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Report on new record of sea slug nudibranch species *Cadlinella subornatissima* (Gastropoda: Chromodorididae) from Korean waters

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ABSTRACT

A chromodorid nudibranch species *Cadlinella subornatissima* Baba, 1996 (Gastropoda: Nudibranchia: Chromodorididae) is newly recorded from Korean water. In this report, detailed external morphology is provided with its colored illustrations. This species is morphologically distinguished from other congeneric species by the following characteristics: the tip of dorsal papillae is pointed with pink pigment; yellow dorsal marking on central dorsum without mantle margin. The Korean chromodorid nudibranchs are composed of 19 species of 10 genera, including *Cadlinella subornatissima* which is firstly reported in the present study.

Keywords: Nudibranchia, Taxonomy, Chromodorididae, *Cadlinella subornatissima*, Korea

INTRODUCTION

The family Chromodorididae Bergh, 1891 (Chromodorids) is one of the well-known nudibranch families that includes over 300 described species of 17 genera worldwide (Turner and Wilson, 2008; Bouchet, 2014). They are morphologically diverse, beautiful colored sea slugs found mostly from tropical to subtropical coastal waters (Johnson and Gosliner, 2012). Some species of this family secrete toxic defensive substance by mantle glands on mantle edge (Rudman, 1984; Debelius and Kuiter, 2007; Yonow, 2008).

Chromodorid nudibranchs have been recorded for 18 species from 9 genera in Korea (Choe, 1992; Choe and Lee, 1994; Lee and Min, 2002; Choi, 2003; Min *et al*., 2004; Koh, 2006; Jung *et al*., 2013, 2014; Jung, 2014). In this study, we newly report a chromodorid nudibranch species *Cadlinella subornatissima* Baba, 1996 and provide detailed description for their external morphology and illustration. The genus *Cadlinella* Thiele, 1931 contains 4 Indo-Pacific species described thus far (Gosliner *et al*., 2008; Bouchet and Caballer, 2014) and are distinguished from its congeners by the characteristics of enlarged and elongated papillae on the dorsum (Gosliner *et al*., 2008). The genus *Cadlinella* for which *C. subornatissima* newly redescribed hereto is the first report from Korean waters. Along with morphological information of the species, we determined mitochondrial cytochrome c oxidase subunit I (*cox1*) partial sequence, and deposited to the GenBank (Accession No. KP257095) as DNA barcode reference sequence.

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MATERIALS AND METHODS

Specimen used for the present study was collected by SCUBA diving in the sub-tidal zone of the Korean east coast on September 28th in 2014, and preserved in

97% ethanol after anesthetized by 1:1 mixture of seawater and 7% $MgCl_2$ solution. A stereoscopic microscope (Leica M205C, Wetzlar, Germany) was used for morphological examination of the specimen. The body length that refers to the length from the anterior mantle margin to posterior end of metapodium was measured. The specimen examined for morphological analysis was deposited in the National Institute of Biological Resources (NIBR), Incheon, Korea (KOSPIV0000218694).

SYSTEMATIC ACCOUNTS

Phylum Mollusca Linnaeus, 1758 연체동물문
Class Gastropoda Cuvier, 1795 복족강
Order Nudibranchia Cuvier, 1817 나새목
Family Chromodorididae Bergh, 1891 갯민숭달팽이과

[1*] *Cadlinella* Thiele, 1931
[1*]꼬마돌기갯민숭달팽이속 (신칭)

Cadlinella Thiele, 1931: 431 (cited from Rudman, 1984); Rudman, 1984: 246, 247; Rudman and Darvell, 1990: 53; Gosliner *et al*., 2008: 203.

Type species. *Cadlina ornatissima* Risbec, 1928

Diagnosis. Body ovate. Mantle firm, spiculated surface with large and elongated papillae, widely extend to hide the foot. Mantle glands numerous. Gills simple. Jaw rodlets unicuspid or bicuspid. Central tooth denticulate with no central cusp. Inner lateral tooth with long pointed cusps. Denticles present on mid lateral teeth and outer lateral teeth; increased in number 3 to 9 toward outside (Rudman, 1984; Rudman and Darvell, 1990; Gosliner *et al*., 2008).

Species composition. *Cadlinella hirsuta* Rudman, 1995, *Cadlinella ornatissima* (Risbec, 1928), *Cadlinella sagamiensis* (Baba, 1937), and *Cadlinella subornatissima* Baba, 1996

[2*] *Cadlinella subornatissima* Baba, 1996 (Fig. 1)
[2*]꼬마노랑갯민숭달팽이

Cadlinella subornatissima Baba, 1996: 265-271, pl. 1; Okutani, 2000: 791; Debelius and Kuiter, 2007: 211; Gosliner *et al*., 2008: 203.

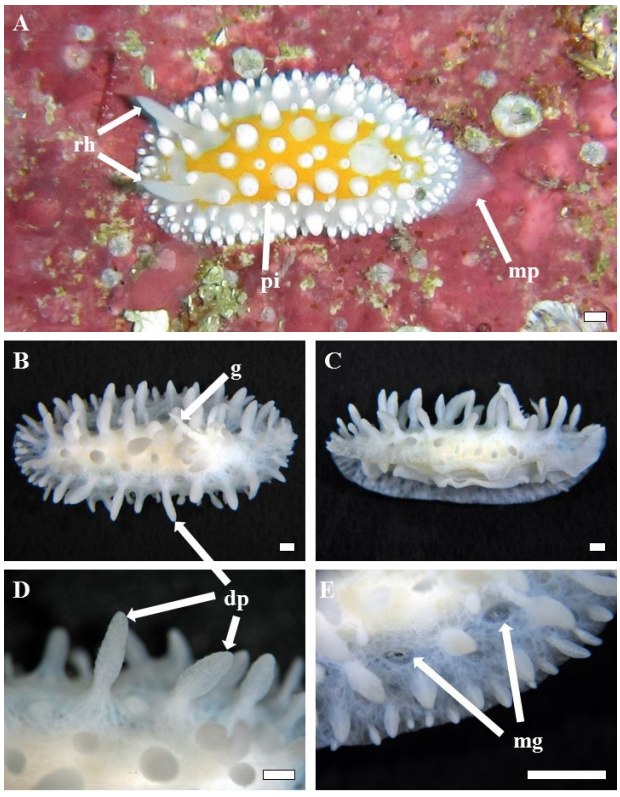

Fig. 1. *Cadlinella subornatissima* Baba, 1996. **A**. Dorsal view, animal alive and its habitat; **B**. Dorsal view; **C**. Lateral view; **D**. Dorsal papillae; **E**. Mantle glands; **B-E**. Preserved specimen. Scale bars = 1mm. Abbreviations: rh, rhinophore; pi, pigment on dorsum; mp, metapodium; g, gill; dp, dorsal papilla; mg, mantle gland.

Material examined. Korea: 1 individual, Gyeongsangbuk-do, Uljin-gun, Hupo-myeon, Hupo-ri, Wangdolcho. September 28th in 2014.

Description. Body ovately elongate (length 16mm, width 6mm; preserved specimen) (Fig 1B, C). Ground color opaque white. Rhinophores digitiform, lamellate, retractable, longer than dorsal papillae, clubs opaque white, stalks translucent white and slightly narrower than clubs. Gills 5 in number, simple and unipinate, form a circle surrounding anus, longer than dorsal papillae when fully relaxed, translucent white in color. Numerous papillae on whole dorsal surface, pointed end, creamy white in color, and vary in its shape, mainly digitiform; some of large papillae spindle shape, tips of papillae on central dorsum without margin pale pink (Fig 1D). Yellow pigment on central

dorsum with margin no pigmented, mantle margin opaque white (Fig 1A). Mantle glands on whole mantle between dorsal papillae, and vary in size; increased both in size and number from dorsum toward margin, with small ones gathered to form large complexes (Fig 1E). Metapodium end blunted. Metapodium and sole translucent white in color. Oral tentacle inverted triangular form. Genital orifices located on right-lateral side of body and positioned about one-third of body length from anterior end.

Distribution. Korea, Japan.

Remarks. Four valid species have been recorded in the genus *Cadlinella* according to WoRMS (World Register of Marine Species; Bouchet and Caballer, 2014). Among these, *Cadlinella subornatissima* is the species recorded for the first time in Korea. This species is similar to its congener *Cadlinella ornatissima* in their morphology, but distinguished by the range of dorsal pigment and shape of papillae: *C. subornatissima* is characterized by yellow pigment on mid-dorsal surface except mantle margin, and its pointed end papillae, whereas *C. ornatissima* has translucent yellow pigment on the whole mantle, and club shaped papillae with a rounded end on dorsum.

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