ASED http://e-ASED.org
Animal Systematics, Evolution and Diversity

Anim. Syst. Evol. Divers. Vol. 30, No. 1: 44-48, January 2014
http://dx.doi.org/10.5635/ASED.2014.30.1.044

Short communication

New Report of Majoid Crab, *Pugettia intermedia* (Crustacea: Decapoda: Majoidea) from Korea

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ABSTRACT

As a result of continuous taxonomic investigations of Korean crabs, *Pugettia intermedia* Sakai, 1938 is newly reported from Korean waters. *Pugettia intermedia* had previously been reported in Korean fauna, but the previous reports of *P. intermedia* were resulted in misidentification of *P. quadridens* (De Haan, 1839). *Pugettia intermedia* differs from *P. quadridens* in having two subequal medial lobes of the first pleopod in male. In *P. quadridens*, one of the two medial lobes is about half-length of the other. *Pugettia intermedia* occurs on the southern coast of the Korean peninsula. The descriptions and illustrations of this species are provided herein.

Keywords: new report, *Pugettia intermedia*, Majoidea, Decapoda, Korean fauna

INTRODUCTION

The species of the genus *Pugettia* belonging to the superfamily Majoidea utilizes algae and sponges for camouflage, and occurs commonly on the rocky shores or in the tide pools of the coast. The genus *Pugettia* presently contains 19 species in the worldwide. Among them, twelve species occur in the West Pacific (Griffin and Tranter, 1986; Ng et al., 2008): *Pugettia elongata* Yokoya, 1933, *P. incisa* (De Haan, 1839), *P. intermedia* Sakai, 1938, *P. kahoshimensis* Rathbun, 1933, *P. leytensis* Rathbun, 1916, *P. marissinica* Takeda and Miyake, 1972, *P. mindanaoensis* Rathbun, 1916, *P. minor* Ortmann, 1893, *P. nipponensis* Rathbun, 1932, *P. quadridens* (De Haan, 1839), *P. pellucens* Rathbun, 1832, and *P. similis* Rathbun, 1932. Of these, only five species have been reported in Korean fauna: *Pugettia incisa*, *P. intermedia*, *P. minor*, *P. quadridens*, and *P. pellucens* (Kim, 1973; Kim and Kim, 1986, 1998). *Pugettia quadridens intermedia* Sakai, 1938 was elevated to *P. intermedia* by Griffin and Tranter (1986) based on several features, such as the first pleopod of male having the subequal length of two medial lobes, and a row of four tubercles above the epimeral ridge.

In Korea, *Pugettia intermedia* was firstly reported without description (Kim and Kim, 1986). Then, this species was re-described with illustrations (Kim and Kim, 1998). Careful examination of previously reported *P. intermedia* in Korea revealed that those specimens were *P. quadridens*. Now, we report firstly *P. intermedia* in Korea based on the observation of specimens collected from Geojedo Island.

All specimens were preserved in 70% ethyl alcohol and were deposited in the "Marine Arthropod Depository Bank of Korea," Seoul National University. All drawings were prepared using a camera lucida on a Nikon SMZ800 (Nikon, Tokyo, Japan). All characters were measured using a slide caliper (Wiha, Monticello, MN, USA) to the nearest 0.1 mm. Images were recorded using a digital SLR camera (D7000; Nikon), and were adjusted to provide a more descriptive image with software (Helicon Focus, Kharkov, Ukraine). The abbreviation "cl" and "cw" refer to carapace length from the tip of the rostrum to the posterior dorsal margin of the carapace and to the width of the carapace at the widest part, respectively.

SYSTEMATIC ACCOUNTS

Order Decapoda Latreille, 1802
Family Epialtidae MacLeay, 1838

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pISSN 2234-6953 eISSN 2234-8190

Genus *Pugettia* Dana, 1851

***Pugettia intermedia* Sakai, 1938 (Figs. 1, 2)**

Pugettia quadridens intermedia Sakai, 1938: 258; 1976: 197.

Pugettia intermedia: Griffin and Tranter, 1986: 93; Muraoka, 1998: 24.

Non *Pugettia quadridens intermedia*: Kim and Kim, 1986: 325; Kim and Kim, 1998: 302 [=*Pugettia quadridens quadridens* (De Haan, 1839)].

Material examined. Korea: 1♂ (cl 30.5 mm, cw 20 mm), Gyeongsangnam-do: Geoje-si, Dongbu-myeon, beach Deokwon, 2 Mar 2006; 2 Inds., Busan: Haeundae-gu, Haeundae, 6 May 1973; 1 Ind., Jeju-do: Seogwipo-si, Isl. Munseom, 20 Jan 1977; 5 Inds., Seogwipo-si, Isl. Munseom, 1 Jul 1993; 1 Ind., Seogwipo-si, Isl. Beomseom, 2 Jul 1993; 2 Inds., Jeollanam-do: Yeosu-si, Samsan-myeon, Isl. Geomundo, 27 Jun 2002; 2 Inds., Incheon: Ongjin-gun, Isl. Seonjaedo, 19 Oct 2005; 1 Ind., Gyeongsangnam-do: Namhae-gun, Seol-ri, 1 Mar 2006.

Comparative materials. *Pugettia incisa* (De Haan, 1839): 1 Ind., Jeju-do: port Seogwipo, 28 Feb 1971; 1 Ind., Jeollanam-do: Goheung-gun, port Nokdong, 21 Apr 1996; 1 Ind., Busan: Haeundae-gu, Haeundae, 27 May 1996; 1 Ind., Gyeongsangnam-do: Geoje-si, Dongbu-myeon, beach Deokwon, 2 Mar 2006.

Pugettia minor Ortmann, 1893: 1 Ind., Jeju-do: Seogwipo-si, Isl. Beomseom, 7 Feb 1971.

Pugettia pellucens Rathbun, 1932: 9 Inds., Busan: Haeundae-gu, Haeundae, 15 Jul 1971; 1 Ind., Gyeongsangbuk-do: Pohang-si, Guryongpo, 17 Jul 1972; 2 Inds., Jeollanam-do: Yeosu-si, Samsan-myeon, Isl. Habaekdo, 12 Jul 1984; 1 Ind., Gyeongsangbuk-do: Uljin-gun, Jukbyeon-myeon, 15 Jun 1985; 1 Ind., Chungcheongbuk-do: Borying-si, port Muchang-po, 7 Jun 1996; 2 Inds., Gyeongsangnam-do: Geoje-si, Nambu-myeon, Yoecha, 9 Jul 1996; 1 Ind., Geoje-si, Dongbu-myeon, 29 Jan 1997; 1 Ind., Jeju-do: Seogwipo-si, Isl. Beomseom, 21 Feb 2001; 15 Inds., Tongyeong-si, Sanyang-eup, Isl. Mireukdo, 10 May 2006; 5 Inds., Geoje-si, Dongbu-myeon, Yulpo-ri, 11 May 2006; 2 Inds., Gyeongsangbuk-do: Ulreung-gun, Isl. Jukdo, 11 Jun 2006.

Pugettia quadridens (De Haan, 1839): 1 Ind., Gyeongsangnam-do: Namhae-gun, Mijo-ri, 18 Jul 1967; 2 Inds. Jeollanam-do: Yeosu-si, Dolsan-eup, Impo-ri, 13 Jun 1969; 1 Ind., Jeju-do: Jeju-si, Isl. Chujado, 9 Aug 1969; 3 Inds., Busan: Haeundae-gu, Haeundae, 30 Jun 1971; 2 Inds., Gangwon-do: Sokcho-si, 25 Aug 1970; 2 Inds., Donghae-si, port Mukho, 25 Aug 1970; 3 Inds., Jeollanam-do: Jindo-gun, Hadong, 5 Aug 1974; 1 Ind., Gangwon-do: Gangreung-si, 5 Jul 1980; 13 Inds., Gyeongsangbuk-do: Uljin-gun, port Jukbyeon, 5 Aug 1983; 2 Inds., Jeollanam-do: Yeosu-si, Samsan-myeon, Isl. Geomundo, 11 Jul 1984; 1 Ind., Jeju-do: Jeju-si, Hangyeong-myeon, Sinchang-ri, 3 May 1985; 3 Inds., Jeollanam-do: Goheung-gun, port Nokdong, 22 Apr 1996; 3 Inds., Wando-gun, Bogil-myeon, 9 Aug 1996; 3 Inds., Gyeongsangnam-do: Geoje-si, Jangmok-myeon, beach Hongnam, 30 Jan 1997; 1 Ind., Jeollanam-do: Sinan-gun, Uido-ri, 5 Aug 1998; 3 Inds., Chungcheongnam-do: Taean-gun, Sinjindo-ri, 15 Jun 1999; 1 Ind., Jeju-do: Seogwipo-si, Seongsan-ri, 2 Nov 2000; 6 Inds., Incheon: Ongjin-gun, Seonjae-ri, 19 Oct 2005.

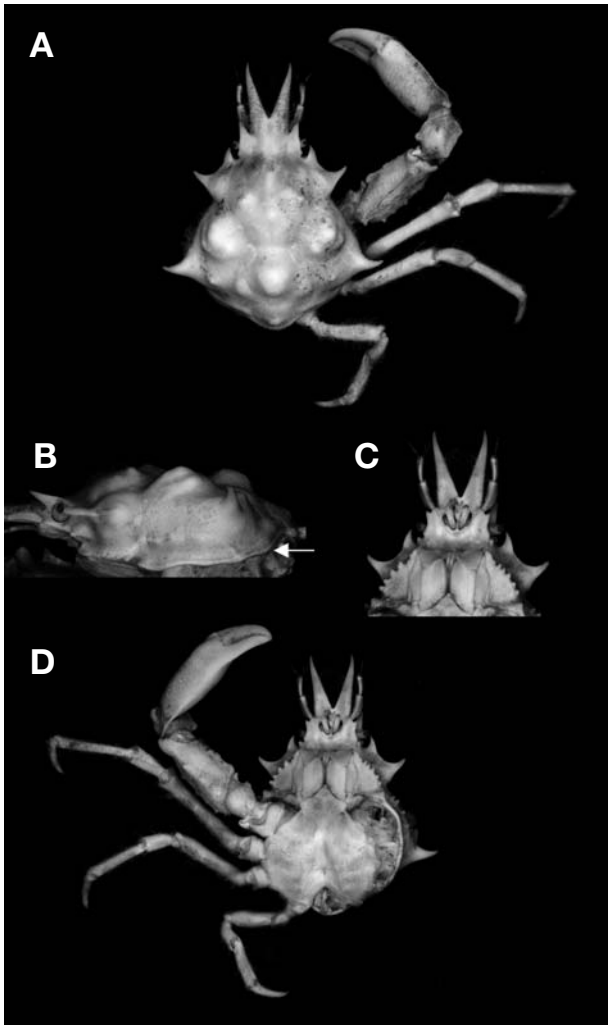

Fig. 1. *Pugettia intermedia* Sakai, 1938, male, cl 30.5×cw 20 mm. A, Whole animal, dorsal view; B, Branchial margin of carapace, left lateral view; C, Basal segment of antenna and third maxilliped; D, Whole animal, ventral view. Arrow indicates the epimeral ridge. cl, carapace length from the rostrum to the posterior margin of the carapace; cw, width of the carapace at the widest part.

Description. Carapace (Figs. 1A, 2A) broadly triangular, naked; dorsal surface depressed; regions with distinctly deep grooves; gastric region with four tubercles, two median in

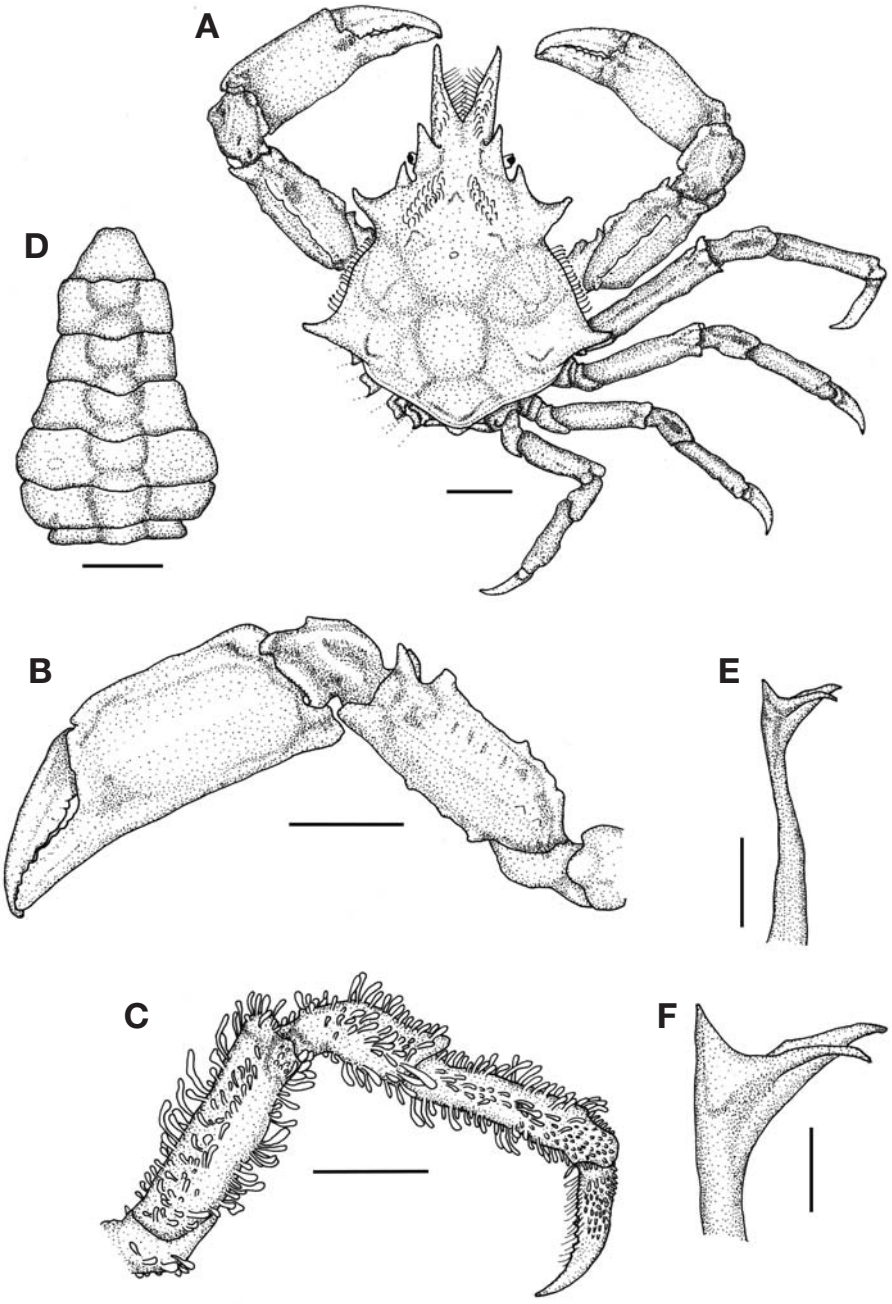

Fig. 2. *Pugettia intermedia* Sakai, 1938, male, cl 30.5×cw 20 mm. A, Whole animal, dorsal view, omitted club-shaped hair on anterior and posterior of ambulatory legs; B, Outer view of left cheliped; C, Posterior view of fourth ambulatory leg; D, Male abdomen; E, Right first pleopod, outer view; F, Tip of right first pleopod, outer view. cl, carapace length from the rostrum to the posterior margin of the carapace; cw, width of the carapace at the widest part. Scale bars: A, B, D=5 mm, C=2.5 mm, E=1.5 mm, F=0.5 mm.

transverse line between anterior and posterior ones, with series of curled hair on either side; cardiac region conical and mounted with tubercle; intestinal tubercle also distinct; branchial region with series of curled hair on either side. Rostrum (Figs. 1A, C, D, 2A) divergent at angle of about 50 degree; bases of rostrum flattened, tips acuminate, curved outwards, series of curled hair on either side. Hepatic spine slender, curved forwards at tip. Lateral brachial spine very prominent, projecting backwards, upward and forwards at tip; two tubercles on epibranchial region, another on inner side of lateral spin. Preocular spine very acuminate. Posterior angle of supraocular eave rounded angle. Postocular tooth

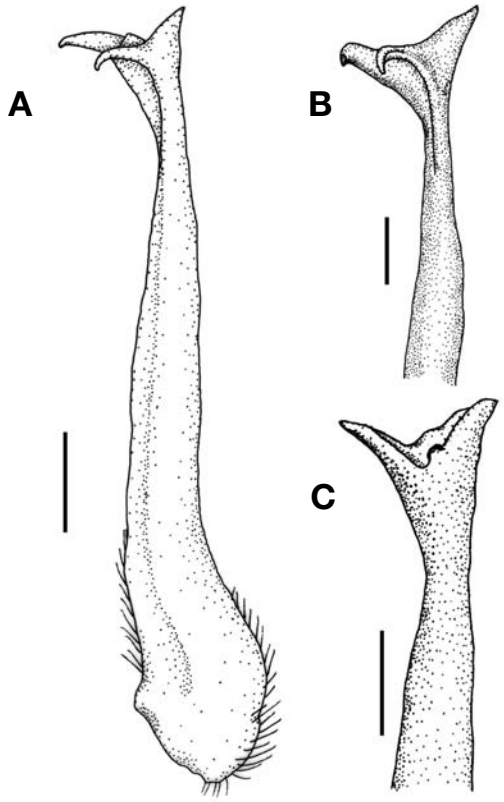

Fig. 3. Left first pleopod, ventral view. A, *Pugettia quadridens* (De Haan, 1839), cl 37.5×cw 24.1 mm; B, *Pugettia pellucens* Rathbun, 1932, cl 13.4×cw 8 mm; C, *Pugettia incisa* (De Haan, 1837), cl 21×cw 14 mm. cl, carapace length from the rostrum to the posterior margin of the carapace; cw, width of the carapace at the widest part. Scale bars: A=1 mm, B, C=0.5 mm.

as strong as hepatic spine. Pterygostomian ridge (Fig. 1C) with four or five tubercles. Sub-branchial margin (Fig. 1B) above epimeral ridge with irregular row of three or four tubercles.

Chelipeds (Figs. 1A, D, 2A, B) stout, ischium with two lobular on anterior border; merus with strong ridge or row of tubercles halfway down, and slightly outward in distal portion.

Ambulatory legs (Figs. 1A, D, 2A, C) with velvet-like tomentum, fringed with club-shaped hairs on anterior and posterior edges.

Abdomen of male (Fig. 2D) consisting of 7 segments with fine seta; third sternite widest; telson broad triangular.

First pleopod of male (Fig. 2E, F) slender, length of two medial lobes subequal.

Habitat. Rocky and weedy bottoms.

Distribution. Korea, Japan, Northern China, and Taiwan Strait (type locality: Shimoda, Japan).

Remarks. The authors carefully examined the some specimens of *P. intermedia* of Kim and Kim (1986), as well as the specimens and the description about *P. intermedia* of Kim and Kim (1998). As a result, those specimens were identified as *Pugettia quadridens* because of the following characteristics: 1) the two medial lobes of the first pleopod of the male *P. intermedia* are subequal, while in *P. quadridens* one of the two medial lobes is about half length of the other one (Figs. 2E, F, 3A); 2) there are three or four small tubercles on the branchial submargin above the epimeral ridge of *P. intermedia* (Fig. 2E, F), but that of *P. quadridens* exhibits just one or two such tubercles (Fig. 1B).

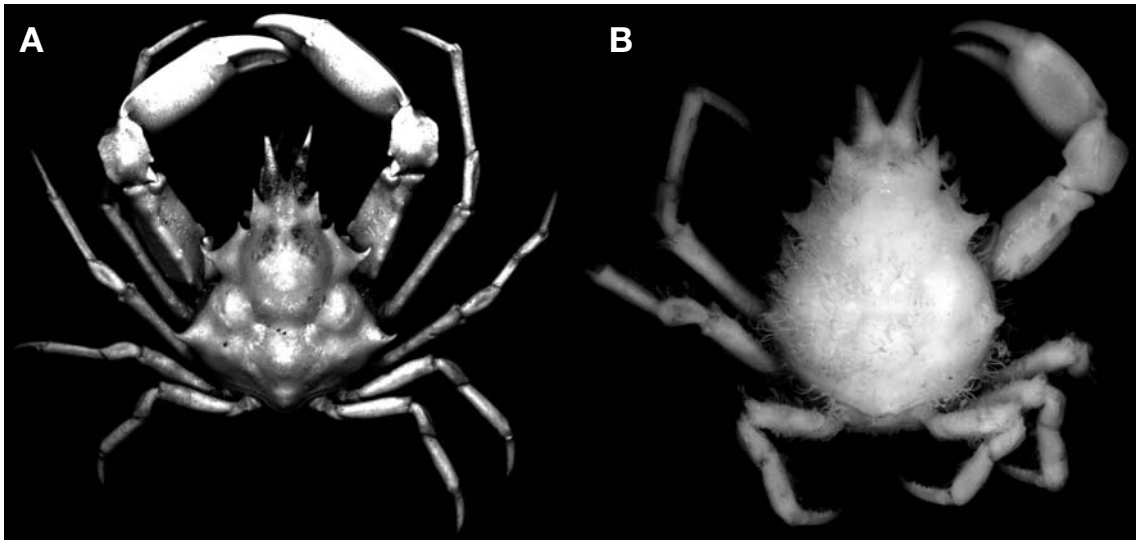

Fig. 4. Whole animals, dorsal view. A, *Pugettia quadridens* (De Haan, 1839), male, cl 37.5×cw 24.1 mm; B, *P. pellucens* Rathbun, 1932, male, cl 13.4×cw 8 mm. cl, carapace length from the rostrum to the posterior margin of the carapace; cw, width of the carapace at the widest part.

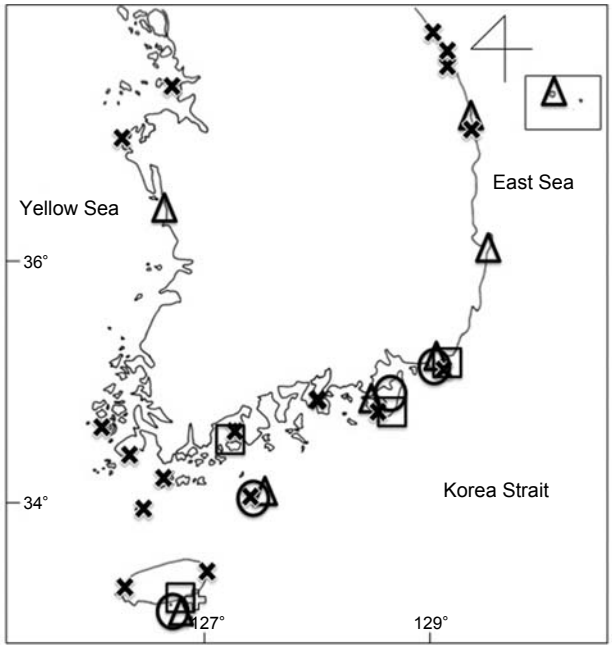

Fig. 5. The distribution of Korean species of the genus *Pugettia*. Cycles, *P. intermedia*; multiples, *P. quadridens*; pluses, *P. minor*; squares, *P. incisa*; triangles, *P. pellucens*.

In regard to the male first pleopod of Korean species belonging to the genus *Pugettia*, that of *P. quadridens* is similar to that of *P. pellucens* but they have different seta patterns on the carapace (Fig. 3A, B), and *P. pellucens* is smaller than *P. quadridens* (Fig. 4). *Pugettia incisa* has a long slender medial lobe and a small triangular lobe on the ventral surface at the tip (Fig. 3C), and this species has the postorbital lobe and the hepatic spine fused as a sing plate with the lateral margin of the carapace. This character distinguishes it from all other species in the genus.

In regard to the distribution of Korean species in the genus *Pugettia* based on the examined specimens, *P. quadridens* and *P. pellucens* occur throughout all coasts of the peninsula while *P. intermedia* and *P. incisa* occur only on the southern coast. *Pugettia minor* was only collected from Isl. Beomseom, Jeju-do, in 1971, and since then, this species has not been collected (Fig. 5).

ACKNOWLEDGMENTS

This study was in part supported by "The Survey of Korean Indigenous Species" from National Institute of Biological Resources (NIBR) of Ministry of Environment of Korea, and by a grant from the Marine Biotechnology Program, funded by Ministry of Oceans and Fisheries of Korean Government. This work was also in part with the support through the research program of KIOST with contract No. PE98928.

REFERENCES

Griffin DJG, Tranter HA, 1986. The decapoda brachyura of the Siboga Expedition. Part VIII. Majidae (Ed., Brill EJ). Leiden, pp. 1-335.

Kim HS, 1973. Illustreated encyclopedia of fauna and flora of Korea. Vol. 14. Anomura and Brachyura. Samhwa Publishing Co. Ltd., Seoul, pp. 1-694.

Kim HS, Kim IH, 1986. Marine invertebrate fauna of Chujado Island. Report on the Survey of Natural Environment in Korea, 5:309-332.

Kim SH, Kim W, 1998. The marine decapods crustaceans of Geojedo Island and its adjacent islets, Korea. Korean Journal of Systematic Zoology, 14:293-309.

Muraoka K, 1998. Catalogue of the Brachyuran and Anomuran crabs donated by Prof. Dr. Tune Sakai to the Kanagawa prefectural museum. Catalogue of the Collection in the Kanagawa Prefectural Museum of Nature History, 11:5-67.

Ng PKL, Guinot D, Davie PJF, 2008. Systema Brachyurorum: Part I. An annotated checklist of extant brachyuran crabs of the world. The Raffles Bulletin of Zoology, Supplement, 17: 1-286.

Sakai T, 1938. Studies on the crabs of Japan, 3. Brachyugnatha, Oxyrhyncha. Yokendo Co., Tokyo, pp. 193-364.

Sakai T, 1976. Crabs of Japan and the adjacent seas. Kodansha Ltd., Tokyo, pp. 1-773.

Received August 4, 2013
Revised December 13, 2013
Accepted December 19, 2013