INTRODUCTION

During a visit to the Folklore and Natural History Museum in Jeju Special Self-governing Province, the authors found in its arthropod collection dried specimens of *Cycloes granulosa* De Haan, 1837, which were originally collected by a fisherman at Port Hallim. As the Korean calappoid crab has been reported for six species of two genera (four species of *Calappa* Weber, 1795 and two species of *Mursia* Desmarest, 1823), it is the first species of the genus *Cycloes* De Haan, 1837.

The majoid genus *Pugettia* Dana, 1851 has been recorded for five species from Korean waters (Kim and Kim, 1997; Lee, 2007; Lee et al., 2014): *P. incisa* (De Haan, 1839), *P. intermedia* Sakai, 1938, *P. minor* Ortmann, 1893, *P. pellucens* Rathbun, 1932, and *P. quadridens* (De Haan, 1839). Recently, some specimens collected from the East Sea are identified as *P. vulgaris* Ohtsuchi, Kawamura, and Takeda, 2014. Therefore, the present paper describes and illustrates these two species with photographs.

Specimens were examined under a Leica EZ40 microscope (Leica Microsystems, Wetzlar, Germany) and digital photographs of crabs taken using an Olympus E-30 camera (Olympus, Tokyo, Japan). The following abbreviations are used in the present study: CL (carapace length) from the tip of rostrum to the posterior dorsal margin of the carapace, CW (carapace width) across the widest point of the carapace excluding branchial spine, and in majoid crab PCL (postrostral carapace length) carapace length excluding rostrum. Measurements were made by using digital vernier caliper (CD-15APX, Mitutojo, Kawasaki, Japan) to 0.1 mm. The brachyuran classification follows that of Ng et al. (2008). All the specimens are deposited at the corresponding author’s collection of Silla University, Busan.

SYSTEMATIC ACCOUNTS

Superfamily Calappoidea De Haan, 1833
Family Calappidae De Haan, 1833
1*Genus *Cycloes* De Haan, 1837

26*Cycloes granulosa* De Haan, 1837 (Figs. 1A–D, 2)
*Cycloës granulosa* De Haan, 1837: 71, Pl. 19, fig. 3, Pl. E.
Fig. 1. *Cycloes granulosa* De Haan, 1837 (A–D): A, Female (CL 31.2 mm, CW 29.5 mm), dorsal view; B, Female (CL 36.6 mm, CW 35.9 mm), dorsal view; C, Ventral view; D, Frontal view. *Pugettia vulgaris* Ohtsuchi, Kawamura, and Takeda, 2014 (E, F), male (CL 22.1 mm, CW 14.2 mm): E, Dorsal view; F, Ventral view.
**Cycloes granulosa**: Sakai, 1976: 139, Pl. 43, fig. 3; Miyake, 1983: 199; Dai and Yang, 1991: 108, fig. 54, Pl. 12(3); Yamaguchi and Baba, 1993: 313, fig. 97; Galil and Clark, 1996: 194, figs. 9B, 10A–C, 11A, B; Minemizu, 2000: 195; Takeda and Manuel-Santos, 2006: 100, fig. 7E.

**Cryptosoma granulosum**: Lucas, 1844: 438; Miers, 1886: 293; Sakai, 1936: 49, Pl. 7, fig. 2; Takeda, 1982: 109, fig. 319.

**Material examined.** 2♂♀ dried, Korea: Jeju Special Self-Governing Province, Hallim-eup, Jeju-si, Hallim Port, 28 Oct 2007, coll. Yang KC.

**Description.** Carapace (Figs. 1A, B, 2A) convex, longitudinally ovate, slightly longer than broad. Dorsal surface densely granulate, with longitudinal rows of low tubercles anteriorly; regions indistinct except furrows bordering cardiac region. Front narrow (Fig. 1A, B, D), with 2 triangular teeth. Anterolateral margin (Figs. 1A, B, 2A) granulate; lateral spine minute, indistinct; posterolateral margin sharply convergent, minutely granulate.

Eye (Fig. 1A, B, D) filling orbit; eyestalk short, smooth, cornea large; orbital margins with long plumose setae; supraorbital margin swollen medially.

Chelipeds (Figs. 1, 2B–D) massive, densely granulate, subequal in size. Merus (Fig. 1A, B, D) with lanceolate tooth distally. Upper margin of carpus (Figs. 1A, B, D, 2D) with 3 teeth increasing in size distally. Palm (Figs. 1A, B, D, 2B, C) crested on upper margin, cut into 9 teeth; outer surface densely granulate, with larger granules below crest; lower margin with 2 parallel rows of acute tubercles, bearing keel-like lobe proximally. Movable finger (Figs. 1C, D, 2B, C) granulose on outer surface, with acute tubercles on upper margin; right one with proximal molariform tooth fitting into shallow depression.

Ambulatory legs (Fig. 1A–C) smooth, laterally compressed; dactyli long, styliiform.

Abdomen of female (Fig. 1C) with 6 segments; segment 2 with bifissured, medially concave crest. Telson (Fig. 1C) triangular, slightly longer than abdominal segment 6.

**Habitat.** The crab was found on the sandy bottom at 5~100 m in depths (Minemizu, 2000).

**Distribution.** Singapore, Vietnam, Taiwan, China, Japan, Philippines, and now Korea.

**Remarks.** These crabs are the first species of the genus *Cycloes* in Korea and collected by a local fisherman. Two species, *Cycloes granulosa* De Haan, 1837 and *Cycloes marisrubri* Galil and Clark, 1996, of the genus *Cycloes* are reported in the world. *Cycloes granulosa* is distinguished from *C. marisrubri* by having a granulate carapace with rows of low tubercles and in chelipeds each carpus with three teeth on upper margin and each palm without knob-like tubercles on outer surface. In Korean waters this species is similar to the species of *Mursia* (*M. armata* De Haan, 1837 and *M. trispinosa* Parisi, 1914) by having a denticulate crest on each propodus of the chelipeds, a proximal tooth fitting into a depression in a dactylus of the larger cheliped, and long styliform dactyli of the ambulatory legs. However, it can be characterized as having a minute lateral spine on margin of the carapace (vs. a well developed spine in the two species of *Mursia*). Although, our specimens dried, they have yellow with reddish brown spots on whole body, inner surface of the cheliped with orange markings, and ambulatory legs with orange stripes.

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Korean name: 1*잔털뿔물맞이게*(신칭)
Eye (Figs. 1E, F, 3B) non-retractile, orbit incomplete.

Basal antennal article (Fig. 3B) with distal spine on outer lateral margin; antennal peduncle consisting of 2 articles; ultimate article shorter than penultimate article, proximal end as broad as distal end.

Pterigostomial region (Fig. 3B) with 4 small tubercles.

Third maxilliped (Fig. 3C): Ischium subrectangular, about 1.2 times longer than broad, inner margin with setae and spinules, antero-inner margin produced; merus with setae on margins; dactylus setose. Outer margin of exopod with setae and spinules.

Chelipeds (Figs. 1E, F, 3A, D, E) equal in size. Merus prismatic; upper crest distinct, with 2 small teeth proximally and larger tooth subdistally; lower surface with 3 small tubercles; inner and outer margins without tubercle. Carpus sharply crested on inner and outer margins, upper surface with shorter crest including 2–3 tubercles. Palm crested on upper surface.

Ambulatory legs (Figs. 2, 3A, F, G) with short dense setae, scattering of longer setae; each merus with distal tooth; each carpus with 2 ridges on upper surface; each dactylus with 2 rows of spinules on posterior margin.

Abdomen of male (Fig. 3H) with 6 segments.

Gonopod 1 (Fig. 3I, J) relatively stout; distal part triangular; lateral lobe broad, triangular; 2 medial lobes slender; dorsal lobe (Fig. 3J) approximately 1.5 times longer than ventral lobe.

**Habitat.** These crabs were found in a scallop farm.

**Distribution.** Japan and now Korea.

**Remarks.** These specimens agree well with those of *P. vulgaris* described by Ohtsuchi et al. (2014) based on the following characteristics: 1) the carapace is covered with setae

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**Fig. 2.** *Cycloes granulosa* De Haan, 1837, female (CL 36.6 mm, CW 35.9 mm). A, Dorsal view of left part of carapace; B, Chela of right cheliped; C, Chela of left cheliped; D, Carpus of left cheliped, outer view. Scale bars: A–C = 10 mm, D = 5 mm.
Fig. 3. *Pugettia vulgaris* Ohtsuchi, Kawamura, and Takeda, 2014, male (CL 22.1 mm, CW 14.2 mm). A, Dorsal view; B, Right anterior carapace, ventral view; C, Right third maxilliped, ventral view; D, Right cheliped, inner view; E, Merus of right cheliped, ventral view; F, Right ambulatory leg 1, outer view; G, Merus and carpus of right ambulatory leg 1, upper view; H, Abdomen; I, Left gonopod 1, ventral view; J, Distal part of left gonopod 1, upper view. Scale bars: A, B = 5 mm, C, I = 1 mm, D–H = 2.5 mm, J = 0.5 mm.
and has no tubercles, 2) the relative length of the rostral spines against the PCL is 0.29–0.31, 3) the hepatic spine is subequal to or slightly larger than the postorbital spine, 4), the merus of the cheliped has 3 teeth on the upper crest, 5) the carpus of the cheliped has 3 crests, and 6) the dorsal lobe of the gonopod is 1.5 times longer than the ventral lobe. However, *P. pellucens* figured by Lee (2007: fig. 10A, as *P. quadridens pellucens*) and Lee et al. (2014: fig. 4B) is significantly differs from that of Ohtsuchi et al. (2014) and similar to *P. vulgaris* because 1) the ratio of length of rostral spine to PCL is not 0.40–0.50, 2) the rostral spines are not widely divergent in the distal half, and 3) the hepatic spine is not much larger than the postorbital spine. Therefore, it is necessary to re-examine their specimens.

Including the present study, six species of the genus *Pugettia* are reported from Korea. Their identification keys are following:

**Key to species of the genus *Pugettia* from Korea**

Eye with incomplete orbit. Basal antennal article short, truncate. Carapace subtriangular or pear-shaped, rostrum with 2 slender spines, preorbital and postorbital spines distinct, hepatic and branchial margins produced with spine. Chelipeds prismatic in meri. All abdominal segments distinct, hepatic and branchial margins produced with spine. With 2 slender spines, preorbital and postorbital spines distinctly truncate. Carapace subtriangular or pear­shaped, rostrum

1. Postorbital spine and hepatic lobe fused as wing-shaped plate ........................................... *Pugettia incisor*
   - Postorbital spine and hepatic lobe not fused as wing-shaped plate ........................................... 2
2. Cardiac region of carapace with prominent spine .............. .......................... .......................... 
   - Cardiac region of carapace without prominent spine ...... 3
3. Postorbital spine much smaller than hepatic spine ...... 4
   - Postorbital spine subequal to hepatic spine ..................... 5
4. Carapace subtriangular .......................... *Pugettia quadridens*
   - Carapace elongated pear-shaped .......................... *Pugettia pellucens*
5. Carapace regions well defined ........................ *Pugettia intermedia*
   - Carapace regions not defined ........................ *Pugettia vulgaris*

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