



A new freshwater gobiid species of *Rhinogobius* Gill, 1859 (Teleostei: Gobiidae) from Minjiang River basin, Fujian Province, southeastern China

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Abstract

A new freshwater gobies of *Rhinogobius* Gill, 1859 were discovered from the Minjiang Basin, Fujian Province, southeastern China. It belongs to fluvial species. The new species, *Rhinogobius dongfongensis* n. sp. which collected from Fujian Province of China can be well distinguished from all other congeners by the unique combination of the following features: (1) fins: second dorsal fin rays modally I/8–9; anal fin rays I/7; pectoral fin rays modally 15; (2) squamation: longitudinal scale series 32–33 (modally 33); peridorsal scales usually 5–6; (3) normal vertebral count 26; (4) rear edge of mouth merely extending beyond vertical of anterior margin of pupil in male and (5) its own specific colouration. The brief comparison and discussion of morphological differentiation from congeners of mainland China would be addressed.

Key words: *Rhinogobius*, new species, freshwater fish, fish taxonomy, Minjiang basin, PR China

Introduction

Gobioid fishes are the very important components of benthic freshwater fish fauna in East Asia. The freshwater goby, *Rhinogobius* Gill, 1859, is widely distributed on several islands of the Western Pacific including Japan (Akihito *et al.* 1984, 1993, 2002; Masuda *et al.* 1989; Suzuki *et al.* 2011), Taiwan (Chen & Shao 1996; Lee & Chang 1996; Chen *et al.* 1998; Chen & Fang 1999; Chen *et al.* 2022), Hainan (Wu & Ni 1986; Chen *et al.* 2002; Wu *et al.* 2009; Chen & Miller 2013), and Philippines (Herre 1927), and also continental Asia, in Russia, Korea, China, Vietnam, Laos, Cambodia, and Thailand (Chu & Wu 1965; Zheng & Wu 1985; Chen & Miller 1998; Chen *et al.*, 1999a–c, Chen & Kottelat 2000, 2003, 2005; Chen & Fang 2006; Chen & Miller 2008; Huang & Chen 2007; Li & Zhong 2007; Li *et al.* 2007; Yang *et al.* 2008; Chen *et al.* 2008; Chen 2009; Wu *et al.* 2009; ; Chen *et al.* 2022a–b; Wang & Chen 2022).

The life history of *Rhinogobius* species comprises amphidromous and non-diadromous, landlocked, fluvial species (Mizuno 1960; Iguchi & Mizuno 1991; Akihito *et al.* 1984, 1993, 2002) as well as lake-river migratory species and lentic species (Takahashi & Okazaki 2002).

At present, the author estimates that there are at least over 90 species are known in East and Southeast Asia and some of them still need formal description (Chen & Kottelat 2003, 2005; Chen & Fang 2006; Chen *et al.* 2008; Yang *et al.* 2008; Chen & Miller 2013).

In Fujian Province of China, there are highly diverse as *Rhinogobius* species diversity especially fluvial species. The aim of this paper is to document and report a new fluvial species has been collected from a small tributary of the Minjiang River basin around northern region of Fujian Province, southeastern China. The brief comparison and discussion of morphological differentiation among the congeneric species of mainland China would be addressed herein.

Materials and Methods

Sample collection and morphological survey from the type specimens of the new goby were collected by hand-net and cast-net. All counts and measurements were made from specimens finally preserved in 70% ethanol. Morphometric methods follow Miller (1988) and meristic methods follow Akihito *et al.* (1984) and Chen & Shao (1996). Terminology of cephalic sensory canals and free neuromast organs (sensory papillae) was from Wongrat & Miller (1991), mainly based on Sanzo (1911). Meristic abbreviations were as follows: A = anal fin; C = caudal fin; D1 = first dorsal fin; D2 = second dorsal fin; LR = longitudinal scale rows; P = pectoral fin; PreD = predorsal scales; SDP = scale series from origin of first dorsal fin to upper pectoral fin origin; TR = transverse scale series from second dorsal to anal fins; V = pelvic fin; VC = vertebral count. All fish lengths were expressed by standard length (SL).

The type specimens of the current new species would be deposited at the Pisces collection of National Taiwan Ocean University, Keelung (NTOUP).

Systematics

Rhinogobius dongfongensis n. sp.

(東峰吻鰕虎)

(Figs. 1–3)

Materials examined

Holotype.—NTOUP-2003-05-321, 42.9 mm SL, coll. I-S. Chen & J.W. Wang, May 12, 2003, Dongfong township, Jian-Ou City, a small tributary of Minjiang River basin, Fujian Province, PRC.

Paratype.—NTOUP-2003-05-322, 36.1 mm SL, collection date and other data same as holotype.



FIGURE 1. *Rhinogobius dongfongensis* n. sp., holotype, 42.9 mm SL, Dongfong township, Jian-Ou City, small tributary of Minjiang River basin, Fujian Province, PRC.

Diagnosis

Rhinogobius dongfongensis n. sp. which collected from northern region of Fujian Province, China can be well distinguished from all other congeners by the unique combination of the following features: (1) fins: second dorsal fin rays I/8–I/9; anal fin rays I/7; pectoral fin rays modally 15; (2) squamation: longitudinal scale series 32–33 (modally 33); predorsal scales usually 5–6; (3) normal vertebral count 26; (4) rear edge of mouth: merely extending to vertical of anterior margin of pupil in male and (5) specific colouration: side of body light brown to pale brown with about 6–7 clusters of net-like black marks along middle horizontal series; dorsal region of body with 6–7 indistinct gray blotches; cheek and opercle with densely-set rather tiny 160–170 blackish brown spots in male;

second dorsal fin translucent as pale brown tone with 6–7 longitudinal rows of tiny blackish brown spots; and pectoral fin basal region with a cluster of small brown spots on upper 2/3 region.

Description

Body proportions in Table 1. Body rather slender, cylindrical anteriorly, compressed posteriorly. Head moderate large, rather depressed anteriorly in male. Eye large, dorsolateral. Snout pointed. Cheek rather fleshy in male. Lips thick. Mouth oblique, rear edge extending beyond vertical of anterior margin of eye in male. Both jaws with 3–4 rows of conical teeth, outer jaws enlarged. Tongue margin rounded. Anterior nostril in short tube and posterior nostril round. Gill opening small and restricted, extending ventrally to vertical midline of opercle. Vertebral count $10 + 16 = 26$.

Fins.—D1 VI, D2 I/8–9; A I/7; P 15–16 (modally 15); V I/5+I/5 (distribution frequency in Table 2). D1 rounded, 3rd and 4th rays slightly longer, with rear tip while depressed extending beyond D2 origin in male. Origin of A inserted below second branched rays of D2. Rear tips of D2 and A fin rays not extending to procurrent rays of C in male. P moderate moderate large and oblong, rear tip not reaching vertical line through anus in male. V small and rounded, spinous rays with somewhat pointed membrane lobe. C elliptical, rear edge rounded.

Scales.—Body with moderately size ctenoid scales, anterior region of predorsal area naked; posterior dorsal area and belly cycloid. LR 32–33 (modally 33); TR 11; PreD 5–6; and SDP 11–12 (distribution frequency in Table 2). Head and prepelvic region naked. Anterior edge of midpredorsal squamation restricted, not extending to the vertical of midline of opercle.

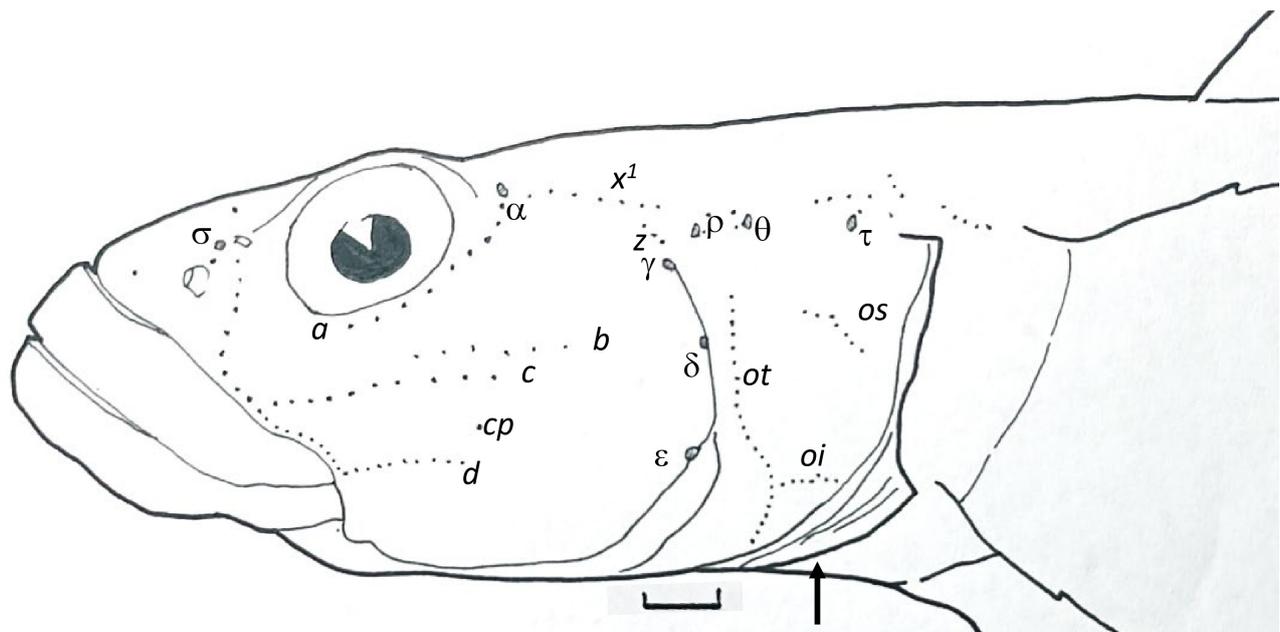


FIGURE 2. Head lateral-line system of *Rhinogobius dongfongensis* n. sp., holotype, 42.9 mm SL, Dongfong township, Jian-Ou City, small tributary of Minjiang River basin, Fujian Province, PRC. (Bar = 1 mm).

Head lateral-line system.—(Figure 2)

Canals: Nasal extension of anterior oculoscapular canal with terminal pore σ located in between anterior and posterior nostrils. Anterior interorbital sections of oculoscapular canal with paired pore λ . A single pore κ in near rear of interorbital region also with paired pore ω . Lateral section of anterior oculoscapular canal with terminal pore α . Posterior oculoscapular canal with two terminal pores θ and τ .

Sensory papillae: Row *a* extending forward beyond vertical midline of orbit. Row *b* length about equal to eye diameter. Rows *c*, *d* longer. A single *cp* papilla. Row *f* paired. Anterior edge of row *oi* somewhat connecting to lower region of row *ot*.



FIGURE 3. Head pigmentation pattern of *Rhinogobioius dongfongensis* n. sp., holotype, 42.9 mm SL, Dongfong township, Jian-Ou City, small tributary of Minjiang River basin, Fujian Province, PRC.

Colouration while fresh.—(Figs. 1, 3)

Body yellowish brown to grayish brown. Side of body light brown to pale brown with about 6–7 clusters of net-like black marks along middle horizontal series. Dorsal region of body with 6–7 indistinct gray blotches.

Head yellowish brown to brown. Cheek and opercle with densely-set rather tiny 160–170 blackish brown spots in male. Anterior part of nape to interorbital region with densely-set, rather tiny blackish brown spots in male. Snout on dorsal side with a pair of blackish to pale brown stripe united at snout tip. Snout on lateral side with an infraorbital pale brown stripe turning vertical ventrally terminating half way above upper lip in male.

Lips and dorsal snout pale brown. Branchiostegal membrane gray with some outer short, parallel brown bars separating light spots in male.

First dorsal fin translucent as pale brown tone with grayish fin membrane, and a small black spot in front of its second spine on lower half of fin membrane. Second dorsal fin translucent as pale brown tone with 5–6 longitudinal rows of tiny blackish brown spots and with narrow distal margin. Anal fin pale to grayish white with distal white margin. Caudal fin translucent to pale white with 7–9 vertical rows of blackish brown spots. Its basal region with a middle conspicuous but small deep black spot. Pectoral fin pale brown and its basal region with a cluster of small brown spots on upper 2/3 region. Pelvic fin grayish black in male.

Etyomolgy

The specific name “*dongfongensis*” is referred to the type locality of current species occurring around the area of “Dongfong” township as a small tributary of Minjiang River basin, Fujian Province, PR China.

TABLE 1. Morphometry of *Rhinogobius dongfongensis* n. sp. from Minjiang, Fujian Province, China.

Type	Holotype	Paratype
Sex	Male	Male
Standard length (mm)	42.9	36.1
% in SL		
Head length	26.8%	29.1%
Predorsal length	40.3%	40.2%
Snout to 2nd dorsal origin	61.8%	57.6%
Snout to anus	66.0%	48.8%
Snout to anal fin origin	67.6%	63.2%
Prepelvic length	31.7%	32.4%
Caudal peduncle length	21.9%	23.0%
Caudal peduncle depth	11.4%	10.0%
First dorsal fin base	21.2%	19.7%
Second dorsal fin base	29.8%	28.3%
Anal fin base	19.6%	20.2%
Caudal fin length	26.8%	26.3%
Pectoral fin length	24.7%	28.0%
Pelvic fin length	16.6%	18.0%
Body depth of pelvic fin origin	12.1%	12.5%
Body depth of anal fin origin	12.4%	15.0%
Body width of anal fin origin	10.0%	10.8%
Pelvic fin origin to anus	25.6%	27.7%
% in HL		
Snout length	47.0%	42.9%
Eye diameter	53.9%	51.4%
Postorbital length	65.2%	60.0%
Cheek depth	42.6%	37.1%
Head width in upper gill opening	60.0%	50.5%
Head width in maximum	63.5%	61.9%
Fleshy interorbital width	28.7%	21.9%
Bony interorbital width	14.8%	13.3%
Lower jaw length	50.4%	44.8%

Distribution

The new species is endemic species in fresh waters of the tributary of Minjiang basin, Fujian Province in mainland China. The distribution range of the species may be very restricted.

Remarks

The new species, *Rhinogobius dongfongensis* is rather similar to *Rhinogobius multimaculatus* (Wu & Zheng, 1985) in Zheng & Wu 1985 by cheek as highly spotted pattern with over 100 blackish brown spots than any other congeneric fluvial species around mainland China. However, *Rhinogobius dongfongensis* can be clearly distinguished from *Rhinogobius multimaculatus* by the several following features: (1) pectoral fin rays: modally 15 vs. 17; (2) second dorsal fin rays I/8–9 vs. modally I/10; (3) longitudinal scale rows usually 33 vs. 37; and (4) vertebral count 26 vs. 29.

In addition, the former species is merely endemic to northern region of the Minjiang River basin, Fujian Province; the later species is only endemic to upper reaches of the Jaoshi River basin, northern region of Zhejiang Province from mainland China.

Furthermore, the unpublished mitogenetic data of current species and all remaining undescribed or related nominal fluvial species of *Rhinogobius* species is still processing to make a resolution of evolutionary puzzle for them, the molecular phylogenetic analysis for those species may provide the more detail evolutionary history and establishing some hypothesis for speciation pattern in near future (Chen, unpublished data).

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