse caught with gill-net for fish.

***Eumedonus brevirhynchus*** Chia and Ng, 2000

[New Japanese name: Minami-gokakugani]

(Fig. 1A)

*Material examined.* West off Amami-Oshima I., 200 m deep, 28–III–1989, 1 ♀ (cb  $9.1 \times$  cl 10.2 mm), NSMT-Cr 27447.

*Remarks.* The female specimen examined is very close to *Eumedonus crassimanus* (Haswell, 1880) recorded from off the Kii Peninsula by Takeda and Marumura (1997), which has been synonymized with *E. niger* H. Milne Edwards, 1834, together with *E. villosus* Rathbun, 1918. According to the original description of *E. brevirhynchus* (Chia and Ng, 2000: 24, figs. 5–7), the genus *Eumedonus* H. Milne Edwards, 1834, is differentiated from the genus *Gonatonotus* White, 1847, not only by the long rostrum but also having the cristate upper margins of the ambulatory meri. The *Eumedonus* species are *E. niger* H. Milne Edwards, 1834, *Z. zebra* Alcock, 1895, *E. vicinus* Rathbun, 1918, and *E. brevirhynchus* Chia and Ng, 2000, as summarized in the paper dealing with *Gonatonotus nasutus* Chia and Ng, 2000 by Endo and Naruse (2016).

The female specimen at hand is identified as *E. brevirhynchus* following the key made by Chia and Ng (2000). *Eumedonus niger* and *E. brevirhynchus* are, without doubt, close to each other, but the rostrum is comparatively shorter in

*E. brevirhynchus* than *E. niger*, with the ratio of length to width 0.7–1.1 (mean 0.9) in *E. niger*, and 0.5–0.7 (mean 0.6) in *E. brevirhynchus*, and the posterior part of the carapace lateral tooth bending towards the metabranchial region sharply in *E. niger* and gently in *E. brevirhynchus*.

*Distribution.* *Eumedonus niger* is known from western and eastern Australia, China, Philippines, East China Sea and Japan, 40–138 m deep, and *E. brevirhynchus* has been originally reported from New Caledonia, Vanuatu and Philippines, 52–210 m deep. The known host sea urchin is *Prionocidaris baculosa* (Lamarck). New to Japan.

#### ***Latopilumnus tuberculosus***

(Garth and Kim, 1983)

[New Japanese name: Toranoogani-modoki]

(Fig. 4)

*Material examined.* Off Naha, Okinawa-jima I., 60–70 m deep, 6–XII–1990, 1 ♀ (cb 5.3 × cl 4.2 mm), NSMT-Cr 27448; 1 ♀ (cb 4.7 × cl 3.4 mm), NSMT-Cr 27449.

South off Ishigaki-jima I., 130–150 m deep. 15–III–1990, 2 ♀♀ (cb 5.1 × cl 3.4 mm; cb 4.6 × cl 3.5 mm), NSMT-Cr 27450.

Nakagusuku Bay, Okinawa-jima I., 10–IV–1986, 1 ♂ (cb 10.6 × cl 8.2 mm), NSMT-Cr 27465.

*Remarks.* This small species was originally described by Garth and Kim (1983) as *Parapilumnus tuberculosus* which is very close to *P. truncatospinus* (De Man, 1914) in having the obtuse or truncated tubercles on the cheliped carpus and palm, but distinguished from it by the broader carapace. The carapace dorsal surface is weakly convex in both directions, the areolation is indistinct, with several, symmetrically arranged rows of short hairs and small granules on the protogastric and anterior branchial regions. The carapace anterolateral margin is armed with three teeth behind the obtuse external orbital angle; the first tooth is more or less lobular, with the obtuse tip and the weakly convex

outer margin; the distance between the external orbital angle and the anterior base of the first tooth occupies one third of the carapace anterolateral margin, and the posterior end of the first tooth ends at the median part of the carapace anterolateral margin; the second tooth is smaller than the first tooth, sharper and directed obliquely outward, the distance between the tips of the third teeth of both sides being the widest of the carapace; the third tooth is small and the smallest of all. The carapace posterolateral margin behind the tip of the third tooth is longer than the anterolateral margin. The chelipeds are distinctly unequal and heavy in both sexes. The carpus is covered with spaced, truncated granules of good and variable sizes. The palm of the larger chela is bare for most part of the outer surface, but the upper part is covered with longish hairs and conical granules; the palm of the smaller chela is wholly covered with hairs and smaller sharp granules.

The specimens at hand are characteristic in the dentition of the carapace anterolateral margin and the tuberculation of the cheliped carpus just like both of *Parapilumnus truncatospinosus* and *P. tuberculosus*. The later species was described to be distinguished by the broader carapace and the numerous tubercular granules on the cheliped carpus and palm. The numbers of the tubercles of the cheliped carpus and palm may be exposed to the variation, and the small extent of the proportional difference of the carapace may also be not always the specific criterion; the carapace breadth is 7.7 mm and length is 5.1 mm in the holotype male of *P. tuberculosus* from the Philippines (ratio of length to width, 1.51), and the carapace breadth is 5.5 mm and length is 4 mm in the holotype female from Madagascar (ratio of length to breadth, 1.38). In the four female specimens from the Ryukyu Islands (cb 4.6 × cl 3.5 mm—cb 5.3 × cl 4.2 mm), the ratio of the carapace length to the breadth varies from 1.26 to 1.5. This fact suggests that the specimens from Madagascar in the western Indian Ocean and the specimens from the Philippines and the Ryukyu Islands in the western Pacific are conspecific to

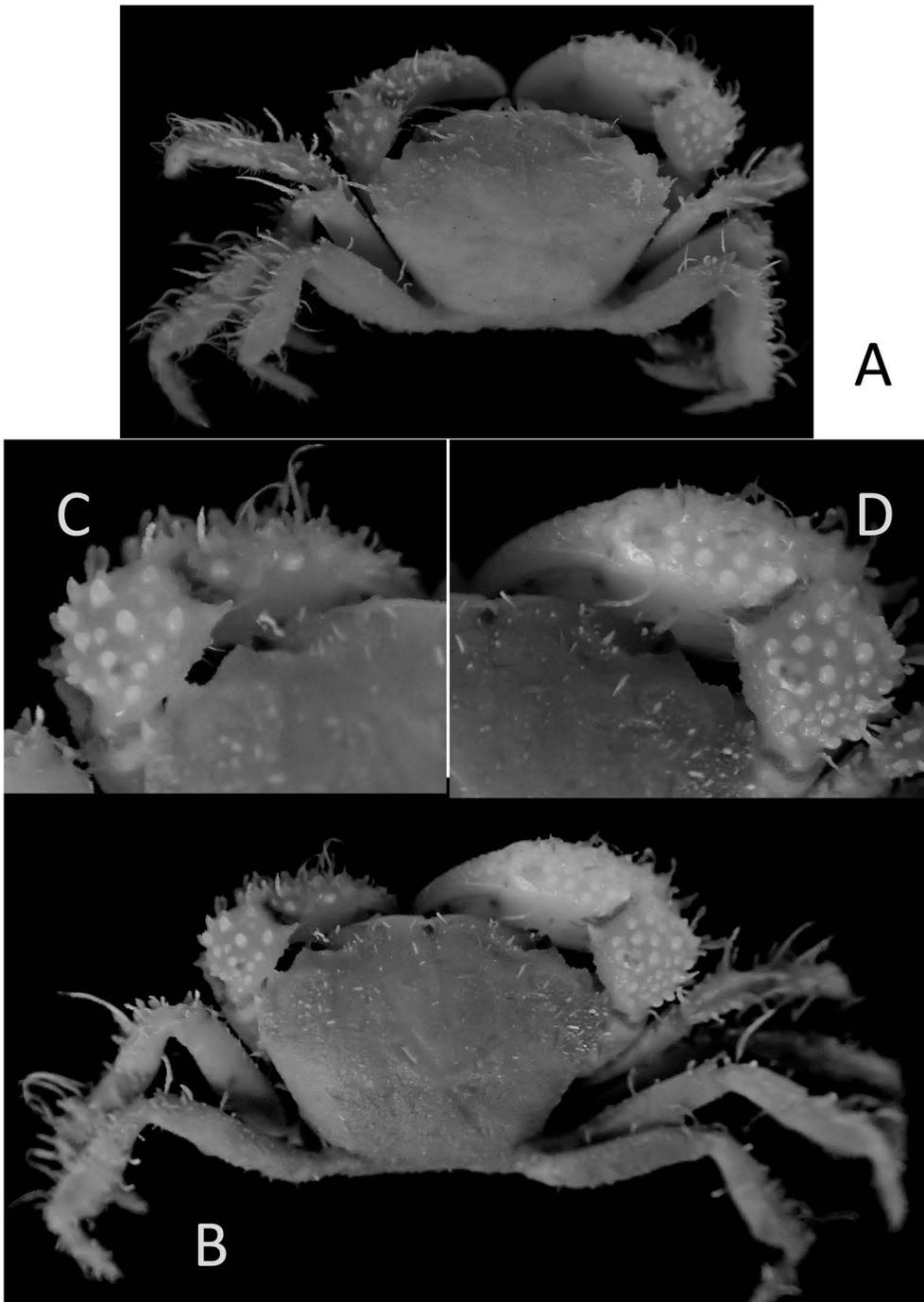


Fig. 4. *Latopilumnus tuberculatus* (Garth and Kim, 1983). A: Female (NSMT-Cr 27449; cb  $4.7 \times$  cl  $3.4$  mm). B–D: Female (NSMT-Cr 27448; cb  $5.3 \times$  cl  $4.2$  mm), with both chelae (C–D) enlarged to show detailed tuberculation.

each other. In the present paper only on the literature comparison, the specimens from the Ryukyu Islands is referred to *P. tuberculosus*.

Ng (2002) deeply discussed the systematic position of the genus *Parapilumnus* Kossmann, 1877, which was restricted only to the type species *P. cristimanus* A. Milne-Edwards, 1873, and his new species *P. oryctus* and transferred to the family Acidopsidae of the superfamily Goneplacoidea, not the Pilumnoidea. As a result, twelve *Parapilumnus* species then known were transferred to some genera. As for *P. truncatospinosus* (De Man, 1914) and *P. tuberculosus* (Garth and Kim, 1983), they are now known as the species of the genus *Latopilumnus* Türkay and Schuhmacher, 1985.

*Distribution.* Originally described on a male from Jolo Island and vicinity (5°52'27"N, 120°52'18"E), Philippines, 45 m deep. New to Japan.

***Pilumnus curvipennis* Komai and Motoh, 2012**

[New Japanese name:

Sagami-kebukagani-modoki]

*Material examined.* West off Amami-Oshima I., 120 m deep, 2–IV–1989, 3 ♀♀ (cb 3.8 × cl 3.1 mm—cb 4.0 × cl 3.4 mm), NSMT-Cr 27451.

Off Naha, Okinawa-jima I., 60–70 m deep, 4–XII–1990, 1 ♂ (cb 4.1 with lateral spines × cl 3.5 mm), NSMT-Cr 27452.

*Remarks.* Komai and Motoh (2012) reassessed the species group of *Pilumnus dofleini* Balss, 1933, and described three new species and redescribed two known species, *P. dofleini* and *P. acanthosoma* Ng, 2000. The general formation and strong armature of the carapace, chelipeds and ambulatory legs are similar in these species, but they were distinguished with the thorough description and the detailed figures and photographs. The small male in this collection was identified as *P. curvipennis*, one of three species described by them. According to the original authors, *P. curvipennis* is the closest to *P. bohol* Komai and Motoh, 2012, from the Philippines, 95–276 m deep, sharing the characters that the

posterior part of the carapace is provided with a row of indistinct tubercles or unarmed, there are no clefts on the upper orbital margin, the palms of the chelipeds are armed with scattered small spines or tubercles on the outer surface, the thoracic sternum is smooth or microscopically granular, the first abdominal somite is devoid of tubercles, and the distal part of the first gonopod bears a row or stout spinules. In *P. curvipennis*, however, the distal part of the first gonopod is strongly curved and hooked, the anterolateral spines of the carapace are relatively stronger, the fourth ambulatory merus is ca. 2.9 times longer than wide in contrast to ca. 2.4 times in *P. bohol*, and the female vulvae are not narrower as in *P. bohol*.

*Distribution.* Originally reported from the Izu Islands, 160–230 m deep.

***Pilumnus hirsutissimus* sp. nov.**

[New Japanese name: Chou-kebukagani]

(Figs. 5–6)

*Material examined.* West off Kohama-jima I., 25 m deep, 14–III–1990, 1 ovig. ♀ (cb 11.4 with lateral teeth × cl 8.4 mm), holotype, NSMT-Cr 27453, 1 ♀ (cb 12.4 × cl 8.6 mm), paratype, NSMT-Cr 27454.

Chinen, Nakagusuku Bay, Okinawa-jima I., 24–II–1986, 1 ♀ (cb 9.6 × cl 7.0 mm), paratype, NSMT-Cr 27455, N. Shikatani leg.

*Diagnosis.* Typical, but rather small *Pilumnus* species, densely covered with flexible long hairs and soft short hairs. True surfaces of carapace, chelipeds and ambulatory legs completely disguised under hairs; on denudation, carapace surface divided into sparsely granulated regions; epigastric region distinctly subdivided into two by a median longitudinal furrow, with each anterior margin thickly ridged. Frontal margin separated into two weakly convex lobes by a median deep, narrow slit. Carapace anterolateral margin armed with three subequal stout teeth behind external orbital tooth of similar size and shape. Ambulatory legs stout, moderate in length, unarmed.

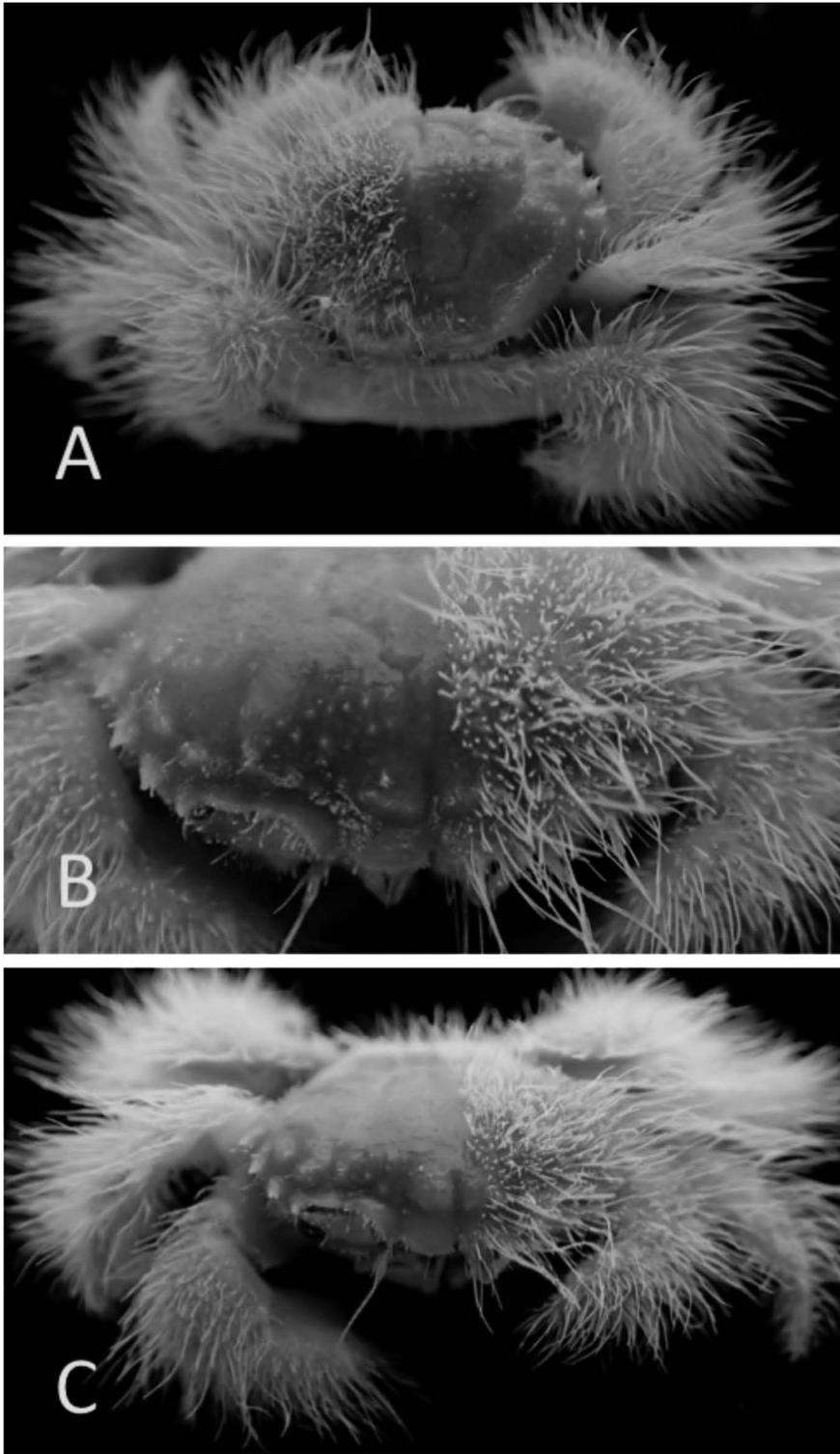


Fig. 5. *Pilumnus hirsutissimus* sp. nov., ovig. ♀ (Holotype, NSMT-Cr 27453; cb 11.4 × cl 8.4 mm) in different views (A–C).

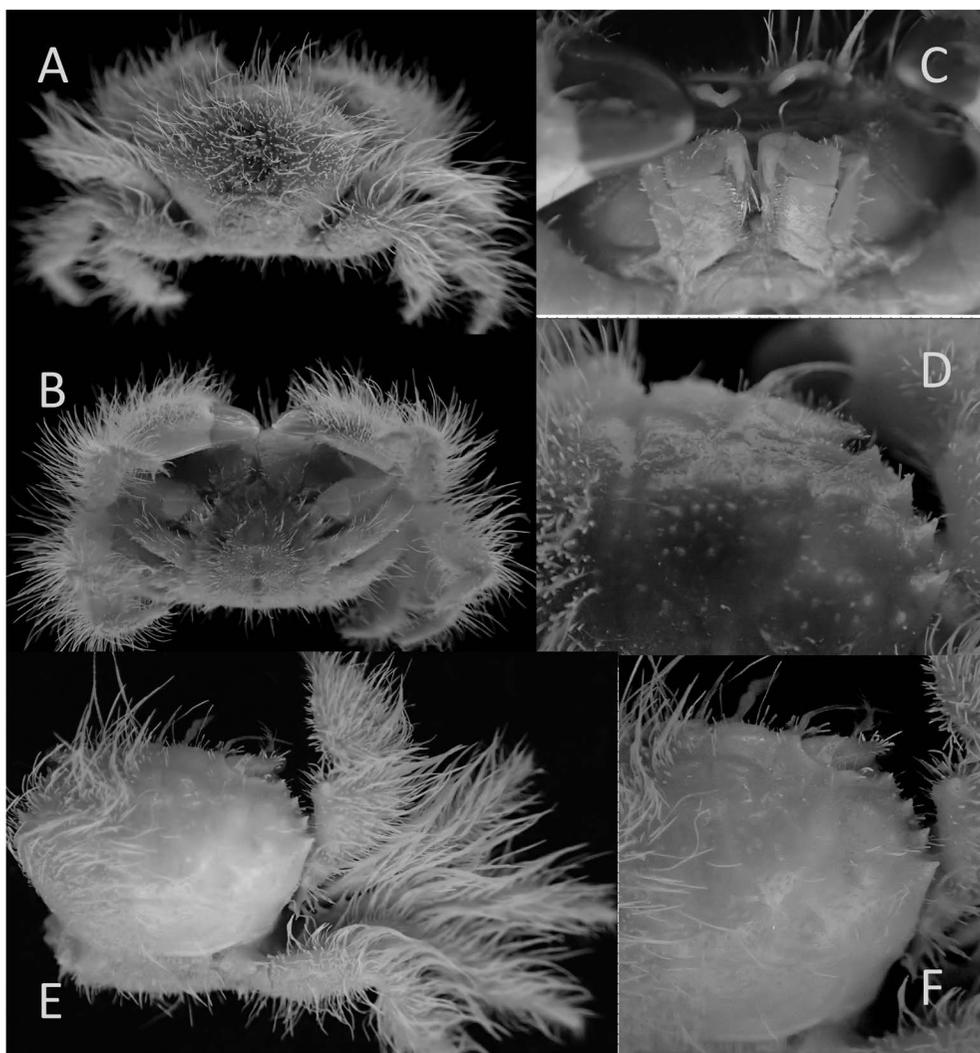


Fig. 6. *Pilumnus hirsutissimus* sp. nov. A–B: Female (Paratype, NSMT-Cr 27454; cb 12.4 × cl 8.6 mm). C–D: ovig. ♀ (Holotype, NSMT-Cr 27453; cb 11.4 × cl 8.4 mm). E–F: Female from Nakagusuku Bay (Paratype, NSMT-Cr 27455; cb 9.6 × cl 7.0 mm).

*Description of holotype.* Carapace, chelipeds and ambulatory legs heavily covered with long, flexible, stout hairs, mixed with short soft hairs (Fig. 5); on denudation, carapace surface weakly convex in both directions, distinctly divided into regions by shallow, but distinct interregional furrows; furrows deeper behind supraorbital margin, inside of anterolateral teeth, and along outer parts of protogastric and mesogastric regions; protogastric region prominent, provided with scant granules of variable sizes, with inner one third of

anterior margin forming an obtuse callus; mesogastric region prominent, anterior extension between protogastric regions of both sides attains to level of anterior one third of protogastric region; mesogastric region with a faint longitudinal furrow dividing mesogastric region into two side by side; cardiac region hardly traceable, with a transverse furrow behind mesogastric region, but without lateral longitudinal furrow, confluent with posterior branchial region. Anterior branchial regions isolated as two islands

tipped each with a small tubercle from protogastric region and carapace anterolateral teeth; posterior branchial margin provided with scant, minute granules for its anterior half, two large tubercles of similar size with tubercles on anterior branchial regions.

Frontal margin declivous, subtruncated for its inner two thirds, divided into two lobes by a median V-shaped notch, deeply concave laterally inside of lobule at lateral end. Supraorbital margin weakly oblique, with a small but distinct notch at median part and a shallow but wide depression inside of external orbital tooth.

External orbital tooth sharp, triangle in dorsal view, but not spine-tipped. Three anterolateral teeth (Figs. 5, 6D) subequal, directed obliquely forward, rather tuberculate, tipped each with sharp horny tubercle on a stout base. Subhepatic region with a small tubercle. Infraorbital margin with deeply interrupted closer to external orbital tooth, complete for its most part, fringed with setae, angulated at inner angle.

Third maxilliped (Fig. 6C) supplied with scant longish setae on ischium and merus surfaces, exopod outer margin with several long equidistant setae.

Both chelipeds slightly different in size, but hairiness and granulation almost similar to each other; granulation and tuberculation entirely disguised with short and long hairs.

Ambulatory legs comparatively stout, heavily covered with long and short flexible hairs like carapace and chelipeds; both margins of meri, carpi and propodi of all pairs unarmed.

*Notes on paratypes.* In a female (NSMT-Cr 27455: Fig. 6E–F) from Nakagusuku Bay, the left cheliped and first two pairs of the ambulatory legs are missing, and two posterior pairs of the left ambulatory legs are detached. The heavy hairiness covering the whole surfaces of the carapace, chelipeds and ambulatory legs is quite same with that of the holotype. The dorsal sculpture of the carapace is slightly shallower and the subhepatic tubercle is smaller than in the holotype, but the carapace anterolateral tubercles are quite similar to those of the holotype.

As for the paratype female (NSMT-Cr 27454: Fig. 6A–B) obtained together with the holotype ovigerous female, there is no remarkable difference from the holotype in the external morphology of the hairiness of the carapace, chelipeds and ambulatory legs and the dorsal sculpture and anterolateral armature of the carapace.

*Remarks.* The new species is characteristic in having the heavy coat of short and long, flexible hairs and distinguished from most of the *Pilumnus* species which are covered with stiff setae, long shaggy hairs, short pubescence, fine silky hairs etc. As far as the descriptions in the literature concerned, the hairiness of the new species may be close to that of *P. kempfi* Deb, 1987, from India. The description is not thorough, with a photograph which represents only the hairy image, describing as “The entire upper and outer surfaces of carapace and the appendages covered thickly and uniformly with long, golden yellow, stiff, bristle like hairs and short, soft, thick hairs of similar colour”. The carapace true surface is said to be areolated, and sharp granules are present only on the branchial and epibranchial regions only.

In the new species the carapace dorsal areolation is also distinct, and the gastric regions are roughened with roughly flattened granules not mentioned in the description of *P. kempfi*. In the new species the epigastric region of both sides are deeply separated by a longitudinal furrow, with each anterior margin thickened. In *P. kempfi*, the carapace anterolateral margin is armed with three spiniform acuminate teeth, while in the new species three teeth are stout and tuberculate at bases, and tipped each with a small tubercle. As for the ambulatory legs, *P. kempfi* was described as “Legs joints thickly hairy and granular on their upper outer surfaces,” but in the new species the ambulatory legs are hairy, but not granular on the margins and surfaces.

*Pilumnus ryukyuensis* sp. nov.

[New Japanese name: Ryukyu-hime-kebukagani]  
(Fig. 7)

*Material examined.* South off Amami-Oshima I., 200 m deep, 28-V-1989, 1 ♂ (cb 4.7 with lateral teeth  $\times$  cl 3.8 mm), holotype, NSMT-Cr 27456.

*Diagnosis.* Small species, with roughly hexagonal carapace; dorsal surface weakly separated into regions, smooth, covered with scant long silky hairs and some tufts of feathered hairs on gastric and branchial regions. Front developed forward, divided into two by a median deep notch to form an angulated margin of each lobe. Median part of supraorbital margin developed forward as an angulated lobe. External orbital angle developed as a strong tooth directed obliquely forward. Anterolateral carapace margin cut into three strong teeth: second tooth largest, widest between second teeth of both sides; third tooth much smaller than first and second teeth. Chelipeds comparatively heavy; outer surfaces of both palms smooth for their most parts. Ambulatory legs long, hairy, armed with a strong tubercle at terminal part of anterior margin of each carpus.

*Description of holotype.* Carapace (Fig. 7A–B) narrow, with 1.24 in ratio of breadth to length of carapace, roughly hexagonal, with smooth dorsal surface weakly convex dorsally except for marginal parts; gastric, cardiac and branchial regions traceable, separated by shallow indistinct furrows, covered with scant long silky hairs mainly along frontal and anterolateral carapace margins and some tufts of feathered hairs on gastric and branchial regions.

Front (Fig. 7C) developed forward, nearly one third as wide as carapace breadth, exceeding beyond inner supraorbital angle; frontal margin deeply separated into two by a median deep, wide V-shaped notch; inner angle thus formed by a notch developed forward, angulated; outer end obtusely angulated, separated from frontal main margin, obliquely in front of inner supraorbital margin. Orbit comparatively large, as wide as

length of frontal margin, half as wide as frontal margin.; supraorbital margin between two depressions of supraorbital margin developed triangularly.

External orbital angle developed as a sharp tooth of considerable size, with a small horny tip, directed obliquely forward. Following external orbital tooth, anterolateral margin of carapace armed with three prominent teeth, each with a small horny tip, but not spiniform; second tooth biggest, first tooth slightly smaller than second tooth, but larger than external orbital tooth; third tooth much smaller than precedents.

Chelipeds (Fig. 7D) heavy, with same shape, armature and hairiness in both chelipeds; outer surfaces of carpi and palms with strong, stout, subequal, well-spaced tubercles except for some along upper margins, interspaced with long silky hairs; outer surfaces of palms in both chelae, smooth, shining without tubercles, granules and hairs. Fingers sharply toothed, with some conical teeth of different sizes. Ambulatory legs long, covered rather sparsely with silky hairs along both margins, densely with short tomentum on both margins and surfaces; each carpus of first three pairs armed with a stout, more or less tuberculate tooth at terminal part of upper margin.

G1 (Fig. 7E) of typical *Pilumnus*-type, tip comparatively long, almost with a right angle against stem.

*Remarks.* This new species is somewhat of appearance of *Pilumnus dofleini* Balss, 1933, and its related species, *P. acanthosoma* Ng, 2000, and *P. armatus*, *P. curvipenis* and *P. bohol* described by Komai and Motoh (2012) in having the narrow carapace with scant silky hairs. In these species the carapace dorsal surface and margins and the ambulatory legs are armed with spines and spinules. In this new species, however, the carapace dorsal surface and frontal margin are unarmed, the frontal margin is strongly developed at both sides of the median V-shaped notch, the anterolateral marginal teeth are not provided with accessory spinules, and the first three pairs of the ambulatory legs are armed only with a ter-

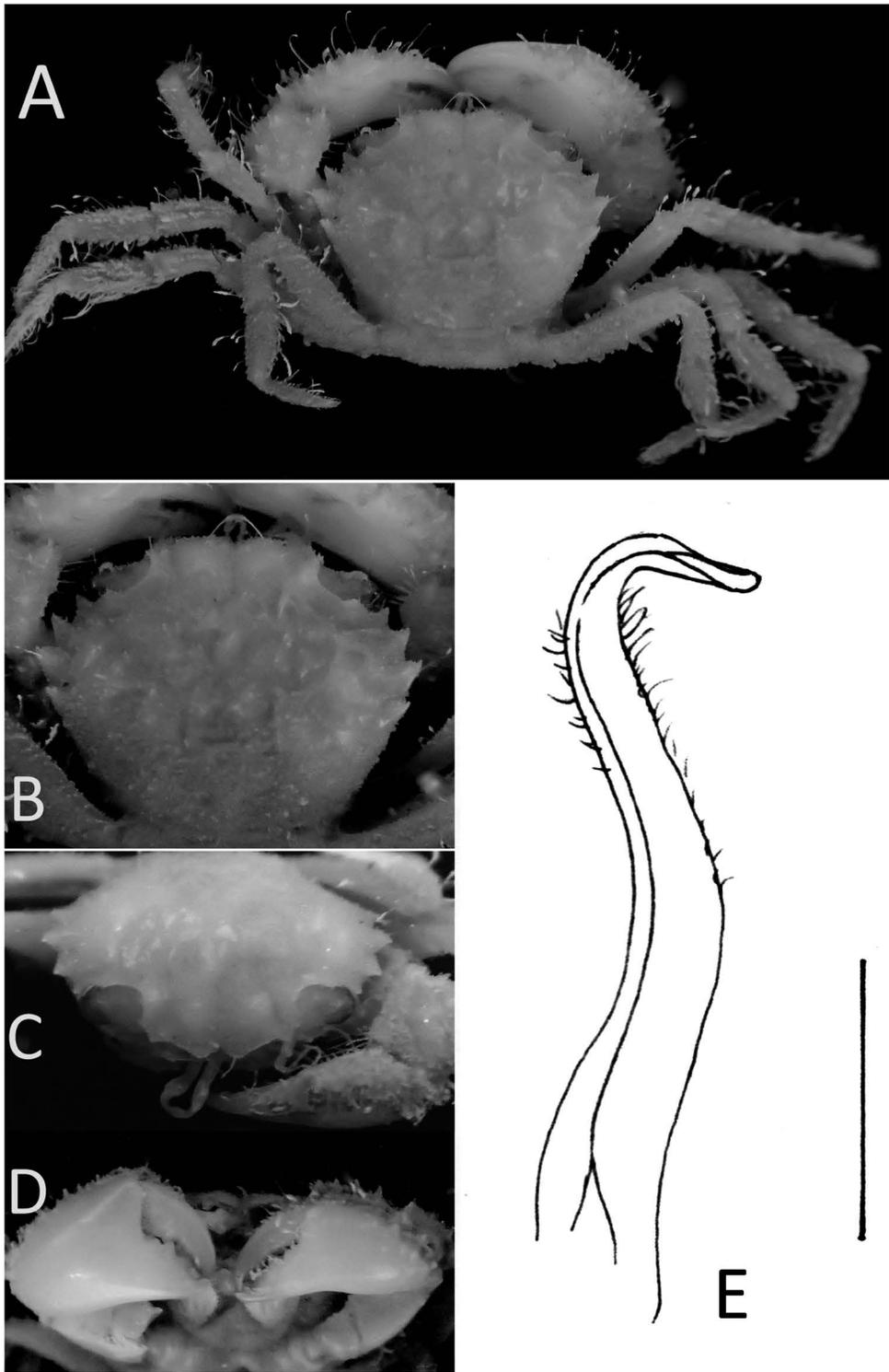


Fig. 7. *Pilumnus ryukyuensis* sp. nov., male (cb 4.7 × cl 3.8 mm), holotype, NSMT-Cr 27456. A–D: Carapace and chelipeds in different views. E: G1 in abdominal view. Scale = 0.5 mm.

minal tubercle of each carpus.

The new species is closer to *P. chani* Ng and Ho, 2003, which was described on a female of small size (cb  $4.7 \times$  cl  $3.4$  mm) from Taiwan. In the new species, however, the size of the holotype male is cb  $4.7 \times$  cl  $3.8$  mm, and thus the carapace is apparently narrower than *P. chani*. Otherwise, the external orbital tooth and three anterolateral teeth of the carapace are sharply pointed at the tips, the frontal margin is produced forward and angulated at each side of the median V-shaped notch, and the orbit is oblique, with the angular supraorbital margin in the middle. In *P. chani* each merus of the first three pairs is described and figured as having two to four short spines on the dorsal margin, and each carpus is armed with a distal spine on the dorsal margin, whereas in the new species each merus is unarmed on the upper margin, and the carpus is armed with a stout tubercle instead of a spine at distal part of the dorsal margin.

#### Family PLANOPILUMNIDAE

##### *Vellumnus pygmaeus* (Takeda, 1977)

[Japanese name: Hime-meiro-kebukagani]

*Material examined.* South off Ishigaki-jima I., 90–100 m deep, 10–III–1990, 1 ♂ (cb  $4.4 \times$  cl  $3.7$  mm), NSMT-Cr 27457.

*Remarks.* This small species originally described as a *Planopilumnus* species (Takeda, 1977b) is one of five *Vellumnus* species having the carapace covered with characteristic labyrinth-like pattern of soft hairs. Since the original description, Takeda and Komatsu (2018) recently recorded this species from the Ogasawara Islands with color in life.

*Distribution.* Previously known only from the Ogasawara Islands, 41–105.6 m deep.

#### Acknowledgements

This paper is a contribution from two projects “Spatiotemporal Analyses on Origins and Properties of the Biodiversity Hotspots in Japan” (2018–) and “Geological, Biological, and Anthro-

pological Histories in Relation to the Kuroshio Current” (2016–), conducted by the National Museum of Nature and Science, Tokyo. The collections studied at present are those donated by the late Mr. Seiji Nagai who was active during his lifetime in collecting the offshore invertebrates with hand-made dredging gear and kind enough to enrich the National Museum of Nature and Science, Tokyo. In this paper, also, the specimens of *Actumnus marissinicus* from Nakagusuku Bay in the Shikatani collection were incorporated with the Nagai collection. We would like to tender our cordial thanks to Dr. Norikazu Shikatani of the *Nature Guide* in Okinawa.

#### References

- Alcock, A. 1895. Materials for a carcinological fauna of India. No. 1. The Brachyura Oxyrhyncha. Journal of the Asiatic Society of Bengal, (II), 64: 157–291, pls. 3–5.
- Alcock, A. 1898. Materials for a carcinological fauna of India. No. 3. The Brachyura Cyclometopa. Part I. The family Xanthidae. Journal of the Asiatic Society of Bengal, (II), 67: 67–233.
- Alcock, A. 1899. Materials for a carcinological fauna of India. No. 4. The Brachyura Cyclometopa. Part II. A revision of the Cyclometopa with an account of the families Portunidae, Cancridae and Corystidae. Journal of the Asiatic Society of Bengal, (II), 68: 1–104.
- Apel, M. and V. A. Spiridonov 1998. Taxonomy and zoogeography of the portunid crabs (Crustacea: Decapoda: Brachyura: Portunidae) of the Arabian Gulf and adjacent waters. Fauna of Arabia, 17: 153–331.
- Balss, H. 1924. Expedition S.M. Schiff “Pola” in das Rote Meer. Nördliche und Südliche Hälfte 1895/96—1897/98. Zoologische Ergebnisse XXXIV. Decapoden des Roten Meeres III. Die Parthenopiden, Cyclo- und Catometopen. Denkschriften der Akademie der Wissenschaften in Wien, Mathematisch-Naturwissenschaftliche Klasse, 99(6): 1–18.
- Balss, H. 1933. Beiträge zur Kenntnis der Gattung *Pilumnus* (Crustacea Dekapoda) und verwandter Gattungen. Capita Zoologica, 4: 27–47, pls. 1–7.
- Boone, L. 1934. Scientific results of the world cruise of the yacht “Alva”, 1931, William K. Vanderbilt, commanding. Crustacea: Stomatopoda and Brachyura. Bulletin of the Vanderbilt Marine Museum, 5: 1–210, pls. 1–109.
- Bouvier, E. L. 1915. Décapodes marcheurs (Reptantia) et stomatopodes recueillis à l’île Maurice par M. Paul

- Carié. Bulletin Scientifique de la France et de la Belgique, 48 : 178–318, pls. 4–7.
- Chen, H. and J. Lan 1978. Preliminary studies on the Xanthidae (Brachyura, Crustacea) of the Xisha Islands, Guangdong Province, China. In: Report on the Scientific Results of Marine Biology of the Xisha Islands and Zhongsha Islands (South China Sea). South China Sea Institute of Oceanology, Academia Sinica, pp. 261–286, pls. 1–8.
- Chia, D. G. B. and P. K. L. Ng 2000. A revision of *Eumedonius* H. Milne Edwards, 1834 and *Gonatonotus* White, 1847 (Crustacea: Decapoda: Brachyura: Eumedonidae), two genera of crabs symbiotic with sea urchins. Journal of Natural History, 34: 15–56.
- Crosnier, A. 1962. Crustacés Décapodes Portunidae. Faune de Madagascar, 16: 1–154, pls. 1–13.
- Dai, A. and S. Yang 1991. Crabs of the China Seas. China Ocean Press, Beijing and Springer-Verlag, Berlin, 682 pp.
- Dana, J. D. 1852. Crustacea. United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U.S.N., 13: i–viii, 1–685. Atlas (1855), pp. 1–27, pls. 1–96.
- Davie, P. J. F. 1997. Crustacea Decapoda: Deep water Xanthoidea from the south-western Pacific and the western Indian Ocean. In: A. Crosnier (ed.), Résultats des campagnes MUSORSTOM. Volume 18. Mémoires du Muséum National d'Histoire Naturelle, Paris, 176: 337–387.
- Deb, M. 1987. Description of seven new species and one new record of Pilumnidae; Xanthidae: Decapoda: Crustacea from India. Bulletin of the Zoological Survey of India, 8: 299–312.
- Edmondson, C. H. 1962. Xanthidae of Hawaii. Occasional Papers of Bernice P. Bishop Museum, 22: 215–309.
- Endo, Y. and T. Naruse 2016. Morphological characteristics and host species of *Gonatonotus nasutus* Chia & Ng, 2000 (Crustacea: Decapoda: Brachyura: Pilumnidae: Eumedoninae) from Japan. Fauna Ryukyuna, 33: 21–31.
- Fabricius, J. C. 1798. Supplementum Entomologiae Systematicae. Proft et Storch, Hafniae, 573 pp.
- Forest, J. and D. Guinot 1961. Crustacés Décapodes Brachyours de Tahiti et des Tuamotu. Expédition française sur les récifs coralliens de la Nouvelle-Calédonie. Volume préliminaire. Éditions de la Fondation Singer-Polignac, Paris, 9–11: i–xi, 1–195, pls. 1–18.
- Garth, J. S. and H. S. Kim 1983. Crabs of the family Xanthidae (Crustacea: Brachyura) from the Philippine Islands and adjacent waters based largely on collections of the U.S. Fish Commission steamer *Albatross* in 1908–1909. Journal of Natural History, 17: 663–729.
- Gordon, I. 1938. On three species of Portunidae (Decapoda, Brachyura) from the Malay Peninsula. Bulletin of the Raffles Museum, 14: 175–185.
- Guinot, D. 1976. Constitution de quelques groupes naturels chez les Crustacés Décapodes Brachyours. I. La superfamille des Belloioidea et trois sous-familles de Xanthidae (Polydectinae Dana, Trichiinae de Haan, Actaeinae Alcock). Mémoires du Muséum National d'Histoire Naturelle, Paris, (A), 97: 1–308, pls. 1–19.
- Haswell, W. A. 1880. On the Australian Brachyura Oxyrhyncha. Proceedings of the Linnean Society of New South Wales, 4: 431–458, pls. 25–27.
- Heller, C. 1861. Beiträge zur Crustaceen-Fauna des rothen Meeres. Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe, 43: 297–374, pls. 1–4.
- Henderson, J. R. 1893. A contribution to Indian Carcinology. Transaction of the Linnean Society of London, (2), 5: 325–458, pls. 35–40.
- Kensley, B. 1970. A small collection of decapod Crustacea from Moçambique. Annals of the South African Museum, 57: 103–122.
- Kim, H. S. 1973. Anomura · Brachyura. Illustrated Encyclopedia of Fauna & Flora of Korea, 14: 1–694.
- Kim, H. S. and K. B. Park 1972. New records of ten brachyuran species (Crustacea: Decapoda) from Korea. Korean Journal of Zoology, 15: 57–69.
- Klunzinger, C. B. 1913. Die Rundkeabben (Cyclometopa) des Roten Meeres. Nova Acta. Abhandlungen der Kaiserl. Leop.-Carol. Deutschen Akademie der Naturforscher, 99: 97–402, pls. 5–11.
- Komai, T. 2014. New record of a xanthid crab *Alainodaeus nuku* Davie, 1997 (Crustacea: Decapoda: Brachyura) from Japanese waters. Natural History Research, 13: 19–24.
- Komai, T. and H. Motoh 2012. The identity of *Pilumnus dofleini* Balss, 1933 (Crustacea: Decapoda: Brachyura: Pilumnidae), with descriptions of three new species from the western Pacific. Zootaxa, 3305: 1–27.
- Kossmann, R. 1877. Chapter Erste Halfe, III. Malacostroaca (1. Theil: Brachyura). In: Kossmann, R. (ed.), Zoologische Ergebnisse einer in Auftrage der Königlichen Academie der Wissenschaften zu Berlin ausgeführten Reise in die Küstengebiete des Rothen Meers. Leipzig: W. Engelmann, pp. 1–66, pls. 1–3.
- Kurata, Y. 1967. On the occurrence of *Lybia caestifera* (Alcock) (Decapoda, Brachyura) in Japanese waters. Researches on Crustacea, 3: 84–85. (In Japanese)
- MacGilchrist, A. C. 1905. Natural history notes from R.I.M.S.S. Investigator. Ser. III, no. 6. An account of the new and some of the rarer decapod Crustacea obtained during the surveying seasons 1901–1904 The Annals and Magazine of Natural History, (7), 15: 1233–1268.
- Man, J. G. De 1902. Die von Herrn Professor Kükenthal im Indischen Archipel gesammelten Dekapoden und Stomatopoden. In: W. Kükenthal (ed.), Ergebnisse

- einer zoologischen Fiorschungsreise in den Molukken und Borneo. Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft, 25: 467–929.
- Man, J. G. De 1914. Description de deux espèces nouvelles du genre *Pilumnus* Leach et d'une jeune femelle du *Pil. longicornis* Hilgd., découvertes dans des coquilles vides de balanes. Bulletin de la Société Zoologique de France, 39: 330–343.
- Marumura, M. 1985. Rare crabs around the coast of Minabe, Kii (II). Nankiseibutu, 27: 86–88. (In Japanese)
- Marumura, M. and A. Kosaka 2003. Catalogue of the brachyuran and anomuran cabs donated by the late Mr. Seiji Nagai to the Wakayama Prefectural Museum of Natural History. Wakayama Prefectural Museum of Natural History, pp. 17–73, pls. 1–8. (In Japanese)
- Mendoza, J. C. E., R. M. Lasley Jr. and P. K. L. Ng 2014. New rock crab records (Crustacea: Brachyura: Xanthidae) from Christmas and Cocos (Keeling) Islands, eastern Indian Ocean. The Raffles Bulletin of Zoology, Supplement 30: 274–300.
- Mendoza, J. C. E. and P. K. L. Ng 2010. The euxanthine crabs (Crustacea: Brachyura: Xanthidae) of the Philippines. The Raffles Bulletin of Zoology, 58: 57–74.
- Mendoza, J. C. E. and P. K. L. Ng 2011. The Polydectinae Dana, 1851, of the Philippines, with description of a new genus for *Lybia hatagumaana* Sakai, 1961 (Crustacea: Decapoda: Brachyura: Xanthidae). Zootaxa, 3052: 51–61.
- Miers, E. J. 1886. Report on the Brachyura collected by H.M.S. Challenger during the years 1873–786. In: Report on the scientific results of the voyage of H.M.S. Challenger during the years 1873–1876 under the command of Captain George S. Nares, N.R., F.R.S. and the late Captain Frank Tourle Thomson, R.N. prepared under the superintendence of the late Sir C. Wyville Thomson, Knt., F.R.S. &c. Regius Professor of Natural History in the University of Edinburgh of the Civilian Scientific Staff on board of the Expedition. Zoology, published by Order of Her Majesty' Government. London, Edinburgh and Dublin, HMSO, 17: i–L, 1–362, pls. 1–29.
- Milne-Edwards, A. 1865. Études Zoologiques sur les Crustacés récents de la famille des Cancériens. Première Partie. Cancérides, Pirmérides, Carpilides. Nouvelles Archives du Muséum d'Histoire Naturelle, Paris, 1: 177–308, pls. 11–19.
- Milne-Edwards, A. 1873. Recherches sur la faune carcinologique de la Nouvelle-Calédonie. Part 2. Nouvelles Archives du Muséum d'Histoire Naturelle, Paris, 9: 155–332, pls. 4–18.
- Milne Edwards, H. 1834. Histoire Naturelle des Crustacés, comprenant l'Anatomie, la Physiologie et la Classification de ces Animaux. Tome Premier. Librairie Encyclopédique de Roret, Paris, xxx + 468 pp.
- Ng, P. K. L. 2000. The Indo-Pacific Pilmunidae XIII. On a new species, *Pilumnus acanthosoma* (Crustacea: Decapoda: Brachyura) from Taiwan and the South China Sea, with note on *P. doffeini* Balss, 1933. Zoological Studies, 39: 301–306.
- Ng, P. K. L. 2002. The Indo-Pacific Pilmunidae XVI. On the identity of *Pilumnus cristimanus* A. Milne Edwards, 1873, and the status of *Parapilumnus* Kossmann, 1877 (Crustacea: Decapoda: Brachyura), with description of a new species from rubble beds in Guam. Micronesica, 34: 209–226.
- Ng, P. K. L. and D. G. B. Chia 1994. The genus *Glyptocarcinus* Takeda, 1973, with descriptions of a new subfamily, two new genera and two new species from New Caledonia (Crustacea: Decapoda: Brachyura: Xanthidae). The Raffles Bulletin of Zoology, 42: 701–731.
- Ng, P. K. L., D. Guinot and P. J. F. Davie 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. Raffles Bulletin of Zoology, Supplement 17: 1–286.
- Ng, P. K. L. and P.-H. Ho 2003. The Indo-Pacific Pilmunidae XVIII. New species and new records from Taiwan (Decapoda, Brachyura). Crustaceana, 76: 167–176.
- Odhner, T. 1925. Monographierte Gattungen der Krabbenfamilie Xanthidae. I. Göteborgs Kungl. Vetenskaps- och Vitterhets-Samhälles Handlingar, (4), 29: 1–92, pls. 1–5.
- Rathbun, M. J. 1906. The Brachyura and Macrura of the Hawaiian Islands. Bulletin of the United States Fish Commission, 23: 827–930, pls. 1–25.
- Rathbun, M. J. 1909. New crabs from the Gulf of Siam. Proceedings of the Biological Society of Washington, 22: 107–114.
- Rathbun, M. J. 1911. Marine Brachyura. The Percy Sladen Trust Expedition to the Indian Ocean in 1905 under the leadership of Mr. J. Stanley Gardiner, 3 (11). Transactions of the Linnean Society of London, (2), 14: 191–261, pls. 15–20.
- Rathbun, M. J. 1918. Report on the spider crabs obtained by the F.I.S. "Endeavour" on the coasts of Queensland, New South Wales, Victoria, South Australia and Tasmania. Biological Results of the Fishing Expeditions carried on the F.I.S. "Endeavour," 1909–14, 5 (1): 1–29, pls. 1–15.
- Rüppell, E. 1830. Beschreibung und Abbildung von 24 Arten kurzschwänzigen Krabben, als Beitrag zur Naturgeschichte des rothen Meeres. Gedruckt und in Commission bei Heinrich Ludwig Brönnner, Frankfurt a.M., 28 pp., 6 pls.
- Sakai, T. 1939. Studies on the Crabs of Japan. IV. Brachygnatha, Brachyryncha. Yokendo Co., Tokyo, pp. 365–741, pls. 42–111.
- Sakai, T. 1965a. Notes from the carcinological fauna of Japan (II). Researches on Crustacea, 2: 37–46, frontispiece 2–3, pls. 5–6. (In Japanese and English)
- Sakai, T. 1965b. The Crabs of Sagami Bay collected by

- His Majesty The Emperor of Japan. Maruzen Co., Ltd., Tokyo, xvi + 206 + 92 + 32 pp., 1 map, 100 pls.
- Sakai, T. 1967. Notes from the carcinological fauna of Japan (III). Researches on Crustacea, 3: 68–83, 1 frontispiece. (In Japanese and English)
- Sakai, T. 1976. Crabs of Japan and the Adjacent Seas. Kodansha Ltd., Tokyo, xxix + 773 pp. (In English) / 16 pp. + 251 ps. (Plates) / 461 pp. (In Japanese)
- Sakai, T. 1983. Description of new genera and species of Japanese crabs, together with systematically and biogeographically interesting species (I). Researches on Crustacea, 12: 1–44, pls. 1–8. (In English and Japanese)
- Sankarankutty, C. 1961. On Decapoda Brachyura from the Andaman and Nicobar Islands. I: Families Portunidae, Ocypodidae, Grapsidae, and Mictyridae. Journal of the Marine Biological Association of India, 3: 101–119.
- Sankarankutty, C. 1962. On Decapoda Brachyura from the Andaman and Nicobar Islands: 2. Family Xanthidae. Journal of the Marine Biological Association of India, 4: 121–150.
- Serène, R. 1984. Crustacés Décapodes Brachyures de l'Océan Indien Occidental et de la Mer Rouge. Xanthoidea: Xanthidae et Trapeziidae. Addendum: Carpiliidae et Menippiidae by A. Crosnier. Faune Tropicale, 24: 1–349, pls. 1–48.
- Shen, C.-J. 1937. Notes on a collection of swimming crabs (Portunidae) from Singapore. Bulletin of the Raffles Museum, 13: 96–139.
- Spiridonov, V. A. 1999. Results of the Rumphius Biohistorical Expedition to Ambon (1990). Part 8. Swimming crabs of Ambon (Crustacea: Decapoda: Portunidae). Zoologische Mededelingen, Leiden, 73: 63–97.
- Stephenson, W. 1967. The portunid crabs (Crustacea: Portunidae) collected by the Naga Expedition. Naga Report, 4: 4–37.
- Stephenson, W. 1975. Biological results of the Snellius Expedition, XXVI. The Portunidae (Decapoda—Brachyura) of the Snellius Expedition (Part II). Zoologische Mededelingen, Leiden, 49: 174–206, pls. 1–3.
- Stephenson, W. and B. Campbell 1959. The Australian portunids (Crustacea: Portunidae). III. The genus *Portunus*. Australian Journal of Marine and Freshwater Research, 10: 84–124, pls. 1–5.
- Stephenson, W. and M. Rees 1967. Portunid crabs from the International Indian Ocean Expedition in the Smithsonian collections (Crustacea: Portunidae). Proceedings of the United States National Museum, 122: 1–34.
- Stimpson, W. 1858. Prodromus descriptionis animalium evertibratorum quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata missa, Cadwaladaro Ringgold et Johanne Rodgers Ducimus, observavit et descripsit. Pars. IV. Crustacea Cancroidea et Corystoidea. Proceedings of the Academy of Natural Sciences of Philadelphia, 10: 31–40.
- Takeda, M. 1973. A new genus and a new species of the Parthenopidae from the sea off the Ogasawara Islands (Crustacea, Brachyura). Bulletin of the National Science Museum, Tokyo, 16: 32–36.
- Takeda, M. 1977a. Crabs from shallow waters off Magejima Island, southwest Japan. Bulletin of the National Science Museum, Tokyo, Series A (Zoology), 3: 73–89.
- Takeda, M. 1977b. Crabs of the Ogasawara Islands, V. A collection made by dredging. Memoirs of the National Science Museum, Tokyo, 10: 113–140, pls. 12–17.
- Takeda, M. 1989. Shallow-water crabs from the Oshima Passage between Amami-Oshima and Kakeroma-jima Islands, the northern Ryukyu Islands. Memoires of the National Science Museum, Tokyo, 22: 135–184, pl. 4.
- Takeda, M. 2008. A small collection of crabs from shallow water off Amami-Oshima Island, northern Ryukyu Islands, collected by the RV *Tansei Maru* (KT-04-24 Cruise). Journal of Teikyo Heisei University, 19: 1–13.
- Takeda, M. and H. S. Kim 1977. A new *Actumnus* (Crustacea: Decapoda; Brachyura) from Jeju Island, Korea. Korean Journal of Zoology, 20: 135–139.
- Takeda, M. and H. Komatsu 2017. Two new species of the genus *Actumnus* Dana, 1851 (Decapoda, Brachyura, Pilumnidae) from the Ryukyu Islands, southwest Japan. Crustaceana, 90: 1251–1265.
- Takeda, M. and H. Komatsu 2018. Offshore crabs of the family Xanthidae and some related families (Crustacea, Decapoda, Brachyura) from the Ogasawara Islands, Japan. Memoirs of the National Museum of Nature and Science, Tokyo, 52: 153–189.
- Takeda, M. and H. Komatsu 2020. Some records of offshore crabs (Crustacea, Decapoda, Brachyura) from the Ryukyu Islands. I. Families Cyclodorippidae, Homolidae, Raninidae, Leucosiidae, Inachidae and Parthenopidae. Bulletin of the National Museum of Nature and Science, Tokyo, Series A (Zoology), 46: 49–65.
- Takeda, M., H. Komatsu, N. Shikatani, T. Maenosono and T. Naruse 2019. Annotated list of subtidal crabs in the Shikatani Collection made at Nakagusuku Bay, Okinawa Island, the Ryukyu Islands, Japan. Fauna Ryukyuna, 50: 1–69, pls. 1–20. (In Japanese with English summary)
- Takeda, M. and M. Marumura 1997. Rare crabs from the west coast of the Kii Peninsula, central Japan (IV). Nankiseibutu, 39: 15–20. (In Japanese with English summary)
- Takeda, M. and M. Marumura 2002. The genus *Pseudactea* Serène, 1862 (Crustacea, Decapoda), with description of a new species from central Japan. Bulletin of the National Science Museum, Tokyo, Series A (Zoology), 28: 101–107.
- Takeda, M. and S. Miyake 1969. Pilumnid crabs of the family Xanthidae from the West Pacific. II. Twenty-one species of four genera, with descriptions of four new

- species. Ohmu, 2: 93–156.
- Türkay, M. and H. Schuhmacher 1985. *Latopilumnus tugicolus* n. gen. n. sp., eine neue korallenassozierte Krabbe, die die Bildung einer Wohnhöhle induziert (Crustacea: Decapoda: Pilumnidae). *Senckenbergiana Maritima*, 17: 55–62, pl. 1.
- Vannini, M. and G. Innocenti 2000. Research on the coast of Somalia. Portunidae (Crustacea Brachyura). *Tropical Zoology*, 13: 251–298.
- Wee, D. P. C. and P. K. L. Ng 1995. Swimming crabs of the genera *Charybdis* De Haan, 1833, and *Thalamita* Latreille, 1829 (Crustacea: Decapoda: Brachyura: Portunidae) from Peninsular Malaysia and Singapore. *The Raffles Bulletin of Zoology*, Supplement 1: 1–128.
- White, A. 1847. Descriptions of new Crustacea from the eastern seas. *The Annals and Magazine of Natural History, including Zoology, Botany, and Geology*. 20: 61–63.
- Zehntner, L. 1894. Crustacés de l'Archipel Malais. Voyage de MM. M. Bedot et C. Pictet dans l'Archipel Malais. *Revue Suisse de Zoologie et Annales du Musée d'Histoire Naturelle de Genève*, 2: 135–214, pls. 7–9.