

## First Record of Two Gobiid Fishes, *Luciogobius elongatus*, *L. platycephalus* (Perciformes: Gobiidae) from Korea

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### ABSTRACT

Two species of small gobiid fishes genus *Luciogobius*, i.e., *L. elongatus*, *L. platycephalus* were described as the first records from Korea based on specimens collected from gravel beaches of Gijang-gun, Busan-si, Korea. *Luciogobius elongatus* is distinguished from congeners by very elongated and naked body, 42–44 vertebrae, 6–7 dorsal soft rays, and no free rays on pectoral fin, and *L. platycephalus* is characterized by having very depressed head, naked body, 40–41 vertebrae, 10–11 dorsal soft rays, and pectoral fin with only upper 2–4 free rays. We propose the new Korean name “Ga-neun-mi-kkeun-mang-dug”, “Nab-jak-mi-kkeun-mang-dug” for *L. elongatus* and *L. platycephalus*, respectively.

**Keywords:** Gobiid fishes, *Luciogobius elongatus*, *Luciogobius platycephalus*, first record, gravel beaches

### INTRODUCTION

The gobiid fishes of genus *Luciogobius* Gill, 1859, mainly inhabit the shallow, cryptobenthic habitats of freshwater stream, estuaries, intertidal zone of coasts, and subterranean waters with the exception of *Luciogobius adapel*, which has been collected from the bottom of the sea at depths of 20 m to 50 m in Eastern Asiatic region including Primorsky Kray, Japan, China, Taiwan, and Korea (Okiyama, 2001; Chen et al., 2008; Maeda et al., 2008; Kanagawa et al., 2011; Kondo et al., 2012). The genus with elongated, worm-like body shape, depressed head, and absence of the first dorsal fin has been considered as comprising 16 nominal species (Kanagawa et al., 2011; Kondo et al., 2012), and of these, five species i.e., *L. grandis* Arai, 1970, *L. guttatus* Gill, 1859, *L. koma* (Snyder, 1909), *L. saikaiensis* Dôtu, 1957, and *L. pallidus* Regan, 1940, have been only reported from Korean waters to date (Kim, 2012).

In the course of surveys on fish fauna of intertidal zone, two unrecorded species of *Luciogobius* were collected from rocky coasts with round pebbles exposed to the air during low tide on the Southern Coast of Busan-si, Korea, and found that they are *L. elongatus* Regan, 1905, *L. platycephalus*

Shiogaki and Dotsu, 1976, respectively. In this study, we described these species as the first records from Korea, and represent a diagnostic key on the genus *Luciogobius* from Korea.

### MATERIALS AND METHODS

The specimens of *Luciogobius elongatus* and *L. platycephalus* examined in the present study are deposited in National Institute Biological Resources (NIBR). All counts and measurements were made from specimens preserved in 75% ethanol. Morphometric and meristic methods generally followed Hubbs and Lagler (2004) and Akihito et al. (1984). Counts of dorsal and anal fin rays, and vertebrae were taken from a radiograph. The method of counting and the formula for the relation between the pterygiophores of the dorsal fin and vertebrae follow those of Akihito et al. (1984). Standard length and head length are expressed as SL and HL, respectively. The single dorsal fin composed of one spine and numerous soft rays was regarded as the “second dorsal fin” based on consideration of the evolutionary trends of this genus (Okiyama, 2001).

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## SYSTEMATIC ACCOUNTS

Order Perciformes Bleeker, 1859  
 Family Gobiidae Cuvier, 1816  
 Genus *Luciogobius* Gill, 1859

<sup>1\*</sup>***Luciogobius elongatus* Regan, 1905 (Table 1, Fig. 1A)**

*Luciogobius elongatus* Regan, 1905: 23 (type locality: inland sea of Japan); Shiogaki and Dotsu, 1972: 9–18; Akihito et al., 1984: 282.

**Material examined.** 5 specimens, 30.7–33.9 mm SL, Korea: Busan-si, Gijang-gun, Ilgwang-myeon, Sinpyeong-ri (35° 17' 32.78"N, 129° 15'39.22"E), 4 Apr 2011, NIBR-P13513.

**Description.** Comparison of counts and measurements is shown in Table 1. First dorsal fin absent; second dorsal fin rays I,6; anal fin rays I,7; pectoral fin rays 8; first dorsal pterygiophore inserted between 24th and 25th vertebrae; last dorsal pterygiophore inserted between 27th and 28th vertebrae; total dorsal pterygiophore 7–8; vertebrae (AV+CV) (20–21) +(22–23)=42–44. Measurements in % of SL: head length 13.2–14.9 (mean 14.0); body depth 5.3–7.2 (6.1); predorsal length 68.1–70.5 (68.9); preanal length 61.4–66.2 (63.4); dorsal fin base 6.6–8.5 (7.3); anal fin base 9.5–11.0 (10.3); caudal peduncle length 21.1–27.4 (24.8); caudal peduncle depth 4.4–6.2 (5.0). Measurements in % of HL: snout length 19.0–35.4 (25.5); eye diameter 6.4–12.5 (8.4); interorbital width 16.7–23.8 (19.6).

Body very elongated and naked, cylindrical anteriorly and somewhat compressed posteriorly. Head small. Mouth terminal; maxilla extending to posterior margin of eye. Teeth on both jaws with 3–4 rows of tiny conical teeth. Tongue deeply notched to middle part. Eyes moderately small and located front than center of head. Snout flat and short. Two paired nasal pores on dorsal part between upper lip and eyes. Anterior nasal pores as a protruded, horizontal short tube; reaching to tip of snout, and posterior nasal pores as a round hole; it located closer to eyes than upper lip. Interorbital region flat. First dorsal fin absent. Origin of second dorsal fin in front of that of anal fin. Pectoral fin rounded and small. Pelvic fin very small sucker form. Caudal fin small and circular. **Cephalic lateral line system.** Sensory canal and pore absent. Sensory papillae scattered, arranged some longitudinal rows on occipital region, cheek, and opercle.

**Coloration when fresh.** Based on the fresh specimens from Gijang-gun, Busan-si (Fig. 1), the body and head light brown to yellowish brown background. All fins white with many light brown spots.

**Ecological notes.** This small, elongate gobiid fish growing to a maximum of 40 mm inhabits a pebbled surface area in an upper intertidal zone, and it burrowed among moistened pebbles during ebb tide (Shiogaki and Dotsu, 1972; present study).

**Distribution.** Although the present specimens have been only obtained from Gijang-gun, Busan, Korea, the species is also found on the southern coast of Korea including Geoje Island and Jeju island (personal observation). Known from Amori pref. to Okinawa islands in Japan (Akihito et al., 1984, 2002).

**Remarks.** During the survey of fish fauna in a intertidal region on the Southern Coast of Korea, we collected 5 species of small fishes belonging to *Luciogobius*, including *L. guttatus* Gill, 1859, *L. grandis* Arai, 1970, *L. saikaiensis* Dôtu, 1957, and two unrecorded species from Korea. One of these species had a very elongated body shape and was identified as *L. elongatus*, because all morphological characters corresponded with the original description by Regan (1905) as well as subsequent descriptions of the species given by Shiogaki and Dotsu (1976), Akihito et al. (1984), and Chen et al. (2008).

According to Chen et al. (2008), *L. elongatus* with its naked body, more than 40 total vertebrae, and anal fin origin in front of dorsal fin origin, shares the same morphological features as the following four species: *L. guttatus* Gill, 1859, *L. parvulus* (Snyder, 1909), *L. grandis* Arai, 1970, and *L. platycephalus*, Shiogaki and Dotsu, 1976. However, *L. elongatus* was easily distinguishable from the others by a very elongated body, 6 dorsal soft rays, and no free soft rays on pectoral fin.

<sup>2\*</sup>***Luciogobius platycephalus* Shiogaki and Dotsu, 1976 (Table 1, Fig. 1B)**

*Luciogobius platycephalus* Shiogaki and Dotsu, 1976: 126 (type locality: intertidal zone on the coast of Kawahara, Sanwa-cho, Nakasaki, Japan); Shiogaki and Dotsu, 1977: 43–48; Akihito et al., 1984: 282.

**Material examined.** 2 specimens, 44.5–53.8 mm SL, Korea: Busan-si, Gijang-gun, Ilgwang-myeon, Sinpyeong-ri (35° 17' 32.78"N, 129° 15'39.22"E), 6 Apr 2011, NIBR-P13514; 3 specimens, 41.6–55.3 mm SL, Busan-si, Gijang-gun, Ilgwang-myeon, Sinpyeong-ri (35° 17'32.78"N, 129° 15'39.22"E), 4 Apr 2011, NIBR-P13515.

**Description.** Comparison of counts and measurements is shown in Table 1. First dorsal fin absent; second dorsal fin rays I, 10; anal fin rays I, 12–13; pectoral fin rays 13–15; pelvic fin rays I, 5; first dorsal pterygiophore just reaching

Korean name: <sup>1\*</sup>가논미끈망둑 (신칭), <sup>2\*</sup>납작미끈망둑 (신칭)

**Table 1.** Comparison of counts and measurements of *Luciogobius elongatus* and *L. platycephalus*

	<i>L. elongatus</i>			<i>L. platycephalus</i>		
	Present specimens	Regan (1905)	Akihito et al. (1984)	Present specimens	Holotype and paratypes (Shiogaki and Dotsu, 1976)	Akihito et al. (1984)
Standard length (mm)	31.7–33.9 (n=5)	40.0	38.0	42.1–54.8 (n=6)	70.9–82.3 (n=37)	55.0
Dorsal fin rays	I, 6–7	7	I, 6	I, 10–11	10–13	I, 10
Anal fin rays	I, 7–8	9	I, 7	I, 12–14	13–15	I, 14
Pectoral fin rays	6–8	–	8	13–15	13–15	14
Pelvic fin rays	I, 2	–	I, 2	I, 5	I, 5	I, 5
Free rays on pectoral fin	Absent	–	Absent	3–4 (upper)	2–4 (upper)	2–4 (upper)
Vertebrae (AV+CV)	(20–21)+(22–23)=42–44	–	20+22=42	17+(23–24)=40–41	(16–17)+(23–25)=39–42	17+24=41

**Fig. 1.** A, *Luciogobius elongatus* (NIBR-P13513, 32.8 mm standard length [SL]); B, *Luciogobius platycephalus* (NIBR-P13514, 44.5 mm SL) collected from the Gijang-gun, Busan, Korea.

neural spine of 23rd vertebra or inserted between 22nd and 23rd vertebrae; last dorsal pterygiophore inserted between 28th and 29th vertebrae; total dorsal pterygiophore 10–12; vertebrae (AV+CV) 17+23–24=40–41. Measurements in % of SL: head length 15.6–16.2 (mean 15.9); body depth 7.5–8.9 (8.1); predorsal length 64.7–66.3 (65.9); preanal length 59.3–61.7 (61.0); dorsal fin base 10.8–14.4 (12.4); anal fin base 16.3–18.2 (16.6); caudal peduncle length 21.9–23.6 (23.4); caudal peduncle depth 7.7–9.0 (8.4). Measurements in % of HL: snout length 26.4–32.8 (29.5); eye diameter 5.7–8.8 (7.2); interorbital width 20.7–23.9 (21.6).

Body slender, gradually compressed posteriorly. Head very depressed and broader than body. Mouth terminal; maxilla extending below posterior margin of eye. Teeth on both jaws villiform. Tongue deeply notched to middle part. Eyes small. Snout flat and short. Nostrils separated; anterior nasal pores with a protruded, horizontal short tube above upper lip; posterior nasal pores with a round hole located center between upper lip and eyes. Interorbital region flat and moderate. Gill opening narrow, and reaching to just below lower

part of pectoral fin. First dorsal fin absent. Dorsal and anal fins short and low. Origin of dorsal fin in advance of origin of anal fin. Pectoral fin with only upper 3–4 free rays rounded. Pelvic fin a small sucker form with connecting membrane. Caudal fin small fan shape.

**Cephalic lateral line system.** Sensory canal and pore absent. Sensory papillae scattered, arranged some longitudinal rows on occipital region, cheek, and opercle.

**Coloration when fresh.** Body and head light brown. Pectoral, pelvic, dorsal, and anal fins white color. Caudal fin yellowish brown.

**Ecological notes.** The habitats of this species growing to 80 mm total length is restricted to the upper intertidal zone where pebbles and stones are sedimented over the hollows of the rocky bottom, and the bottom is exposed to the air for several hours during the ebb tide (Shiogaki and Dotsu, 1977; present study). Although the present species is found from the same site as *L. elongatus*, the former is collected in more lower intertidal zone than the latter.

**Distribution.** Known from Gijang-gun of Busan-si, Geoje-

Island, and Jeju Island, Korea (in this study; personal observation); Aomori Pref., Chiba Pref., Ehime Pref., Kochi Pref., Nagasaki Pref., Japan (Akihito et al. 1984, 2002).

**Remarks.** In conclusion, we identified the present specimens collected among gravels, as *L. platycephalus* Shiogaki and Dotsu, 1976, due to its morphological characters corresponding with the description on the species presented by Shiogaki and Dotsu (1976), Akihito et al. (1984), Chen et al. (2008), and Kanagawa et al. (2011).

*Luciogobius platycephalus* is easily differentiated from its most similar species, *L. guttatus* and *L. grandis* by having a very depressed snout, pectoral fin with only upper 3–4 free rays, 10–11 dorsal soft rays, and 40–41 total vertebrae.

#### Diagnostic key for 7 species of the genus *Luciogobius* reported from Korea

1. Body at least with scales on caudal peduncle ..... *koma*  
Body entirely naked ..... 2
2. Dermal ridge on cheek with barbels ..... *saikaiensis*  
Dermal ridge on cheek no barbells ..... 3
3. Eyes small and embedded beneath skin; D2 origin in front of A origin ..... *pallidus*  
Eyes moderate and not embedded; A origin in front of D2 origin ..... 4
4. D2 usually 6 soft rays; P in lacking any upper free soft ray ..... *elongatus*  
D2 more than 10 soft rays; P at least with 1 or more upper free soft rays ..... 5
5. 1 free soft ray near upper basal origin of P ..... *guttatus*  
2–5 free soft rays on upper margin of P ..... 6
6. P with 2–3 free soft rays on lower margin; D2 15 soft rays ..... *grandis*  
P in lacking free rays on lower margin; D2 10–11 soft rays ..... *platycephalus*

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