



# First record of the Cheekscaled frill-goby, *Bathygobius cotticeps* (Gobiiformes: Gobiidae) from Jeju-do Island, Korea

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## Abstract

A single specimen of *Bathygobius cotticeps* (41.0 mm SL) was collected from the rocky pools of intertidal zone of Jeju-do Island, Korea. This species is characterized by having VI–I, 9 dorsal fin rays, I, 8 anal fin rays, scales on cheek and opercle, 23 predorsal scales, 38 longitudinal scales, 24 pectoral fins, 7 free rays on upper pectoral fin, each divided to 5–7 branches, cephalic sensory canal pores H and K fused, and the middle of pelvic frenum curved inwards smoothly. We propose a new Korean name, “Bi-neul-mu-nui-mang-duk” for the *B. cotticeps* based on the presence of scales on the cheek.

**Keywords:** *Bathygobius cotticeps*, Gobiidae, Jeju-do Island, Korea, First record

## Introduction

Gobiid fishes of the genus *Bathygobius* Bleeker (1878) have been reported as a total of 28 valid species worldwide (Nelson et al., 2016). To date, four species of the genus have been documented in Korea *Bathygobius coalitus* (Bennett, 1832), *Bathygobius cyclopterus* (Cuvier & Valenciennes, 1837), *Bathygobius fuscus* (Rüppell, 1830), and *Bathygobius hongkongensis* Lam, 1986 (Kwun & Kang, 2023).

The genus *Bathygobius* is distributed along tropical coasts

and has features such as the VI first dorsal fin, branched free rays on the upper pectoral fin, the longitudinal pattern of cheek papillae, and a gill opening equivalent to the base of the pelvic fin (Akihito & Meguro, 1980; Hoese, 1986).

During the fish survey of the rocky tidal zone, we found a single gobiid fish belonging to the genus *Bathygobius*. It was stored as a specimen for more detailed identification, and recently, this species was identified as *Bathygobius cotticeps* (Steindachner, 1879) based on the morphological characters of 7 free rays on the upper pectoral fin each branch into 5 to 7, scales on

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the cheek and opercle, 23 predorsal scales, 24 pectoral fins, cephalic sensory canal pores H and K fused, and the middle of the pelvic frenum curved inwards smoothly, but without protrusions (Akihito & Meguro, 1980; Akihito et al., 2002). The distinctiveness of the pectoral fins in free rays was identified and compared to those of the previously announced *Bathygobius* to accurately identify the species. Hence, this study reports the appearance of a fifth fish belonging to the genus *Bathygobius* in Korea.

## Materials and Methods

The single specimen was captured from the rocky tidal zone in northwest Jeju Island using a set net, fixed in 10% formalin, and subsequently preserved in 70% ethanol. Methods of counting and measurements followed by Hubbs et al. (2004) and ex-

pressed in percentages of standard length (SL) or head length (HL). Cephalic sensory canal pores and scales count method followed Uyeno et al. (1984). The specimen is deposited at the Kunsan National University, Korea.

## Results and Discussion

### *Bathygobius cotticeps* (Steindachner, 1879)

(New Korean name: Bi-neul-mu-nui-mang-duk) (Table 1; Figs. 1 and 2).

*Gobius cotticeps* Steindachner (1879): 137 (Society Islands, French Polynesia).

*B. cotticeps* (Steindachner, 1879): Akihito & Meguro, 1980: 229; Uyeno et al., 1984: 273 (Japan); Hoese, 1986: 781; Akihito et al., 2002: 1219 (Japan).

**Table 1. Comparison of meristic and morphometric characters of *Bathygobius cotticeps***

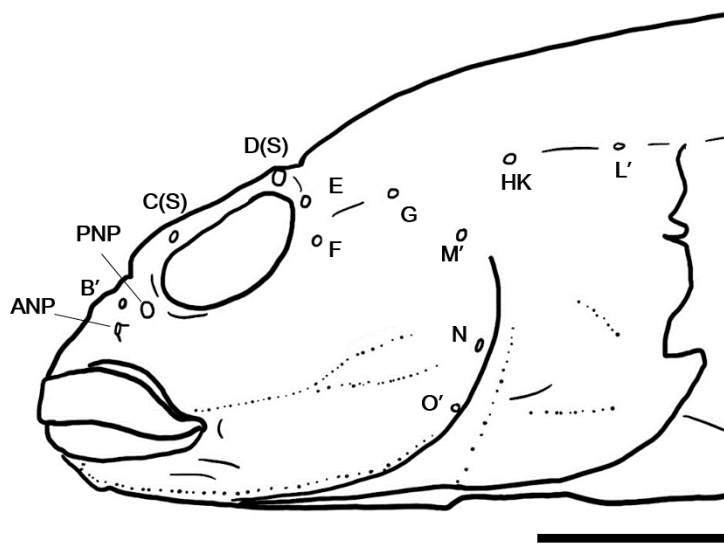
	Present study (n = 1)	Steindachner (1879)	Akihito & Meguro (1980)	Hoese (1986)
Standard length (mm)	41.0	70.0	-	-
Meristic characters				
Dorsal fin rays	VI-I, 9	VI-I, 9	VI-I, 9-10	VI-I, 9
Anal fin rays	I, 8	I, 9 <sup>1)</sup>	I, 8	I, 8
Pectoral fin rays	24	21-22	21-25	23-24
Free rays on pectoral fin	7	-	6, 7, 9	-
Branches on free rays	5-7	-	5-7	5-7
Longitudinal scales	38	33	35-46	35-38
Predorsal scales	23	-	21-32	21-32
Scales on cheek	Present	Present <sup>2)</sup>	Present	Present
Measurements in % of SL				
Body depth	19.5	-	-	-
Body width	14.6	-	-	-
Head length	30.5	-	-	-
Predorsal length	35.1	-	-	-
Preanal length	60.7	-	-	-
Prepelvic length	31.7	-	-	-
Prepectoral length	29.3	-	-	-
Caudal peduncle length	20.7	-	-	-
Caudal peduncle depth	13.4	-	-	-
Measurements in % of HL				
Snout length	23.2	-	-	-
Eye diameter	24.0	-	-	-
Interorbital width	12.0	-	-	-

<sup>1)</sup> It is considered a difference in measurement method (Hubbs et al. (2004) counts the last two rays as one).

<sup>2)</sup> Data from Akihito & Meguro (1980) which was written by measuring holotype. SL, standard length; HL, head length.



**Fig. 1.** *Bathygobius cotticeps* (AREIS-0002, 41.0 mm SL) collected from Aewol-eup, Jeju-si, Jeju-do Island, Korea. SL, standard length.



**Fig. 2.** Cephalic sensory pores of *Bathygobius cotticeps* (AREIS-0002, 41.0 mm SL). ANP, anterior nasal pore; PNP, posterior nasal pore; S, single pore (scale bar indicates 5 mm); SL, standard length.

### Materials examined

*B. cotticeps*, AREIS-0002, 41.0 mm SL, was collected from the Aewol-eup, Jeju-si, Jeju-do Island, Korea, using a hand net on 18 November 2011. It lived in rocky intertidal areas, hiding in algae and rocky crevices.

### Description

Meristic and measurements are shown in Table 1. Body moderate and compressed posteriorly. Body covered in scales from predorsal to caudal fin base. Head depressed with slight triangular cross section. Anterior nasal pores cylindrical and covered skin flap. Snout short. Mouth terminal and maxilla slightly extend beyond the anterior border of the eye. Opercle and upside

cheek covered with scales. Pectoral fin rounded shape. Free rays on the upper part of the pectoral fin and at each branched, respectively (5 to 7). Pelvic fin united, forming like a disc. Middle of pelvic frenum curved inwards smoothly not convexity. Anal fin originates posterior to the second dorsal fin. Length of second dorsal fin base longer than anal fin base length. Margin of caudal fin rounded.

Cephalic sensory canal pores (Fig. 2): anterior oculoscapular canal with B', C (single), D (single), E, F, G, and H; posterior oculoscapular canal with K and L'; the anterior and posterior oculoscapular canals are united. So, H' and K' pores are one opening, HK; preopercular canal with M', N, and O'.

### Coloration

The body coloration changes easily depending on the surrounding environment. When fresh, the background color of the body consists of a dark brown. Upper body with some whitish brown transverse bands. No blotches alongside body. Abdominal region relatively bright. Each membrane of fins is translucent. Small dark spots concentrate on pectoral fin base. After preserved, whole body color is pale brown. Band pattern faint.

### Distribution

*B. cottiiceps* is a tropical fish and has a wide distribution range. Southwestern Japan, Taiwan, western central pacific (Akihito & Meguro, 1980; Akihito et al., 2002), western coast of India (Manilo & Bogorodsky, 2003; Sreeraj et al., 2022), and Korea (this study).

### Remarks

The present specimen collected from Jeju-do Island, Korea, matched with characters of the genus *Bathygobius* and was identified as *B. cottiiceps* by the following meristic count features 23 pectoral fin rays, 7 free rays on the upper pectoral fin part, 5–7 branches of free ray, 23 predorsal scales, 38 longitudinal scales, and cephalic sensory canal pores H and K fused (Akihito & Meguro, 1980). The original description of *B. cottiiceps* is considerably insufficient, particularly with the number of longitudinal scales being 33, However Akihito & Meguro (1980) confirmed the holotype and used a longitudinal scale range of 35–46 as the standard in this study.

These features distinguish *B. cottiiceps* from the other four *Bathygobius* species in Korea. *B. cottiiceps* has 21–25 pectoral fins (vs. 17–20 in *B. coalitus* and 16–20 in *B. fuscus*), 21–32 predorsal scales (vs. 13–17 in *B. hongkongensis* and 12–20 in *B. cyclopterus*), connected cephalic sensory canal pore (HK) is present only in *B. cyclopterus*, and scales on the cheek which are only present in *B. cottiiceps*, unlike the other four species (Akihito & Meguro, 1980; Akihito et al., 2002; Lam, 1986).

We, therefore propose a new Korean name, “Bi-neul-mu-nui-mang-duk” for *B. cottiiceps*, which refers to the presence of scales on the cheeks.

### Competing interests

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

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### Acknowledgements

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### Availability of data and materials

Upon reasonable request, the datasets of this study can be available from the corresponding author.

### Ethics approval and consent to participate

This study conformed to the guidance of animal ethical treatment for the care and use of experimental animals.

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