

First Korean Record of *Porcellanopagurus japonicus* (Decapoda: Paguroidea), a Hermit Crab Living in Bivalve Shells

Jibom Jung^{1,*}, Sang-Hui Lee²

¹School of Biological Sciences, Seoul National University, Seoul 08826, Korea

²National Marine Biodiversity Institute of Korea, Seocheon 33662, Korea

ABSTRACT

This study reports the pagurid hermit crab *Porcellanopagurus japonicus* in Korean waters for the first time. This species has a right cheliped larger than the left one, reduced and globular abdomen, and symmetrical uropods. *Porcellanopagurus japonicus* is similar to *P. nihonkaiensis*, a previously reported congeneric species in Korea, but also has distinguished morphological and ecological characters. There are currently issues with the Korean scientific name for *P. japonicus*, we suggest a reasonable Korean scientific name of this organism with its etymology. In addition, this species inhabits bivalve shells, which is not a typical habitat for hermit crabs, and the unique habitats of this and several other Korean hermit crabs are reviewed.

Keywords: Paguridae, deep sea, unique habitat, symmetrical abdomen, Korean scientific name

INTRODUCTION

Hermit crab species in the genus *Porcellanopagurus* generally have a reduced and globular abdomen and symmetrical uropods (McLaughlin, 2003), and 13 species have been reported in the world (McLaughlin et al., 2010). Some of these species protect their soft abdomen with a bivalve shell (Martin et al., 2009), and this is different from other hermit crabs, which generally cover their abdomen with a gastropod shell (Williams and McDermott, 2004). Four *Porcellanopagurus* species have been reported in Japan (Arima, 2014). Among them, *P. japonicus* is known to live at deeper depths than the other three species; however, reports of this species in academic studies are rare. In Korea, only *P. nihonkaiensis* are reported to live in the temperate shallow subtidal zone (Ko and McLaughlin, 2008; Jung et al., 2018b). One specimen of *P. japonicus* was recently found in the Korean Strait during a continuous systematic study of the Korean hermit crab. Herein, we report *P. japonicus* with a diagnosis. Morphological examination of the specimen as that of Jung et al. (2018a). The examined specimen in this study was deposited in the

Marine Arthropod Depository Bank, Seoul National University (MADBK). Three specimens of *P. japonicus* in Natural History Museum and Institute (Chiba, Japan) were examined for comparison:

1 ind, Izu Islands, Hyotan-se Bank, Japan, 135–150 m, 22 Oct 1996, CBM-ZC 4579.

1 ind, Izu Islands, Omuro-dashi Bank, Japan, 138–141 m, 19 Oct 1993, CBM-ZC 7868.

1 ind, Sagami Sea, W of Izu-oshima Island, Japan, 143–154 m, 27 Nov 2007, CBM-ZC 10382.

SYSTEMATIC ACCOUNTS

Order Decapoda Latreille, 1802

Family Paguridae Latreille, 1802

Genus *Porcellanopagurus* Filhol, 1885

¹**Porcellanopagurus japonicus* Balss, 1913

Porcellanopagurus japonicus Balss, 1913: 66, fig. 40 (type locality: Uruga Channel); Miyake, 1978: 118 (part); Mc-

Korean name: ¹*큰조개집게



Fig. 1. Dorsal view of *Porcellanopagurus japonicus* Balss, 1913 (male, sl 6.9 mm, MADBK 160749_001) and its bivalve shell.

Laughlin et al., 2010: 35 (list), fig. 17B; Arima, 2014: 144, unnumbered fig.
 not *Porcellanopagurus japonicus*: Miyake, 1978: 118 (part);
 Jo et al., 2006: 72, 73, unnumbered fig.

Material examined. Korea: 1♂ (shield length [sl] 6.9 mm), Jeju, Seongsanpo port, 100 m, fishing trawler, 1 May 2019, coll. Lee S, MADBK 160749_001.

Diagnosis. Shield (Figs. 1, 2A) subtrapezoid, length 0.8 times as long as width; rostrum roundly and broadly triangular with sharp prominent median margin; lateral projection sharply triangular; three anterior carapace lobe tunicate, with sharp spine tip. Ocular peduncle 0.4 times as long as shield, base inflated; cornea slightly dilated. Antennular and antennal peduncle overreaching distal corneal margin when fully extended. Right cheliped (Figs. 1, 2B) larger and greatly broader than left; chela 1.7 times as long as wide, covered with numerous minute granules; movable and fixed fingers with tuft of setae on dorsal surfaces, hiatus with row of calcificated teeth and tuft of slightly long setae, outer margins with row of small spines; palm almost unarmed, with row of small granulose spines and scattered minute setae on dorsomesial and dorsolateral margins, dorsomesial margin slightly elevated; carpus with spread ridges on dorsal surface, moderately long setae and row of large tubercles on mesial margin; ventral

margin of merus with several small spines. Left cheliped (Figs. 1, 2C) slender; chela 2.8 times as long as wide, with moderately long setae on outer margin; movable and fixed fingers unarmed, slightly longer than palm, hiatus with row of minute teeth and few tuft of slightly long setae; palm with spread small granules on dorsal surface, row of small blunt spines on mesial and lateral margins; carpus with large granules on dorsal surface and row of large blunt spines and few moderately long setae on outer margins; merus with small blunt spines on ventromesial and ventrolateral margins. Ambulatory legs (Figs. 1, 2D, 2E) dactyl slightly shorter than propodus, dorsal margin with 2 small distal spines; ventral margin with row of 7–9 corneous spines, dorsomesial surface with 6 small distal spines; ventral margin of propodus with row of 6–7 corneous spines; dorsal margins of propodus and carpus, and ventral margin of merus with row of blunt spines or tubercles; lateral surface of carpus with rugged edge. Abdomen reduced, membranous, globular, dorsal surface slightly calcificated. Uropod (Figs. 1, 2F) symmetric, endopod and exopod clearly separated as x-shape.

Distribution. Southern water of Korea; nearby Tokyo Bay, Japan.

Habitat. bivalve shell.

Remarks. There is no distinguished difference between the original description and Korean *P. japonicus*. The ecological

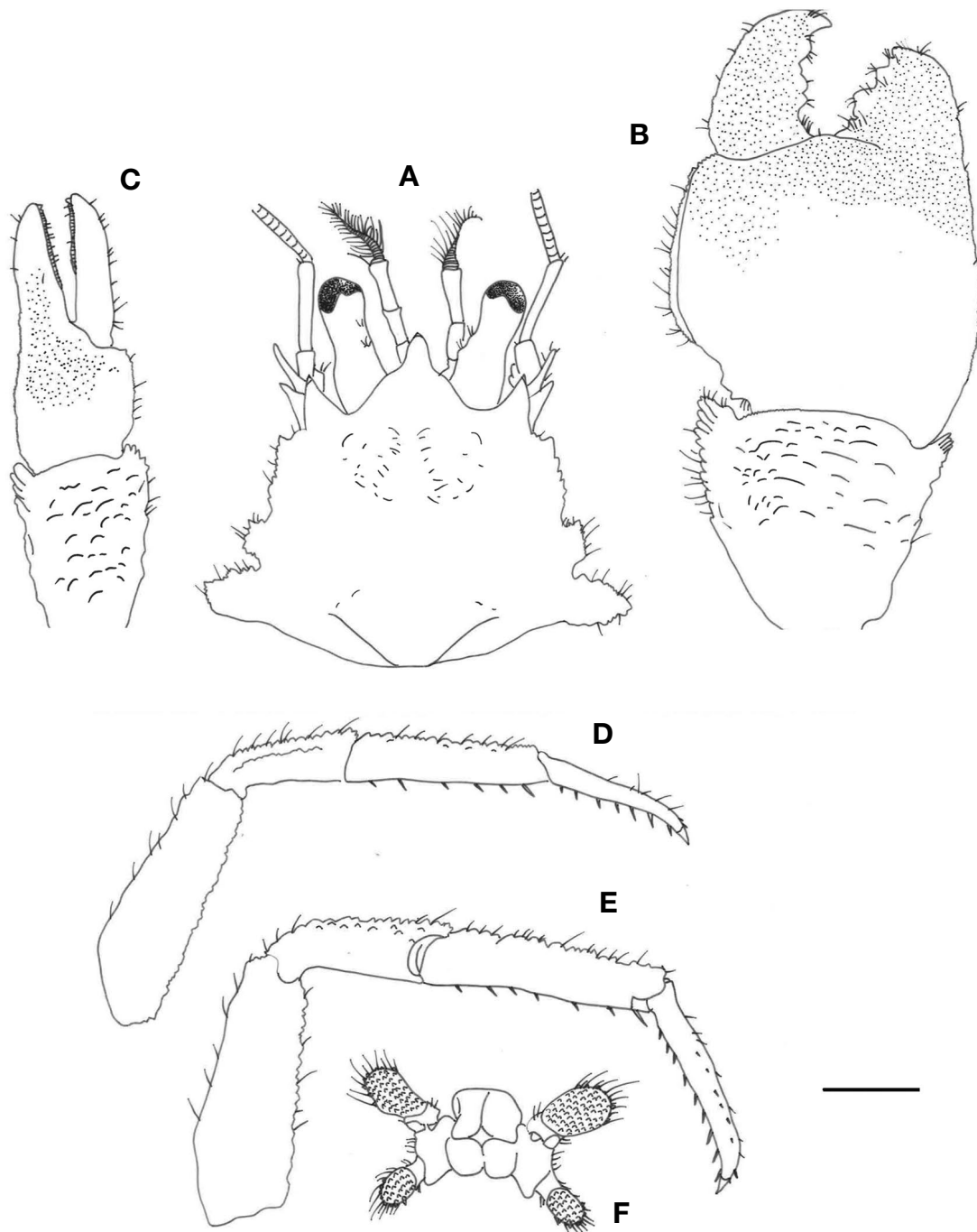


Fig. 2. *Porcellanopagurus japonicus* Balss, 1913 (male, sl 6.9 mm, MADBK 160749_001). A, Shield and cephalic appendages, dorsal view; B, Right cheliped, dorsal view; C, Left cheliped, dorsal view; D, Right first ambulatory leg, lateral view; E, Left second ambulatory leg 2, mesial view; F, Uropods, dorsal view. Scale bar: A-F=2 mm.

and morphological characters of *P. japonicus* distinguish it from *P. nihonkaiensis*, a previously reported *Porcellanopagurus* species from Korea. Ecologically, *P. japonicus* is usually found at ≥ 40 m deep (Arima, 2014; Jung J, pers. observation), while *P. nihonkaiensis* is collected at ≤ 30 m

deep (Takeda, 1985; Jo et al., 2006; Ko and McLaughlin, 2008; Arima, 2014). In addition, *P. japonicus* has four morphological characters that *P. nihonkaiensis* does not. First, rostrum and posterolateral projections are acute or subacute in *P. japonicus* but blunt in *P. nihonkaiensis*. Second, lateral

teeth are thick and entirely spinous in *P. japonicus* but sharp and smooth in *P. nihonkaiensis*. Third, the dorsal margins of ambulatory legs have a row of blunt spines or tubercles in *P. japonicus* but not in *P. nihonkaiensis*. Fourth, uropods are clearly separated in an X shape in *P. japonicus* but not in *P. nihonkaiensis*.

Jung et al. (2018b) synonymized Korean *P. japonicus* with *P. nihonkaiensis*, and changed the Korean scientific name of the species to *P. nihonkaiensis*. The study confirms the presence of *P. japonicus* in Korea, and we denominate its Korean scientific name again as “Keun (big)-jogae (bivalve)-jipgae (hermit crab)” to avoid confusion. The etymology of this name is the larger size of *P. japonicus* than *P. nihonkaiensis*, and the Korean scientific name of *Porcellanopagurus*, “Jogae-jipgae-sok (genus)”.

This study reports the sixth case in Korea of hermit crabs do not live in gastropod shells, which are the typical habitat of hermit crabs (Williams and McDermott, 2004). Korea contains five species that do not live in gastropod shells: three species in the tubes of a polychaete tubeworm (*Lophopagurus (Australeremus) triserratus*, *Discorsopagurus macLaughlinae*, and *D. tubicola*), one species in tusk shells (*Pomatocheilus jeffreysii*), and one species in bivalve shells (*Porcellanopagurus nihonkaiensis*) (Kim and Son, 2006; Ko and McLaughlin, 2008; Jung and Kim, 2016). Some Korean hermit crabs e.g., *Pagurus constans*, *P. rectidactylus*, *P. simulans*, *P. pectinatus*, and *P. undosus* are reported as living in the sponge or the carcinoecia formed by associated hydrozoa (Kim and Son, 2006; Jung and Kim, 2014, 2017), but these shells based on the small gastropod shell. Meanwhile, some hermit crabs live in coral, rock holes, and wooden cylinders (Williams and McDermott, 2004) although they have not been reported in Korea. These habitats and others should be investigated to uncover the marine biodiversity in Korea.

ORCID

Jibom Jung: <https://orcid.org/0000-0002-5074-0002>

Sanghui Lee: <https://orcid.org/0000-0002-8724-9292>

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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