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Short communication

A Report of *Carcinus aestuarii* (Decapoda: Brachyura: Carcinidae) from Korea

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ABSTRACT

As a result of continuous taxonomic studies on the Korean crabs, *Carcinus aestuarii* Nardo, 1847 belonging to the superfamily Portunoidea is newly reported from Korean waters. *Carcinus aestuarii* has characteristics as followings: cardiac, hepartic and brachial regions are divided by deep furrow; shape of three lobes in frontal area is flatter with hairy; inside of carpus is with one sharp tooth; the posterior-lateral margin of the carapace is concave, and so on. The examined specimen doesn't have hairy and bump on outer margin of the chelipeds which differed from the previous description of the specimens collected from Tokyo Bay, Japan. Here, the diagnosis and the picture of Korean specimen is provided. Korean portunoids currently consist of 20 species belonging to 10 genera.

Keywords: new report, Decapoda, Portunoidea, *Carcinus aestuarii*, Korean fauna

INTRODUCTION

Crabs inhabit at abyssal ocean depths down to over 2,000 meters, and up to over 1,000 meters above sea level on mountains, and are widely distributed except in polar regions, deserts, and alpine regions, so they are familiar to people (Manning and Holthuis, 1989; Cumberlidge, 2007). The living 6,793 named crabs were recorded, and published estimates range from 5,000 to 10,000 (Ng et al., 2008). Of these, the superfamily Portunoidea Rafinesque, 1815, recorded 455 species, is a diverse clade of marine crabs that includes commercially important species, significant invasive, and several ecologically divergent lineages (De Grave et al., 2009; Brockerhoff and McLay, 2011).

In Korea, a total of 249 species of crabs have been recorded so far (National Institute of Biological Resources, 2019; Youn et al., 2019; Lee et al., 2020). The nineteen portunoids were recorded (National Institute of Biological Resources, 2019). As a result of continuous taxonomic studies on Korean crabs, *Carcinus aestuarii* Nardo, 1847, was newly reported from Korean waters. The family Carcinidae MacLeay, 1838 and the genus *Carcinus* Leach, 1814 were also new to Korean fauna. With the present report, Korean portunoids are now composed of 20 species. We provide their morphological diagnosis with pictures.

Material examined in this study is preserved in 95% ethyl alcohol. The specimen was observed under M205C binocular stereomicroscope (Leica, Wetzlar, Germany). Images were recorded using D7000 digital camera (Nikon Imaging Korea, Seoul, Korea), and developed with Helicon Focus software (Helicon Soft, Kharkov, Ukraine).

The abbreviations "cl" and "cw" refer to the carapace length from the front to the posterior dorsal margin of the carapace and to the width of the carapace measured at the widest part, respectively. All characters were measured using metric dial calipers (Wiha, Monticello, MN, USA). The classification follows that of Ng et al. (2008).

SYSTEMATIC ACCOUNTS

Order Decapoda Latreille, 1802
Superfamily Portunoidea Rafinesque, 1815
[1*]Family Carcinidae MacLeay, 1838

Korean name: [1*]녹색꽃게과(신칭)

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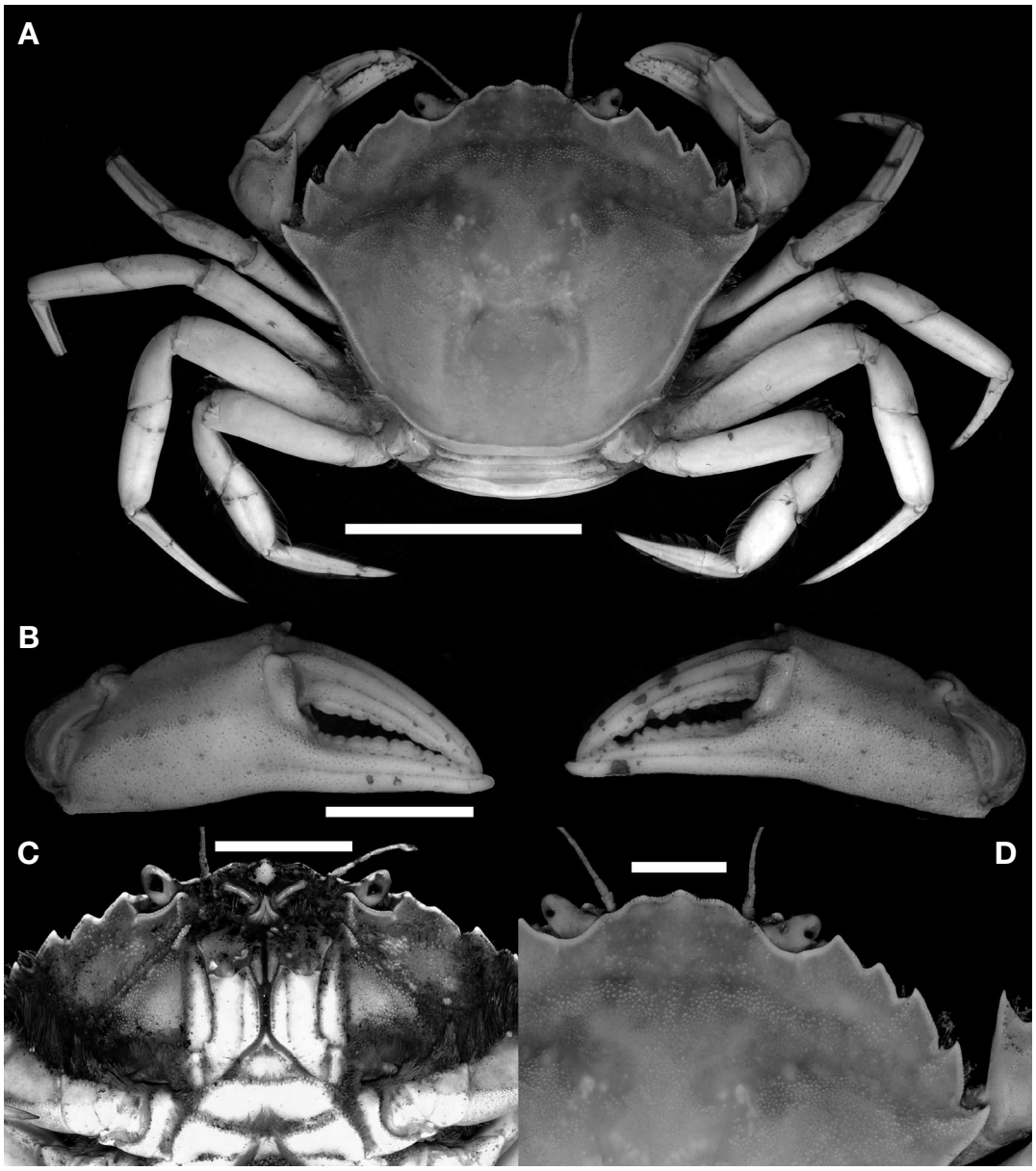

Fig. 1. *Carcinus aestuarii* Nardo, 1847, female (cw 38.1 mm, cl 30.2 mm). A, Whole animal, dorsal view; B, Propodus and dactylus of cheliped, outer view; C, Third maxilliped; D, Frontal margin and antero-lateral border, dorsal view. Scale bars: A=20 mm, B=7 mm, C=9 mm, D=5 mm.

[1*]Genus *Carcinus* Leach, 1814

[2*]***Carcinus aestuarii* Nardo, 1847 (Fig. 1)**

Carcinus aestuarii Nardo, 1847: 2; Sakai, 1986: 3, Pl. 2; Yamada & Hauck, 2001: 907, table 1.

Carcinus mediterraneus Czerniavsky, 1884: 177; Holthuis & Gottlieb, 1958: 82.

Material examined. Korea: cw 38.1 mm×cl 30.2 mm, 1♀, Ulsan-si, Nam-gu, Maeam-dong, Ulsan port, 28 Feb 2000, ethyl alcohol fixed. Coll. Kim SH.

Diagnosis. Carapace (Fig. 1A) hexagonal, convex, regions defined, no transverse ridges. Front (Fig. 1A) projecting beyond inner supraorbital angles, three lobed, one fourth as wide as the carapace; margin flatter and protrudes. Antero-lateral borders (Fig. 1A, D) cut into five strong teeth elevated

Korean name: [1*]녹색꽃게속(신칭), [2*]지중해녹색꽃게(신칭)

and outward. Postero-lateral margin concave. Orbits (Fig. 1A) with one notch in upper and one in the concave lower border. Antennules (Fig. 1C) transversely oblique. Basal segment of antenna (Fig. 1C) slightly longer than broad; flagellum stands in inner hiatus. Buccal cavern squared, little longer than broad.

Chelipeds (Fig. 1B) about as long as first three pairs of legs, slightly unequal. Merus unarmed. Inner angle of carpus spiniform. Propodus with no spine. Dactylus stout, little shorter than length through middle of palm, not very strongly toothed.

Ambulatory legs (Fig. 1A) stoutish. Merus of last pair unarmed elongate. Propodus shortened and somewhat broadened. Dactylus acutely lanceolate.

RESULTS AND DISCUSSION

Carcinus aestuarii is global famous invasion species as *C. maenas* (Linnaeus, 1758), and is even listed among the 100 world's worst alien invasive species. The Mediterranean crab of the genus *Carcinus*, native to around the Mediterranean Sea, has been receiving much attention as a global invasive predator in coastal ecosystems (Grosholz and Ruiz, 1995). It has been invaded in eastern and western North America, South Africa, Australia, and Argentina as *C. maenas* (Koike and Iwasaki, 2011). *Carcinus aestuarii* was found first in Tokyo Bay at 1984 (Sakai, 1986), then the crabs spread to canals and river mouths surrounded by reclaimed land (Watanabe, 1995). The Korean specimen was collected in Ulsan new port where was opened in 1963, and then the port was extended in 1975. Since then, the port has been used only trading mass chemical materials. Based on this situation, the authors supposed this crab may have been moved here by transport mechanisms as follows: (1) ship boring and fouling assemblages, (2) solid ballast, and (3) ballast water.

The European green crabs, *Carcinus maenas* and *C. aestuarii*, are similar in morphology. These two species can be distinguished by some characteristics. The present specimen is agreed with the morphological features in having as followings: (1) cardiac, hepartic and brachial regions are divided by deep furrow, (2) shape of three lobes in frontal area is flatter with hairy, (3) inside of carpus is with sharp tooth, (4) the posterior-lateral margin of the carapace is concave, and so on. According to the description of Yamada and Hauck (2001), the outer margin of chelipeds in *C. aestuarii* from Japan has hairy and bumps, while our specimen do not have them.

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CONFLICTS OF INTEREST

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

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REFERENCES

Brockerhoff A, McLay C, 2011. Human-mediated spread of alien crabs. In: In the wrong place-alien marine crustaceans: distribution, biology and impacts (Eds., Galil BS, Clark PF, Carlton JT). Springer, Dordrecht, pp. 27-106.

Cumberlidge N, 2007. A new species of freshwater crab of the genus *Microthelphusa* (Brachyura: Pseudothelphusidae) from a remote isolated cloud forest on a tabletop mountain in western Guyana, South America. Zootaxa, 1447:57-62. https://doi.org/10.5281/zenodo.176194

Czerniavsky V, 1884. Crustacea Decapoda Pontica Littoralia. Materialia ad zoographiam Ponticam comparatam II. Travavaux de la Societe de l'Universite de Kharkov, 13:1-268 (in Russian).

De Grave S, Pentcheff ND, Ahyong ST, Chan TY, Crandall KA, Dworschak PC, Felder DL, Feldmann RM, Fransen CHJM, Goulding LYD, Lemaitre R, Low MEY, Martin JW, Ng PKL, Schweitzer CE, Tan SH, Tshudy D, Wetzer R, 2009. A classification of living and fossil genera of decapod crustaceans. Raffles Bulletin of Zoology, 21:1-109.

Grosholz ED, Ruiz GM, 1995. Spread and potential impact of the recently introduced European green crab, *Carcinus maenas*, in central California. Marine Biology, 122:239-247. https://doi.org/10.1007/BF00348936

Holthuis LB, Gottlieb E, 1958. An annotated list of the decapod crustacean of the Mediterrnean coast of Israel, with an appendix listing the decapoda of the eastern Mediterranean. Bulletin of the Research Council of Israel, 7B:1-126.

Koike F, Iwasaki K, 2011. A simple range expansion model of multiple pathways: the case of nonindigenous green crab *Carcinus aestuarii* in Japanese waters. Biological Invasions, 13:459-470. https://doi.org/10.1007/s10530-010-9841-5

Lee SH, Lee S-k, Kim JN, Kim W, 2020. New records of two spider crabs (Decapoda, Brachyura, Majidae) from Korea. Crustaceana, 93:215-223. https://doi.org/10.1163/15685403-

bja10005

Manning RB, Holthuis LB, 1989. Two new genera and nine new species of geryonid crabs (Crustacea, Decapoda, Geryonidae). Proceedings of the Biology Society of Washington, 102:50-77.

Nardo GD, 1847. Sinonimia moderna delle specie registrate nell' opera intitolata: Descrizone de' Crostacei, de' Testacei e de' Pesci che abitano le Lagune e Golfo Veneto, rappresentati in figure, a chiaro-scuro ed a colori dall' Abate Chiereghini Ven. Clodiense Applicata per Commissione Governativa, Venezia, pp. 1-127.

National Institute of Biological Resources, 2019. National species list of Korea [Internet]. National Institute of Biological Resources, Incheon, Accessed 1 Sep 2020, <http://krb.go.kr>.

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, 17:1-286.

Sakai T, 1986. Rare species and their genus of crabs in Japan. Researches on Crustacea, 15:1-4 (in Japanese).

Watanabe S, 1995. The massive appearance of the Mediterranean green crab, *Carcinus mediterraneus*, in Tokyo Bay. Cancer, 4:9-10 (in Japanese).

Yamada SB, Hauck L, 2001. Field identification of the European green crab species: *Carcinus maenas* and *Carcinus aestuarii*. Journal of Shellfish Research, 20:905-912.

Youn S-H, Oh HJ, Seo IS, Kim MH, 2019. New record of two pinnotherid crabs, *Pinnixa penultipedalis* Stimpson, 1958 and *Sakaina japonica* Serène, 1964/(Decapoda, Brachyura), from Korea. Korean Journal of Fisheries and Aquatic Sciences, 52(5): 519-523.

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