

Ten Species of Crabs of the Families Acidopsidae, Aphanodactylidae and Pilumnidae (Crustacea: Decapoda: Brachyura) from the Ogasawara Islands, Japan

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Abstract Ten species of three families, i.e. two species of the family Acidopsidae [New Japanese name (NJn): Tsubu-kebukagani-ka], one species of the family Aphanodactylidae [Japanese name (Jn): Koyubi-pinno-ka], and seven species of the family Pilumnidae [Jn: Kebukagani-ka], are recorded as new to the Ogasawara Islands. Of them, *Crinitocinus alcocki* (Borradaile, 1902) [NJn: Tsubu-kebukagani] and *Raoulia fortis* Ng and Rahayu, 2014 [NJn: Raouru-gani] (Acidopsidae), and *Pilumnus tahitensis* De Man, 1890 [NJn: Tahichi-kebukagani] (Pilumnidae) are new to Japanese waters. The genus *Neoactumnus* Sakai, 1964, was considered to be synonymous with the genus *Actumnus* Dana, 1851, and its type species, *N. convexus* Sakai, 1964, known from Japan was synonymized with *A. simplex* Rathbun, 1911, together with *N. unispina* Garth and Kim, 1983, from the Philippines.

Key words: *Crinitocinus alcocki*, *Raoulia fortis*, *Pilumnus tahitensis*, pilumnid crabs, Bonin Islands, Japanese waters, West Pacific.

Introduction

Takeda and Komatsu (2023, 2024a, b) contributed to the crab fauna of the Ogasawara Islands, with the updated list of the known species, and also with the records of some rare and additional species of the families Oziidae, Tetraliidae, Trapeziidae and Xanthidae. In this paper, the fourth of this serial study on the crabs of the Ogasawara Islands, ten species of three families Acidopsidae, Aphanodactylidae and Pilumnidae are recorded. They are *Crinitocinus alcocki* (Borradaile, 1902) and *Raoulia fortis* Ng and Rahayu, 2014 (family Acidopsidae), *Takedactylus masatsunei* Naruse and Maenosono, 2012 (family Aphanodactylidae), and *Actumnus simplex* Rathbun, 1911, *Nanopilumnus heterodon* Sakai, 1934, *Pilumnopeus pearsei* (Rathbun, 1932), *Pilumnus caerulescens* A. Milne-Edwards, 1873, *P. tahi-*

tensis De Man, 1890, *P. trispinosus* (Sakai, 1965), and *Viaderiana longipes* (A. Milne-Edwards, 1873) (family Pilumnidae). All the species are new to the Ogasawara Islands, and *C. alcocki*, *R. fortis* and *P. tahitensis* are new to the carcinological fauna of Japan. It is noted that the genus *Neoactumnus* Sakai, 1964 of the family Pilumnidae is considered to be synonymous with the genus *Actumnus* Dana, 1851, and two known representatives of the genus, *N. convexus* Sakai, 1964, and *N. unispina* Garth and Kim, 1983, were reduced to synonyms of *A. simplex*.

All the specimens examined are preserved in the collections of the Tsukuba Research Departments, National Museum of Nature and Science, Tokyo (NSMT). Abbreviation and forms of measurements and data of the specimens are same with the preceding papers. The maps of the Ogasawara Islands are referred to Takeda and Komatsu (2023, 2024a).

Records of the Species

Family ACIDOPSIDAE Števcíć, 2005

Genus *Crinitocinus* Ng and Rahayu, 2014

Crinitocinus alcocki (Borradaile, 1902)

[Njn: Tsubu-kebukagani]

(Fig. 4F)

Pilumnus alcocki Borradaile, 1902, p. 248, fig. 48. —Rathbun, 1911, p. 230. —Ng *et al.*, 2008, p. 141 (in list).

Crinitocinus alcocki: Ng & Rahayu, 2014, p. 16, figs. 9–11, 12A–C, 40E–H. —Naruse & Maenosono, 2019, p. 170 (in comparative material), fig. 8B. —Ng & Lin, 2023, p. 111, figs. 1E–F, H, 8.

Material examined. Chichi-jima Is. —Off Futami Bay, Chichi-jima I., from stomach contents of sidespot goatfish [Jn: Ryukyu-himeji], *Parupeneus pleurostigma* (Bennett), 1 juv. (cb 4.7 × cl 3.8 mm), NSMT-Cr 32389, date unrecorded, collected by Y. Kurata.

Remarks. The specimen obtained from fish stomach contents is juvenile and at poor condition, without both chelipeds and some ambulatory legs. However, the carapace shape and dorsal areolation are distinctly kept and show the specific character of *Pilumnus alcocki*, which was deeply studied and designated as the type species of the monotypic new genus *Crinitocinus* by Ng and Rahayu (2014). In the specimen examined, the hairs of the carapace, chelipeds and ambulatory legs are mostly fell out together with mucus in fish stomach, but the long and oblique orbit that is as long as the whole length of the frontal margin, the anteriorly elongated mesogastric and protogastric regions, and the three lobiform teeth of the carapace anterolateral margin are clearly observable (Fig. 4F). Ng and Rahayu (2014) gave the fine photographs of the type and some additional specimens to redeem the inaccurate original figure about the carapace proportion. The present specimen agrees well especially with a photograph of a male (4.5 × 4.3 mm) from Amirante (Ng and Rahayu, 2014, fig. 10A).

Distribution. Amirante Islands, Seychelles, 52–70 m; Suvadiva Atoll, Maldives, 36 m; Papua New Guinea, 20 m; Off Oahu, Hawaii, from stom-

ach of goatfish, *Parupeneus multifasciatus* (Quoy & Gaimard); Taiwan. New to Japanese waters.

Genus *Raoulia* Ng, 1987

Raoulia fortis Ng and Rahayu, 2014

[Njn: Raouru-gani]

(Fig. 1A–D)

Typhlocarinodes piroculatus Rathbun: Balss, 1938, p. 73. —Miyake, 1939, p. 220 (in list).

Raoulia fortis Ng & Rahayu, 2014, p. 31, figs. 1G–H, 5F, 6C, 20–21, 41A.

Material examined. Chichi-jima Is. —Tsurihama, Chichi-jima I., 1 ♂ (cb 10.2 × cl 8.2 mm), NSMT-Cr 32390, 11-VII-2009, coll. by H. Saito.

Haha-jima Is. —Wakihama (26°38'10"N, 142°09'29"E), Haha-jima I., 1 ♀ (cb 7.4 × cl 5.5 mm), NSMT-Cr 32391, 7-VII-2015, coll. by H. Komatsu.

Remarks. Ng and Rahayu (2014) revised the family Acidopsidae and recognized two subfamilies, Acidopsinae with three genera and Raouliinae with four genera, preparing the keys to all the genera and species. The present specimens are referred to the Raouliinae, in which the male genital opening is coxo-sternal, the basal antennal article is short and distinctly wider than long, and the female vulvae are arranged submedially on the sixth thoracic sternite. The subfamily Raouliinae contains four genera, *Raoulia* Ng, 1987, *Typhlocarinodes* Alcock, 1900, *Caecopilumnus* Borradaile, 1902, and *Thecoplax* Ng and Rahayu, 2014, all from the Indo-West Pacific.

The present specimens (Fig. 1A–D) are referred to *Raoulia* of the four genera, and *R. fortis* of five species — *R. piroculata* (Rathbun, 1911), *R. limosa* Ng, 1987, *R. galea* Ng and Rahayu, 2014, *R. fortis* Ng and Rahayu, 2014, and *R. calva* Ng and Rahayu, 2014. All of these species were elaborately described and distinguished by Ng and Rahayu (2014), with many photographs and line drawings. The most characteristic for this species is the third maxilliped merus having the rounded anterolateral margin and the hemispherically bulged surface (Fig. 1B). The palm outer surface is smooth, with a longitudinal submar-

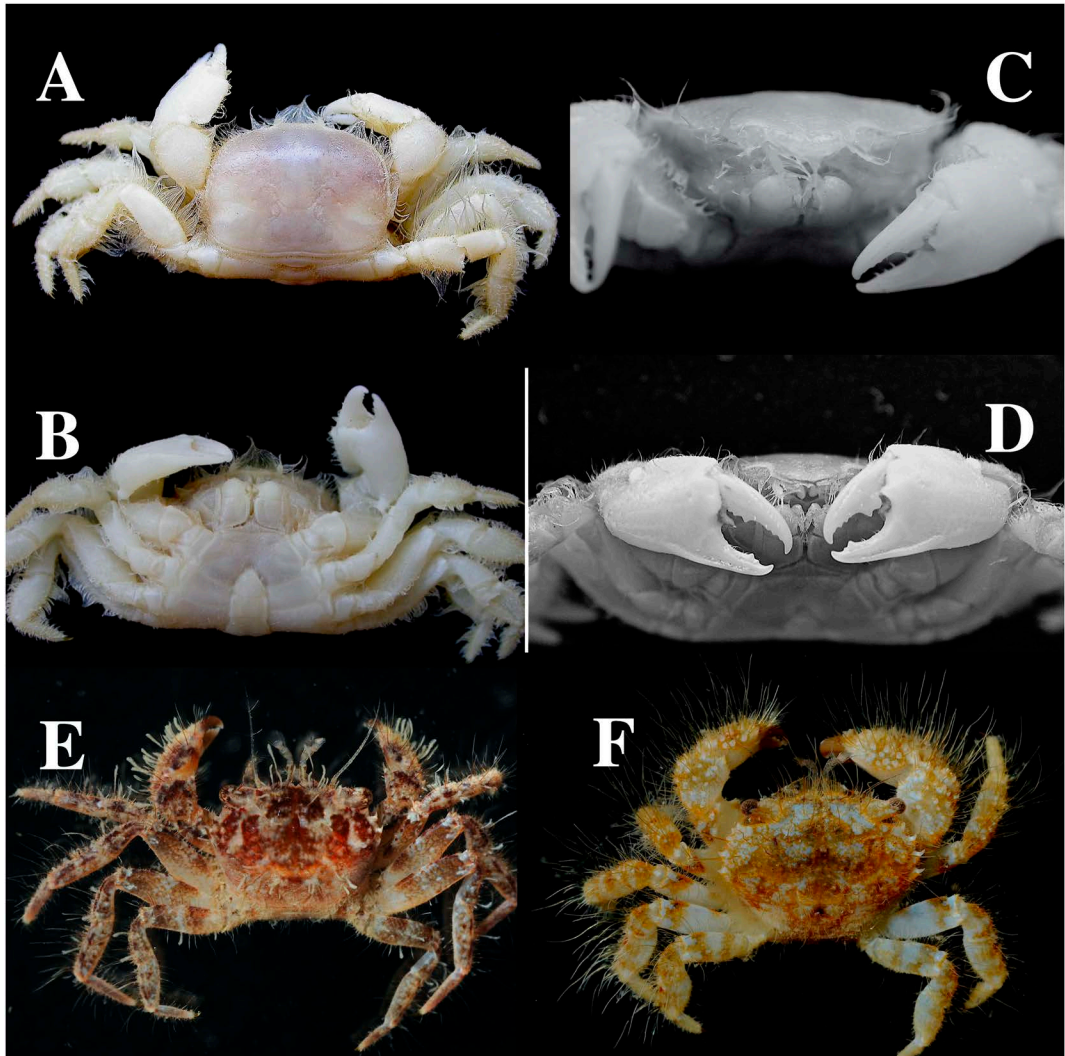


Fig. 1. A–D: *Raoulia fortis* Ng and Rahayu, ♂ (NSMT-Cr 32390; cb 10.2 × cl 8.2 mm) from Tsuru-hama, Chichi-jima I. E: *Viaderiana longipes* (A. Milne-Edwards), young ♂ (NSMT-Cr 32405; cb 5.2 × cl 4.0 mm) from Oomura Beach, Chichi-jima I. F: *Pilumnus caeruleus* A. Milne-Edwards, ♂ (NSMT-Cr 32400; cb 6.9 × cl 5.2 mm) from Miyano-hama, Chichi-jima I.

ginal groove along distal half of the lower part extending on to two-thirds of the immovable finger (Fig. 1D). The G1 is, as illustrated and explained in the original description, only gently curving with small spinules on the subdistal part.

Distribution. Aranuka, Gilbert Islands (= Kiribati); East of Aoré I., Espiritu Santo, Vanuatu, 12 m. New to Japanese waters.

Family APHANODACTYLIDAE Ahyong and Ng, 2009

Genus *Takedactylus* Naruse and Maenosono, 2012

Takedactylus masatsunei

Naruse and Maenosono, 2012

[Jn: Takeda-koyubi-pinno]

(Fig. 2)

Takedactylus masatsunei Naruse & Maenosono, 2012, p. 227, figs. 1–2.

Material examined. Chichi-jima Is. —Ototo-

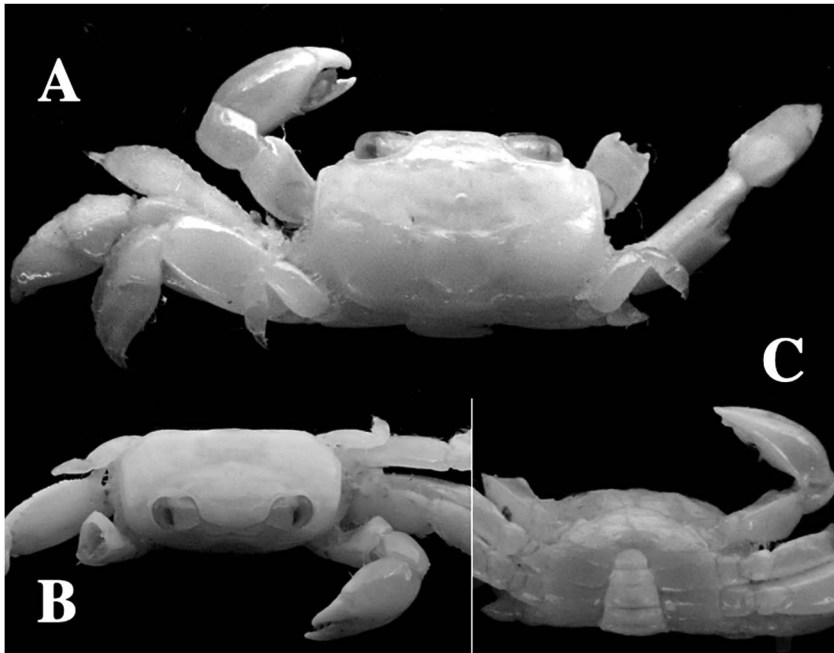


Fig. 2. *Takedactylus masatsunei* Naruse and Maenosono, juv. (NSMT-Cr 32392; cb 3.3 × cl 2.2 mm) from Ototo-jima I.

jima I., 1 juv. (cb 3.3 × cl 2.2 mm), NSMT-Cr 32392, 10-VII-1969, coll. by M. Imajima.

Remarks. This small species has hitherto been known only by the holotype female (cb 2.9 by cl 1.8 mm) from Sesoko Island adjacent to Okinawa Island, Ryukyu Islands. The present juvenile (Fig. 2) from Ototo-jima Island is almost same size with the holotype, agreeing very well with the description, photographs and line drawings of the holotype.

The carapace (Fig. 2A) is laterally rectangular in outline, fairly strongly convex longitudinally and flattened laterally, with the smooth and ill-defined dorsal surface; the posterior part of the dorsal surface is strongly deflexed towards the posterior carapace margin; the frontal region (Fig. 2B) is about one third as wide as the carapace, gently sloping anteriorly, with the obtusely angulated median part. Eyestalk is short and stout, with prominently large cornea, being partly protruded from the orbit. The carapace lateral margins of both sides (Fig. 2A) are longitudinal and parallel to each other. Each epibranchial angle is obtusely angulated, directed towards the

subhepatic region, and reaching the level of the supraorbital margin. In the specimen examined, the right cheliped is lost; the left cheliped is smooth and strong, with the inflated palm; the merus is widened distally, with three obtuse edges; the carpus is small, and its inner angle is obtuse; the palm is quite smooth, and the outer surface and upper margin is regularly convex; both fingers are curved, and the movable finger is shorter than the immovable finger. The first three pairs of the ambulatory legs are long, robust and similar in general shape; the second pair is the longest, and the first and third pairs are similar in length and shape; three edges of each merus are sharp, with the surface between the lower edges is flattened; the anterior margins of the carpi and propodi are heavily furnished with soft hairs; the posterior margin of each carpus of the second pair is lobate distally, with a longitudinal narrow ridge on the upper surface; each dactylus is short and rapidly narrowed at the junction with the claw-like dactylus. The last leg is markedly small and shorter than the merus of the third pair. The pleon (Fig. 2C) is narrow and seven-segmented.

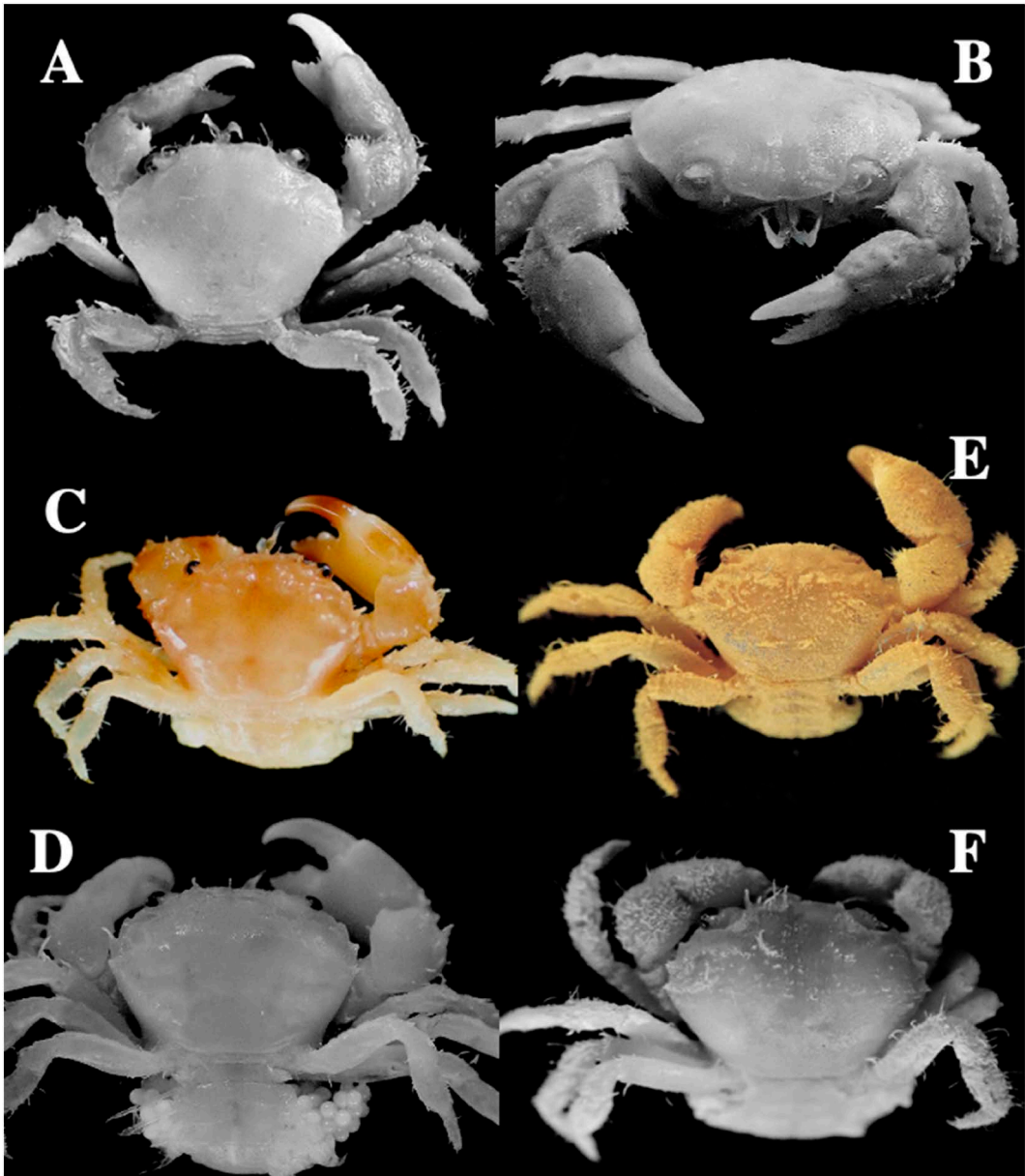


Fig. 3. A–B: *Actumnus simplex* Rathbun, ♂ (NSMT-Cr 32392; cb $6.7 \times$ cl 5.4 mm) found in stomach contents of sidespot goatfish, *Parupeneus pleurostigma* (Bennett) from off Futami Bay, Chichi-jima I. C–D: *Pilumnopeus pearsei* (Rathbun), ovig. ♀ (NSMT-Cr 32396; cb $5.2 \times$ cl 3.7 mm) from Futami Bay, Chichi-jima I. (preserved in 75% ethanol). E–F: *Pilumnus trispinosus* (Sakai), ovig. ♀ (NSMT-Cr 6866; cb $6.6 \times$ cl 5.2 mm) from Futami Bay, Chichi-jima I. (E) (preserved in 75% ethanol.); Ovig. ♀ (NSMT-Cr 32403; cb $6.3 \times$ cl 4.5 mm) from Tsuiri-hama, Chichi-jima I. (F).

The Japanese name, Takeda-koyubi-pinno, was proposed by Naruse (2017).

Another species of *Takedactylus*, *T. compressus* Naruse and Yoshida, 2018, obtained from

tube of annelid worm, *Loimia* sp., at Nakoudo-jima Island and Muko-jima Island, Ogasawara Islands, is, without doubt, close to *T. masatsunei*, but has the much wider carapace.

Distribution. This species has hitherto been known only by the female holotype from Sesoko Island, west of Okinawa Main Island, Ryukyu Islands.

Family PILUMNIDAE Somouelle, 1819

Genus *Actumnus* Dana, 1851

Actumnus simplex Rathbun, 1911

[Jn: Shin-ibotegani]

(Fig. 3A–B)

Actumnus simplex Rathbun, 1911, p. 232, pl. 16 figs.

10–11. —Naderloo & Ng, 2011, p. 1595, figs. 1–3. —Naderloo, 2017, p. 300, fig. 26.7.

Neoactumnus convexus Sakai, 1964, p. 105 fig. 4; 1965, pp. 153 (in English), 66 (in Japanese), fig. 18, pl. 76 fig. 1; 1976, p. 498 (English vol.), p. 307 (Japanese vol.), fig. 267, pl. 177 fig. 4. —Takeda & Koyama, 1974, p. 114, pl. 11 fig. D. —Miyake, 1983, p. 133, pl. 45 fig. 3. —Nagai, 1990, p. 115. —Nomura, 1991, p. 41. —Muraoka, 1998, p. 45. —Minemizu, 2000, p. 282, 1 unnumbered fig. —Kato & Okuno, 2001, p. 131, 1 unnumbered fig. —Marumura & Kosaka, 2003, p. 60. —Okuno, 2004, p. 1. —Lee *et al.*, 2008, p. 291, fig. 1. (**Syn. nov.**)

Neoactumnus unispina Garth & Kim, 1983, p. 699, fig. 8. (**Syn. nov.**)

Material examined. Chichi-jima Is. —Off Futami Bay, Chichi-jima I., from stomach contents of sidespot goatfish [Jn: Ryukyu-himeji], *Parupeneus pleurostigma* (Bennett), 1 ♂ (cb 6.7 × cl 5.4 mm), NSMT-Cr 32393, date unrecorded, coll. by Y. Kurata.

Comparative specimen examined. West of Kameki Reef, Sagami Bay, 40–42 m depth, 1 ♂ (holotype of *Neoactumnus convexus* Sakai, 1964), NSMT-Cr R2406, 19-XII-1962, coll. by His Majesty the Showa Emperor of Japan.

Remarks. As shown in the photograph (Fig. 3A–B), the specimen found in fish stomach contents is in good condition to know the specific and generic characters. The taxonomic identities of *Actumnus simplex* Rathbun, 1911, *Neoactumnus convexus* Sakai, 1965, and *N. unispina* Garth and Kim, 1983, are still unsolved. Naderloo and Ng (2011) discussed deeply on this problem on a reasonable base, but the systematic validity of

the genus *Neoactumnus* and the specific synonymy of three species in question were adjourned until future study probably due to modesty rather than hesitation. The smooth and regularly convex carapace with four-lobed anterolateral margins of both sides (Fig. 3) is quite similar in the three species. In the present specimen, the frontal margin is interrupted medially with a median small notch (Fig. 3B), agreeing well with the figure of the holotype of *A. simplex* given by Naderloo and Ng (2011) and differing from the figure of the holotype of *N. convexus* in which the frontal margin is entire without median notch. In *N. unispina*, the frontal margin was described as being low-triangular in shape without a median emargination. The complete frontal margin without a median notch is considered to be the generic character of *Neoactumnus*, together with the complete absence of a lateral lobule of the frontal margin. However, Naderloo and Ng (2011) showed that the presence or absence of a lateral lobule on the frontal margin is not to be reliable as the generic character. The number of the interruption on the supra-orbital margin was not mentioned in the generic diagnosis, but described as one close to the external orbital tooth, but the notch is sometimes indistinct and almost discernible. It may be remarked that the type specimens of *N. convexus* are small (cb 4.5 and 7.5 mm in the holotype and allotype, respectively). The presence of one spine at the carpus inner angle of the cheliped may be individually variable and not always reliable character to distinguish the species.

The holotype of *Neoactumnus convexus* Sakai, 1965, is a subadult male and agrees well with the descriptions and figures of Sakai (1964, 1976). In the original description, the specimen was said that its taxonomic status is close to the genus *Actumnus* Dana, 1851 in the general formation of the carapace, but considered to be generically distinct in having no median indentation of the frontal margin and the absence of notches on the supraorbital margin. The specimen is, without doubt, not fully matured, and these characters may be referable to the immature state of the

specimen. The original label is typed as *Actumnus convexus* Sakai, type, but it is not sure whether this label was prepared under the guidance of the late Prof. T. Sakai.

As a result of the examination of the type specimen and the reference to the literature concerned, the genus *Neoactumnus* Sakai, 1964, was considered to be synonymous with the genus *Actumnus* Dana, 1852, and *N. convexus* Sakai, 1965, and *N. unispina* Garth and Kim, 1983, were reduced to the synonyms of *Actumnus simplex* Rathbun, 1911.

The crabs obtained from stomach of a same individual of sidespot goatfish were identified as *Neopalicus jukesii* (White, 1847) (family Palicidae) and *Crinitocinus alcocki* (Borradaile, 1902) (family Acidopsidae). *Neopalicus jukesii* represented by 2 males (cb 7.6 × cl 7.1 mm; cb 5.6 × 5.0 mm) and 1 female (cb 8.9 × cl 7.3 mm) has already been known from the Ogasawara Islands by Castro (2000), Komatsu (2011), and Takeda and Tachikawa (2015). The juvenile specimen of *Crinitocinus alcocki* is recorded in this paper as new to the Ogasawara Islands.

Special ecology of this species has not been mentioned since the original descriptions of *Actumnus simplex* in 1911, *Neoactumnus convexus* in 1964, and *N. unispina* in 1983, but Nomura (1991) first mentioned the symbiotic-living with sea-anemone, *Nemanthus nitidus* (Wassilieff), many individuals of which attach to the stems of gorgonaceans at the shallow-water rocky bottom. Then, in Japan, this species is attracted by the divers, and the fine photographs showing the ecology are published in the books for general use such as Minemizu (2000) and Kato & Okuno (2001).

Distribution. Amirante in the western Indian Ocean (as *Actumnus simplex*), Persian Gulf in the northern Indian Ocean (as *A. simplex*); Sulu Archipelago, Philippines (as *Neoactumnus unispina*); Jejudo I., Korea (as *N. convexus*); Japan from Okinawa-jima Island northwards to the Boso Peninsula and Hachijo-jima Island (as *N. convexus*).

Genus *Nanopilumnus* Takeda, 1974
Nanopilumnus heterodon (Sakai, 1934)

[Jn: Kawari-kebukagani]

(Fig. 4D–E)

Pilumnus heterodon Sakai, 1934, p. 307, fig. 19; 1976, pp. 484 (in key), 488 (English vol.), p. 301 (Japanese vol.), fig. 262a, pl. 174 fig. 3. —Sankarankutty, 1962, p. 114, figs. 48–50. —Muraoka, 1998, p. 44. —Takeda & Manuel, 2000, p. 159, fig. 4B. —Kato & Okuno, 2001, p. 131, 1 unnumbered fig.

Pilumnus barbatus A. Milne-Edwards, 1873: Balss, 1938, p. 57. —Sakai, 1939, p. 538. —Takeda & Miyake, 1968, p. 9, figs. 1d–f, 2.

Nanopilumnus heterodon: Ng *et al.*, 2008, p. 141 (in list). —Trivedi *et al.*, 2018, p. 60 (in list).

Material examined. Chichi-jima Is. —Omura Beach (27°05'35"N, 142°11'38"E), Chichi-jima I., 12 m, 1 ♂ (cb 7.9 × cl 5.7 mm), NSMT-Cr 32394, 13-XI-2013, coll. by H. Komatsu.

Remarks. This small species is characterized by the club-shaped hairs of filthy appearance covering the carapace, chelipeds and ambulatory legs; the hairs are variable in length, but basically separated into short and long types. As shown in Fig. 4D–E, of three anterolateral teeth of the carapace behind the external orbital tooth, the first two are prominent and elongate, each with a minute horny tip, protruding from the hairs; the first originates from behind the outer part of the supra-orbital margin, directing anterolaterally; the second is similar to the first in size and shape, but directed more anteriorly and weakly curving forwards; the third is small, acute at tip, and disguised by the hairs. The differences of the carapace anterolateral armature of this species and the close relative, *N. barbatus* (A. Milne-Edwards, 1873), were illustrated by Sakai (1976).

Distribution. Known from Japan, the Philippines, Singapore and the Palau Islands in the West Pacific Ocean, and the Nicobar Islands in the eastern Indian Ocean.

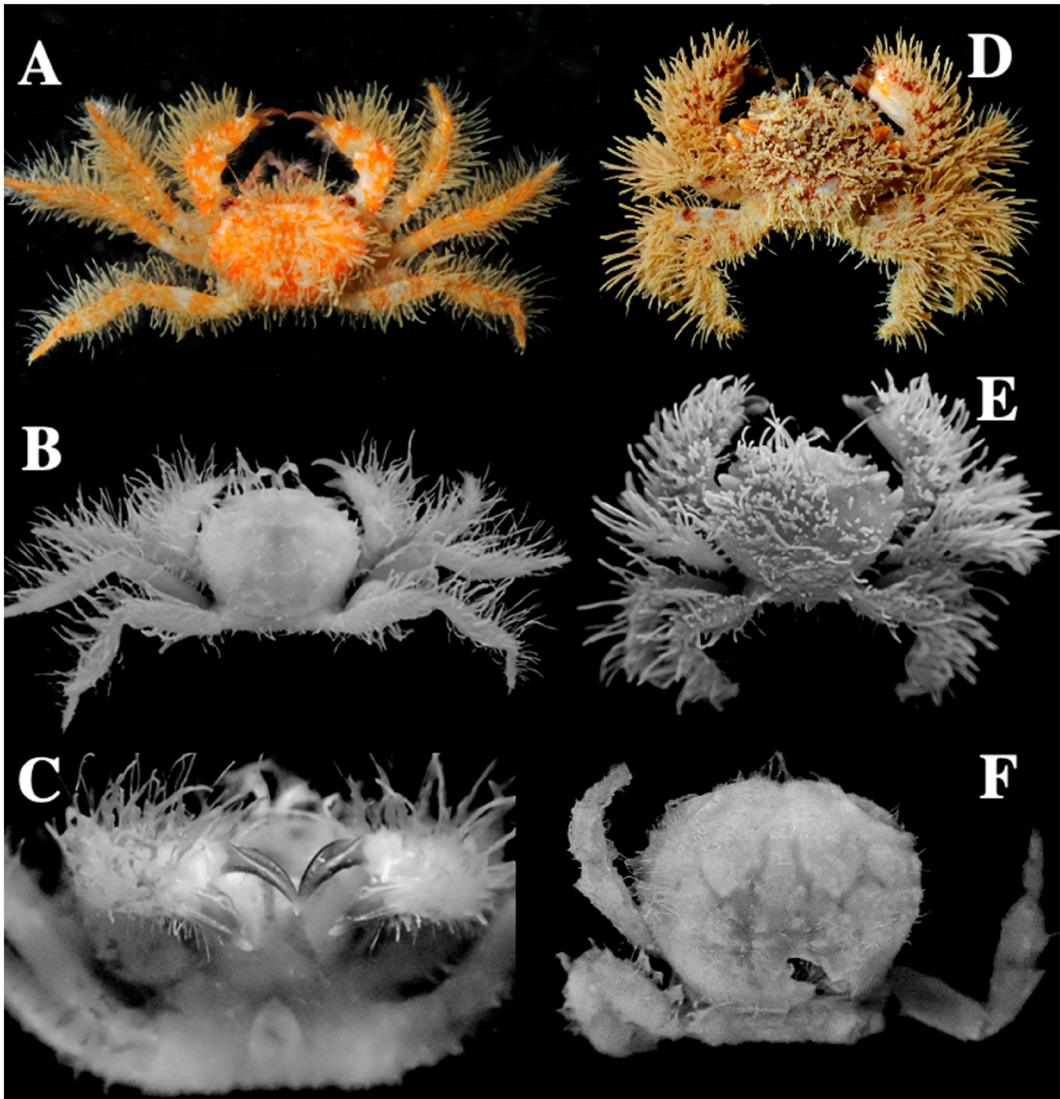


Fig. 4. A–C: *Pilumnus tahitensis* De Man, ♂ (NSMT-Cr 32402; cb 6.2 × cl 4.9 mm) from Sujiiwa-misaki, Anijima I. D–E: *Nanopilumnus heterodon* (Sakai), ♂ (NSMT-Cr 32394; cb 7.9 × cl 5.7 mm) from Omura Beach, Chichi-jima I. F: *Crinitocinus alcocki* (Borradaile), juv. (NSMT-Cr 323889; cb 4.7 × cl 3.8 mm) found in stomach contents of sidespot goatfish, *Parupeneus pleurostigma* (Bennett) from off Futami Bay, Chichi-jima I.

Genus *Pilumnopeus* A. Milne-Edwards, 1867

Pilumnopeus pearsei (Rathbun, 1932)

[Jn: Toranoogani]

(Fig. 3C–D)

Heteropanope pearsei Rathbun, 1932, p. 35. —Sakai, 1936, p. 176, pl. 49 fig. 4.

Pilumnopeus indica (De Man, 1887): Balss, 1933, p. 33. —Sakai, 1939, p. 542, pl. 62 fig. 4; 1965, pp. 159

(in English), 69 (in Japanese), pl. 79 fig. 4; 1976, pp. 500 (English vol.), 308 (Japanese vol.), pl. 178 fig. 2. —Dai *et al.*, 1986, p. 348, fig., 182 (1), pl. 50 fig. 4. —Dai & Yang, 1991, p. 374, fig. 182 (1), pl. 50 fig. 4. —Muraoka, 1998, p. 45.

Heteropanope (Pilumnopeus) indica (De Man, 1887): Kim, 1973, p. 400, fig. 158, pl. 84 fig. 120.

Pilumnopeus indicus (De Man, 1887): Miyake, 1983, p. 138, pl. 46 fig. 5.

Benthopanope indica (De Man, 1887): Ho *et al.*, 2000, p.

116. —Ng *et al.*, 2001, p. 30. —Ko & Lee, 2012, p. 24, pl. 5. —Ng *et al.*, 2017, p. 62.

Benthopanope pearsei (Rathbun, 1932): Takeda *et al.*, 2011, p. 67.

Pilumnopeus pearsei (Rathbun, 1932): Patel *et al.*, 2024, pp. 386–393 (in discussion), figs. 6–7.

Material examined. Chichi-jima Is. —Ototojima I., 1 ♂ (NSMT-Cr 32395; cb 4.1 × cl 3.3 mm), 10-VII-1969, coll. by M. Imajima. —Futami Bay, Chichi-jima I., on buoy, 1 ovig. ♀ (cb 5.2 × cl 3.7 mm), NSMT-Cr 32396, 1 ovig. ♀ (cb 3.6 × cl 3.3 mm), 1 ♀ (cb 4.0 × cl 3.0 mm), NSMT-Cr 32397, 8-VII-2009, coll. by H. Komatsu; Futami Bay, Chichi-jima I., on rope at fishing port, 1 ♀ (cb 4.0 × cl 3.5 mm), NSMT-Cr 32398, 17-XI-2009, coll. by H. Komatsu; Omura Beach (27°05'35"N, 142°11'38"E), Chichi-jima I., 3 m, 1 ♂ (cb 2.7 × cl 2.5 mm), NSMT-Cr 32399, 30-VI-2014, coll. by H. Komatsu.

Comparative specimens examined. Nishino-saki, Hatsuse, Kanagawa Pref., Sagami Bay, 1 ♂, NSMT-Cr R2840, 21-VII-1963, coll. by His Majesty the Showa Emperor of Japan; Shibazaki, Hayama, Kanagawa Pref., 4 ♂♂, 6 ♀♀, NSMT-Cr 5718, 15-V-1978, coll. by M. Takeda.

Shiono-misaki, Kii Penin., Wakayama Pref., 4 ♂♂, 4 ovig. ♀♀, 1 ♀, NSMT-Cr 5869, 20-VII-1978, coll. by M. Takeda.

Shimama, Tanega-shima I., south of Kyushu, 4 ♂♂, 1 ovig. ♀, NSMT-Cr 5208, 9-VI-1975, coll. by M. Takeda; Sunosaki, Tanega-shima I., 1 ♂, 4 ovig. ♀♀, 1 ♀, NSMT-Cr 5190, 14-VI-1975, coll. by M. Takeda.

Remarks. In Japan, this species is rather commonly found among some kinds of seaweed at the rocky shore and long known as *Pilumnopeus indicus* (De Man, 1887) since the suggestion by Balss (1933). When Davie (1989) established the genus *Benthopanope* with the type species, *B. estuarius* sp. nov. from sub-tidal midly bottoms along the southeast to northwest coasts of Australia, *P. indicus* was considered to be congeneric with *B. estuarius* and some additional species. Then, Ho *et al.* (2000), Ng *et al.* (2001) and Ng *et al.* (2017) listed *B. indica* from Taiwan, but commented that *B. indica* and *Heteropanope pearsei*

are specifically distinct from each other, and that *B. indica* from Taiwan should be changed to *B. pearsei* in due time. Ng *et al.* (2008) listed both species as valid, but Takeda *et al.* (2011) recorded this species from the southern Japan Sea as *B. pearsei*. Sakai (1965) recorded the specimens from Sagami Bay as *Pilumnopeus indica* after comparison with the type specimens of *Heteropanope pearsei* which were considered to be quite identical with *Pilumnopeus indicus*.

Most of the specimens examined during this study are small with the carapace breadth less than 1 cm and the rather rounded contour of the carapace, agreeing well with the colored illustration of Sakai (1939, pl. 62 fig. 4). The shape of the carapace anterolateral margin (Fig. 3C–D) is, however, somewhat variable individually and developmentally; the margin continuous with the external orbital angle before the first tooth is not at all developed or posteriorly developed and weakly angulated; in most of the specimens, the first tooth is depressed and more or less lobate, with its outer margin being weakly convex outwards along the general anterolateral curvature, and its obtuse tip is directed forward, but in some and larger specimens, the first tooth is developed to be tubercular and directed obliquely outwards; the second tooth is exposed to the same variation as the first tooth, especially as for the outer margin. In all the specimens, one cheliped is always heavy in both sexes, and the larger cheliped is perfectly smooth and shining.

In the original figure of *Heteropanope indica*, the carapace anterolateral teeth were figured to be more or less tubercular and weakly curved obliquely forwards, but the transverse ridges on the protogastric and epibranchial ridges may be seemingly strong, but the species identification is followed Patel *et al.* (2024) who examined the lectotype and additional specimens of *Pilumnopeus indicus* and the lectotype and paralectotype of *P. pearsei*, and showed the distinct differences in the carapace shape and anterolateral armature of both species.

Distribution. Japan, Korea, Taiwan and coasts of China.

Genus *Pilumnus* Leach, 1816*Pilumnus caerulescens* A. Milne-Edwards, 1873

[Jn: Nyukaredonia-kebukagani]

(Fig. 1F)

Pilumnus caerulescens A. Milne-Edwards, 1873, p. 242, pl. 9 fig. 3. —Rathbun, 1910, p. 355, pl. 1 fig. 15; 1914, p. 660. —McNeill, 1926, p. 315. —Takeda & Miyake, 1968, pp. 6 (in key), 30, fig. 7, pl. 2 fig. D. —Garth & Kim, 1983, p. 693. —Trivedi *et al.*, 2018, p. 60 (in list). —Takeda *et al.*, 2023, p. 110, figs. 2, 5B.

Pilumnus forskalii caerulescens: Balss, 1933, p. 14; 1938, p. 67. —Holthuis, 1953, p. 25.

Pilumnus sp.: Okuno *et al.*, 2021, pp. 77 (in table), 82 (in discussion), figs. 3N, 4B–C.

Material examined. Chichi-jima Is. —Miyano-hama (27°06'16"N, 142°11'39"E), Chichi-jima I., 2–5 m, 1 ♂ (cb 6.9 × cl 5.2 mm), NSMT-Cr 32400, 30-VI-2014, coll. by H. Komatsu.

Haha-jima Is. —Wakihama (26°38'10"N, 142°09'29"E), Haha-jima I., 3 ♀♀ (cb 7.3 × cl 5.2 mm—cb 8.2 × cl 6.0 mm), 2 juvs, NSMT-Cr 32401, 7-VII-2015, coll. by H. Komatsu.

Remarks. This species is characteristic in the rough appearance of the carapace and chelipeds armed with tubercles and stiff long hairs and the carapace anterolateral margin armed with four sharp spines with stout bases (Fig. 1F). Takeda *et al.* (2023) reported this species from the Philippines and compared with *Pilumnus hirsutissimus* Takeda and Komatsu, 2020, from Japan, which is similar in the hairy appearance, but different in the soft, not stiff hairs.

Pilumnus sp. from Chiba Prefecture recorded by Okuno *et al.* (2021) is referred to this species due to the color photograph and line drawings of the carapace and ambulatory leg.

Distribution. Mainly tropical and subtropical Indo-West Pacific waters, from the Andaman Islands eastwards to Australia and New Caledonia, and from the Gulf of Thailand northwards to Japan (Ryukyu Islands, Boso Peninsula and Ogasawara Islands) through the Micronesian islands and the Philippines.

Pilumnus tahitensis De Man, 1890

[Njn: Tahichi-kebukagani]

(Fig. 4A–C)

Pilumnus tahitensis De Man, 1890, p. 61, pl. 3 fig. 4. —Ortmann, 1893, p. 437. —Rathbun, 1907, p. 56; 1911, p. 229. —Balss, 1933, p. 25; 1938, p. 68. —Miyake, 1939, p. 218 (in list). —Holthuis, 1953, p. 25. —Forest & Guinot, 1961, p. 129, fig. 125. —Takeda & Miyake, 1968, pp. 6 (in key), 15.

Material examined. Chichi-jima Is. —Sujiwami-misaki (27°07'50"N, 142°10'46"E), Ani-jima I., 9 m, 1 ♂ (cb 6.2 × cl 4.9 mm), NSMT-Cr 32402, 27-VI-2014, coll. by H. Komatsu.

Remarks. As stressed by the original author (De Man, 1890) and Takeda and Miyake (1968), the upper margin of the movable finger and the lower margin of the immovable finger, and the outer surface of each finger are thickly crested throughout the whole lengths, leaving a longitudinal deep furrow between the crests in each finger (Fig. 4C). The long club-shaped hairs covering the carapace, chelipeds and ambulatory legs and the narrow carapace armed with three sharp anterolateral spines are as seen in Fig. 4A–B. The outer halves of the supraorbital and infraorbital margins are raised and thin to form the deep orbit, with a deep cleft just below the external orbital part, with a spinule as the external orbital angle. A subhepatic spinule is seen between the external orbital angle and the first anterolateral spine.

Distribution. Although the records of occurrence are not many, but the geographical range is wide from Madagascar and Seychelles in the western Indian Ocean to Tahiti and Tuamotu Islands in the southern Pacific Ocean and to the Solomon Islands and Micronesian islands in the western Pacific Ocean. New to Japanese waters.

Pilumnus trispinosus (Sakai, 1965)

[Jn: Toranoogani-damashi]

(Fig. 3E–F)

Parapilumnus pearsei (Rathbun): Sakai 1939, p. 544, fig. 58. *Parapilumnus trispinosus* Sakai, 1965, p. 160 (in English), p. 69 (in Japanese), pl. 79 fig. 5; 1976, p. 502 (English vol.), p. 309 (Japanese vol.), fig. 268. —Takeda & Miyake, 1969, p. 139, fig. 15. —Dai *et al.*, 1986, p. 350,

fig. 183 (2), pl. 50 fig. 7. —Dai & Yang, 1991, p. 376, fig. 182 (2), pl. 59 fig. 7. —Muraoka, 1998, p. 45. —Hsueh *et al.*, 2009, p. 1025. —Števčić, 2011, p. 135 (Type designation of *Daipilumnus* gen. nov.).

Material examined. Chichi-jima Is. —Futami Bay, Chichi-jima I., on buoy, 1 ♂ (cb 6.2 × cl 4.7 mm), 1 ovig. ♀ (cb 6.6 × cl 5.2 mm), NSMT-Cr 6866, 17-V-1975, coll. by Y. Kurata. —Miyano-hama, Chichi-jima I., 1 ovig. ♀ (cb 4.2 × cl 3.0 mm), 26-VI-1976, NSMT-Cr 6552, coll. by M. Takeda; Same place, 1 ♂ (cb 6.1 × cl 4.8 mm), 26-VII—8-VIII-1976, NSMT-Cr 7038, coll. by M. Takeda. —Tsuru-hama, Chichi-jima I., 1 ovig. ♀ (NSMT-Cr 32403; cb 6.3 × cl 4.5 mm), 1 ♂ (NSMT-Cr 32404; cb 3.7 × cl 3.0 mm), 11-VII-2009, coll. by H. Komatsu.

Comparative specimens examined. Sunosaki, Tanega-shima I., south of Kyushu, 1 ♂, 4 ovig. ♀ ♀, 1 ♀, NSMT-Cr 5190, 14-VI-1975, coll. by M. Takeda.

Remarks. Števčić (2011) established a new genus *Daipilumnus* to accommodate *Parapilumnus trispinosus* Sakai, 1965, without mention about the related genera and the definitive generic characters. The definition may be extracted only from the summarized explanations by Sakai (1939, as *P. pearsei*; 1965), without definite reason to establish the genus distinct from *Pilumnus*, and therefore, *Daipilumnus* is generally considered to be a junior subjective synonym of *Pilumnus*.

The present specimens from the Ogasawara Islands (Fig. 3E–F) agree with the colored figure by Sakai (1965, pl. 79 fig. 5) rather than the line drawing by Sakai (1939, fig. 58) in the carapace anterolateral armature. In the line drawing, the three anterolateral teeth are figured as small teeth curving forward along the anterolateral margin, but in the colored figure, the anterolateral teeth are rather tuberculated, directed obliquely forward and protruding distinctly beyond the anterolateral margin. These teeth may be variable individually like in the case of *Pilumnopus pearsei*, to which the smooth and scanty hairy dorsal surface of the carapace is close. In this species, both chelipeds are quite different in size like in *Benthopanope*

indica, but the larger chela is covered with thick minute granules and dense short and scant longish hairs (Fig. 3E–F) in contrast with the smooth and shining chela of *P. pearsei* (Fig. 3C–D).

Sakai (1965) did not designate the type specimens, nor recorded the type depository. There is no specimen of *P. trispinosus* in the Showa Memorial Institute, National Museum of Nature and Science, Tokyo.

Distribution. Sagami Bay to Kyushu in the Japanese mainland, and Amami-Oshima Island to the Yaeyama Group in the Ryukyu Islands; Shihmen, Taipei County, Taiwan; Guangxi coast, southern China; Koror Island, Palau Islands; Suva, Fiji.

Genus *Viaderirana* Ward, 1942

Viaderiana longipes (A. Milne-Edwards, 1873)

[Jn: Kahmiiji-kebukagani]

(Fig. 1E)

Pilumnus longipes A. Milne-Edwards, 1873, p. 245, pl. 10 fig. 1. —De Man, 1888, p. 309. —Ng *et al.*, 2008, p. 142 (in list).

Lithocheila quadrispinosa (Zehntner, 1894): Sakai, 1976, p. 534 (English vol.), p. 329 (Japanese vol.), pl. 191 fig. 3. (*vide* Maenosono, 2020)

Viaderiana longipes: Takeda & Manuel-Santos, 2003, p. 210 (in discussion). —Maenosono, 2020, p. 29, figs. 2E–F, 3D, 10–11, 12K–M.

Material examined. Chichi-jima Is. —Oomura Beach (27°05'35"N, 142°11'38"E), Chichi-jima I., 12 m, 1 young ♂ (cb 5.2 × cl 4.0 mm), NSMT-Cr 32405, 13-XI-2013, coll. by H. Komatsu; Ooiwa (27°07'06"N, 142°10'19"E), Nishi-jima I., 9 m, 1 ♂ (cb 6.0 × cl 5.1 mm), NSMT-Cr 32406, 27-VI-2014, coll. by H. Komatsu.

Haha-jima Is. —Shihon-iwa South (26°38'49"N, 142°08'36"E), Haha-jima I., 1 ♂ (cb 10.7 × cl 8.2 mm), NSMT-Cr 32407, 3-VII-2015, coll. by H. Komatsu; Hirane (26°34'08"N, 142°12'49"E), Haha-jima I., 20–25 m, 1 ♂ (cb 5.1 × cl 4.5 mm), NSMT-Cr 32408, 14-VII-2016, coll. by H. Komatsu.

Remarks. This species has been well studied by Maenosono (2020) on the specimens from the Ryukyu Islands, and distinguished from the related species, especially *V. incerta* (Takeda and

Miyake, 1969). Both species are typical as the *Viaderiana* species, sharing the more or less camouflaged color without special spots, two strong and one vestigial anterolateral teeth, and the long ambulatory legs. In the present species (Fig. 1E), however, the frontal margin is separated into two strongly convex lobes by a median distinct notch (vs each lobe with nearly straight margin in *V. incerta*), and each merus of the first three ambulatory legs is armed with two or three spines on the upper margin, with one terminal spine (vs terminal spine usually absent in *V. incerta*). The armature of the ambulatory legs may be variable in both species, as stated by Maenosono (2020).

In the original description of *Pilumnus comatus* Ng, Dai and Yang, 1997, some differences between *P. comatus* and *P. longipes* (now, *Viaderiana longipes*) were mentioned based on the examination of the type specimen of *P. longipes*. It was noted for *P. longipes* that each frontal lobe is more pronounced, the outer margin and dorsal surface of the cheliped carpus have distinct spines, and the ambulatory meri have one or two distinct spines, and the G1 distal part is strongly recurved.

Distribution. New Caledonia; Pulo Edam, Malay Peninsula; the Ryukyu Islands.

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