Zootaxa 5738 (1): 197–204
https://www.mapress.com/zt/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.5738.1.24
http://zoobank.org/urn:lsid:zoobank.org:pub:CA64C462-5C0C-4D27-B375-5D522FB46B8D

A new freshwater goby of *Rhinogobius* (Teleostei: Gobiidae) from the Chongkang River basin, western Taiwan

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Abstract

A new freshwater goby of *Rhinogobius* was recently collected from the Chongkang River basin of Western Taiwan. The new species, *Rhinogobius chongkangensis* **sp. nov.**, can be well distinguished from all other congeners by the unique combination of the following features: (1) fins: second dorsal fin rays I/9; anal fin rays I/8; pectoral fin rays modally 16; (2) squamation: longitudinal scale series 32–33 (modally 32); perdorsal scales 12–15 (modally 14); (3) vertebral count 27; (4) mouth oblique, rear edge extending to vertical between anterior margin of orbit and anterior edge of pupil in male and (5) specific colouration: lateral body with 7–8 longitudinal rows of small orange to brownish red spots about 1/6–1/10 size of pupil diameter in male; cheek and opercle with 24–32 rather small orange or brownish red spots in male, with 13–16 small brown spots in female; branchiostegal membrane with many 14–18 tiny orange or brownish red spots in male; basal region of first dorsal fin with 8–12 orange or brownish red spots in male, second dorsal fin pale with 3–4 longitudinal rows of orange spots; pectoral fin with two rows of orange to red orange spots which 4–5 larger orange spots or sometimes fusing a vertical line on upper side on anterior row in male; a snow white vertical band between the two rows of orange spots in male. A brief discussion with all nominal congeneric species is also provided.

Key words: new goby, freshwater fish, *Rhinogobius*, fish fauna, Taiwan

Introduction

The freshwater Rhinogobies, as genus the *Rhinogobius* Gill, 1859, are 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 (Aonuma & Chen 1996; Chen & Shao 1996; Lee & Chang 1996; Chen *et al.* 1998; Chen & Fang 1999), Hainan (Wu & Ni 1985; Chen *et al.* 2002; Chen & Miller 2013), and the Philippines (Herre 1927), and also continental Asia, in Russia, Korea, China, Vietnam, Laos, Cambodia, and Thailand (Chu & Wu 1965; Zheng & Wu 1985; Wu & Ni, 1986; Chen *et al.*, 1999a-c, Chen & Kottelat 2000, 2003, 2005; Chen & Fang 2006; Chen & Miller 1998, 2008; Huang & Chen 2007; Li & Zhong 2007; Li *et al.* 2007; Chen *et al.* 2008; Yang *et al.* 2008; Chen 2009; Wu *et al.* 2009; Chen *et al.* 2022a, b; Wang & Chen 2022; Chen & Yeh 2024).

The life history of *Rhinogobius* species comprises non-diadromous, landlocked, fluvial species (Mizuno 1960; Masuda *et al.* 1989; Iguchi & Mizuno 1991; Akihito *et al.* 1984, 1993, 2002; Suzuki *et al.* 2011) 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 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; Chen *et al.* 2022a, b).

In Taiwan before 2020, except for the brief transverse infraorbital papillae group, *Rhinogobius similis* Gill, 1859 (previously *Rhinogobius giurinus* (Rutter, 1897)), all remaining species are with typical longitudinal infraorbital papillae - the *Rhinogobius brunneus* (Temminck & Schlegel, 1845) species complex includes the following 8 species: *Rhinogobius candidianus* (Regan, 1908) from the nearby region of Sun Moon Lake, Natou County; *Rhinogobius formosanus* Oshima, 1919 from Shinchu; *Rhinogobius gigas* Aonuma & Chen, 1996 from Taitung; *Rhinogobius*

Accepted by M.-F. Yeh: 22 Jul. 2025; published: 30 Dec. 2025

nantaiensis Aonuma & Chen, 1996 from Kaohsiung, *Rhinogobius rubromaculatus* Lee & Chang, 1996 from Wushi, Taichung; *Rhinogobius delicatus* Chen & Shao, 1996 from Hualien; *Rhinogobius henchuenensis* Chen & Shao, 1996 from Pingtung; *Rhinogobius maculafascistus* Chen & Shao, 1996 from Kaohsiung; and *Rhinogobius lanyuensis* Chen *et al.*, 1998 from Lanyu, Taitung, around Taiwan. In 2022, a new species, *Rhinogobius yangminshanensis* Chen *et al.*, 2022a, from Taipei with a fluvial life history, which is rather similar to *Rhinogobius rubromaculatus* Lee & Chang, was just described from northern Taiwan. More recently, two newly described species, *Rhinogobius baborinisanensis* Chen & Yeh, 2024 from Maioli, and *Rhinogobius macromaculatus* Chen & Yeh, 2024 from Tainan, has just been formally documented.

The aim of this paper is to provide a formal description of a new species closely related to *Rhinogobius yangminshanensis* Chen *et al.*, 2022a from western Taiwan. A brief discussion of nominal congeneric species from Taiwan will also be provided.

Materials and methods

Fish collection for type specimens of the new goby was 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 new goby are deposited in the Pisces collection of the National Taiwan Ocean University, Keelung (NTOUP). All other comparative materials of congeneric species from Taiwan are listed in Chen *et al.* (2022a).

Systematics

Rhinogobius Gill, 1859

Rhinogobius chongkangensis sp. nov.

(中港吻鰕虎)
(Figures. 1–4)

Materials examined

Holotype. NTOUP-2023-08-281, 36.9 mm SL, male, Aug. 20, 2023, coll., I-S. Chen, Donghe, Chongkang River basin, Maioli County, Taiwan.

Paratypes.

NTOUP-2023-08-282, 1 specimens, 31.9 mm SL, the date, collector and locality same as holotype.

NTOUP-2023-09-283, 4 specimens, 34.2–39.0 mm SL, Spt. 10, 2023, collector and locality same as holotype.

Diagnosis

Rhinogobius chongkangensis can be well distinguished from all other congeners by the unique combination of the following features: (1) fins: second dorsal fin rays I/9; anal fin rays I/8; pectoral fin rays modally 16; (2) squamation: longitudinal scale series 32–33 (modally 32); perdorsal scales 12–15 (modally 14); (4) vertebral count 27; (5) Mouth oblique, rear edge extending to vertical between anterior margin of orbit and anterior edge of pupil in male and (6) specific colouration: lateral body with 7–8 longitudinal rows of small orange to brownish red spots about 1/6–1/10 size of pupil diameter in male; cheek and opercle with 24–32 rather small orange or brownish red spots in male, with 13–16 small brown spots in female; branchiostegal membrane with many 14–18 tiny orange or brownish red spots in male; basal region of first dorsal fin with 8–12 orange or brownish red spots in male, second

dorsal fin pale with 3–4 longitudinal rows of orange spots; pectoral fin with two rows of orange to red orange spots which 4–5 larger orange spots or sometimes fusing a vertical line on upper side on anterior row in male; a snow white vertical band between the two rows of orange spots in male.

Description

Body proportions in Table 1. Body cylindrical anteriorly, compressed posteriorly. Head rather large, somewhat depressed in male. Eye large, dorsolateral. Snout pointed. Cheek rather fleshy in male. Lips thick. Mouth oblique, rear edge extending to vertical between anterior margin of orbit and anterior edge of pupil in male, but not extending beyond vertical anterior margin of orbit in female. 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, extending ventrally to vertical of rear margin of cheek. Vertebral count 10 + 17 = 27 (examined in 6 specimens).

TABLE 1. Morphometry of *Rhinogobius chongkangensis.*

Type	Holotype	Paratype	Paratype	Paratype	Paratype	Paratype
No. of samples						
Sex	Male	Male	Male	Female	Female	Female
standard length (mm)	36.8	36.0	34.2	31.9	35.7	39.0
% in SL						
Head length	32.2	31.1	32.1	29.4	30.8	31.0
Predorsal length	41.8	39.3	40.7	38.2	39.0	41.2
Snout to 2nd dorsal fin origin	61.8	59.4	58.4	58.1	59.7	61.1
Snout to anal fin origin	68.0	6.36	63.6	65.5	63.9	67.9
Snout to anus	62.7	58.2	59.9	60.1	59.0	62.5
Prepelvic length	34.2	28.9	29.9	30.2	31.1	31.7
Caudel peduncle length	18.4	19.6	25.3	22.5	20.9	18.3
Caudal peduncle depth	12.2	13.1	14.3	12.5	13.4	12.4
First dorsal fin base	18.4	17.4	20.1	19.5	17.6	18.1
Second dorsal fin base	22.6	25.9	23.4	22.5	24.0	25.5
Anal fin base	17.7	19.2	19.1	16.9	19.1	31.4
Caudal fin length	25.0	27.0	27.5	19.3	26.8	25.1
Pectoral fin length	24.5	24.4	25.8	24.3	25.6	25.0
Pelvic fin length	19.7	18.9	19.1	17.5	19.3	18.0
Body depth of pelvic fin origin	17.5	16.6	18.7	16.2	17.8	18.4
Body depth of anal fin origin	15.5	16.4	17.4	16.2	16.7	17.4
Body width of anal fin origin	11.9	12.5	13.7	11.4	14.4	13.8
Pelvic fin origin to anus	32.5	27.7	29.9	32.2	28.5	32.3
% in HL						
Snout length	28.7	30.2	33.3	31.1	28.3	29.9
Eye diameter	21.5	23.9	23.5	21.9	23.0	22.3
Postorbital length	54.0	58.2	52.7	59.3	52.4	53.6
Cheek depth	32.7	31.1	33.6	30.0	29.1	29.4
Head width in upper gill-opening	51.7	53.2	53.8	50.4	49.5	54.6
Head width in maximum	64.9	64.0	63.9	66.9	62.4	66.6
Fleshy interorbital width	28.2	27.9	28.5	29.7	24.5	25.8
Bony interorbital width	13.8	12.6	10.9	13.3	10.0	9.3
Lower jaw length	36.8	40.8	38.5	38.8	34.5	36.2
% in Caudel peduncle length						
Caudal peduncle depth	65.9	67.0	56.5	55.7	64.2	67.8

Fins. D1 VI, D2 I/9–10 (modally I/9); AI/8; P 15–16 (modally 16); V I/5+I/5 . D1 rounded, 3rd and 4th rays slightly longer, with rear tip while depressed not extending to or just reaching vertical of D2 origin in male.

Origin of A inserted below or slightly behind second branched rays of D2. Rear tips of D2 and A fin rays not extending to procurrent rays of C in male. P 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 large ctenoid scales, anterior region of predorsal area naked; posterior dorsal area and belly cycloid. LR 32–33 (modally 32); TR 10–11 (modally 11); PreD 12–15 (modally 14); and SDP 8–9 (modally 9) (distribution frequency in Table 2). Head and prepelvic region naked. Anterior edge of midpredorsal squamation extending beyond the vertical of midline of opercle.

Head lateral-line system. (Figure 1)

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 in lacking both with paired pore λ and pore ω. Lateral section of anterior oculoscapular canal with terminal pore α. No posterior oculoscapular canal. No preopercular canal.

Sensory papillae: Row *a* extending 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* near lower region of row *ot*.

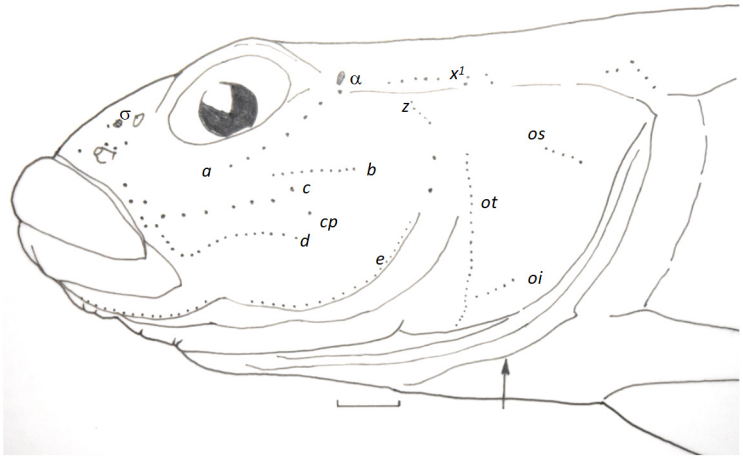

FIGURE 1. head lateral-line system of *Rhinogobius chongkangensis*, male, holotype, 36.9 mm SL. Bar = 1 mm. The arrows indicate the ventral termination point of gill-opening.

Colouration while fresh. (Figures 2–4)

Body creamy yellow to yellowish brown. Side of body without distinct gray or brown blotches or merely with very faint smaller gray blotches in middle lateral side; lateral body with 7–8 longitudinal rows of small orange to brownish red spots about 1/6–1/10 size of pupil diameter in male; orange brown spots less than 1/4 of pupil diameter in female. Dorsal region of body with about 6 indistinct gray blotches.

Head creamy yellow to yellowish brown. Cheek and opercle with 24–32 rather small orange or brownish red spots in male, with 13–16 small brown spots in female. Nape with many orange or brown spots. Snout on dorsal side with a pair of red to brown stripe united at snout tip. Snout on lateral side with two parallel brownish gray stripes (orange one as posterior stripes in male) both terminating toward margin of upper jaw; lower one brownish red but lacking any narrow blue margin in male, but brownish gray in female. Lips and dorsal snout pale brown. Branchiostegal membrane with many 14–18 tiny orange or brownish red spots in male, but rather few spots or spotless in female. Isthmus creamy yellow.

First dorsal fin pale brown with broad orange pink band on distally 1/3 or 1/2 area. A middle grayish black spot in front of third spine of first dorsal fin in both sexes. The spot usually smaller in female. Basal region of first dorsal fin with 8–12 orange or brownish red spots in male, 6–8 brown spots in female. Second dorsal fin pale with orange pink band on distal 1/3–1/4 region, 3–4 longitudinal rows of orange spots in both sexes. Anal fin orange basally

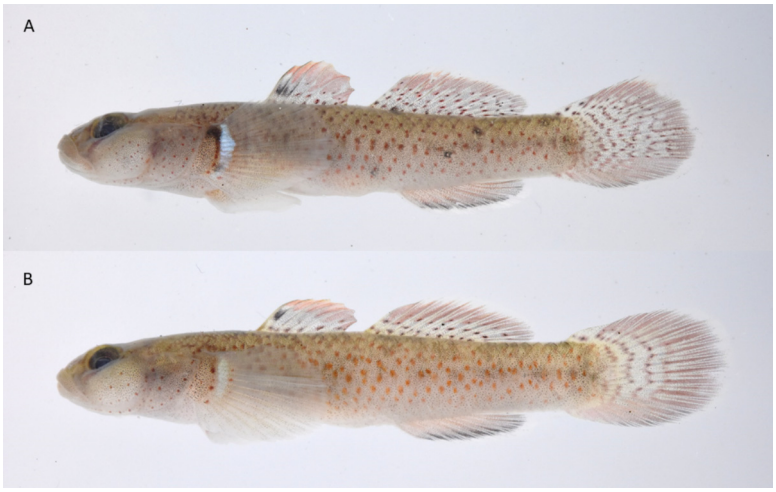

FIGURE. 2. *Rhinogobius chongkangensis* new species, the Chongkong River basin, Miaoli County, Taiwan, ROC. A. male, holotype, 36.9 mm SL, ; B. female, paratypes, 31.9 mm SL.

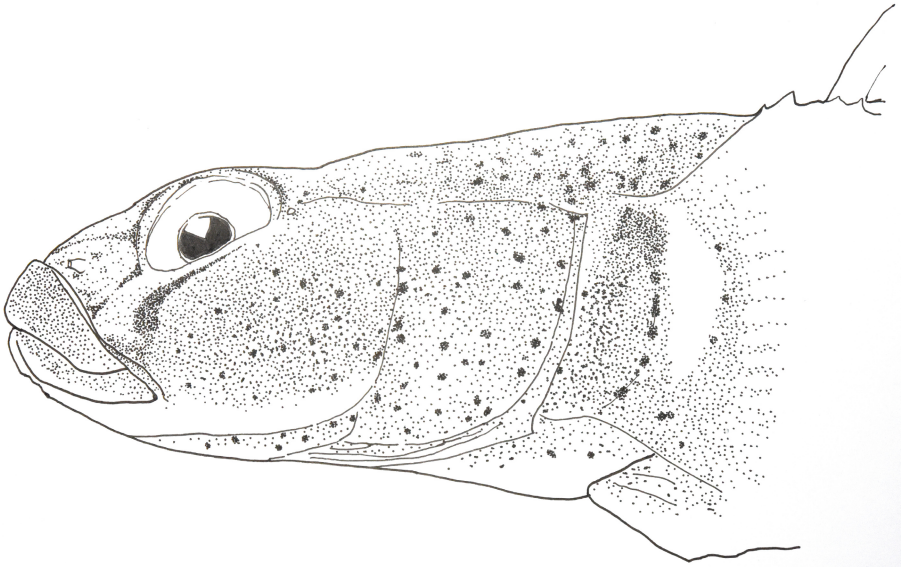

FIGURE. 3. Head pattern of *Rhinogobius chongkangensis*, male, holotype, 36.9 mm SL.

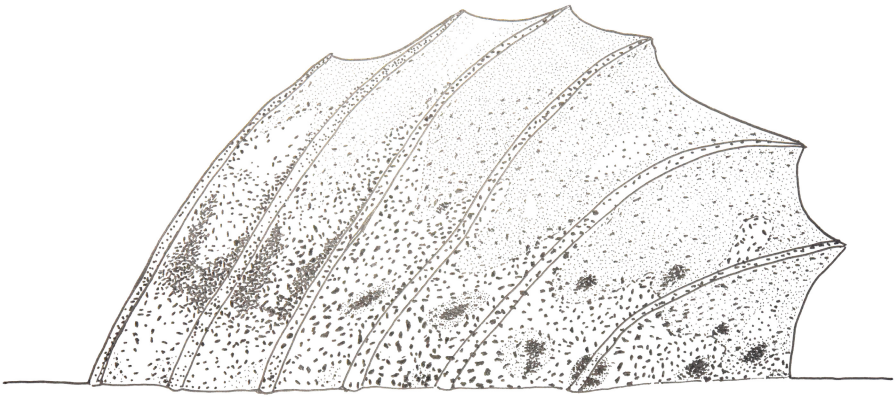

FIGURE. 4. First dorsal fin pigmentationin in *Rhinogobius chongkangensis*, male, holotype, 36.9 mm SL.

with distal gray margin. Caudal fin surrounding with distally grayish brown zone in male accompanying with 4–7 somewhat vertical rows of orange or brownish red spots; with pale brown zone in female accompanying with 3–4 vertical rows of small brown spots. Pectoral fin with two rows of orange to red orange spots which 4–5 larger orange spots or sometimes fusing a vertical line on upper side on anterior row in male; with two rows (anterior 3–4 larger ones; posterior 3–4 smaller ones) of brown spots in female. A snow white vertical band between the two rows of orange spots in male near the basal region of pectoral fin; pale white in female. Pelvic fin pale gray in male, whitish in female.

Etymology

The specific name—*chongkangensis* is referred to the type locality: "Chongkang River basin" of Western Taiwan.

Distribtuion

The new species could be endemic and only found in the several hill-streams of Chong-Kong River basin, Miaoli County, Taiwan.

Remarks

The new species can be immediately separated from all nominal congeners from Taiwan including typical longitudinal infraorbital sensory papillae group -*Rhinogobius candidianus* (Regan, 1908), *Rhinogobius formosanus* Oshima, 1919, *Rhinogobius gigas* Aonuma & Chen, 1996, *Rhinogobius nantaienesis* Aonuma & Chen, 1996, *Rhinogobius delicatus* Chen & Shao, 1996, *Rhinogobius maculafascistus* Chen & Shao, 1996, and *Rhinogobius lanyuensis* Chen, Miller & Fang, 1998 by high vertebral account modally 27 vs. 26 and lower count of pectoral fin rays modally 15–16 vs. more than 17.

Within the species group with higher vertebral count as 27, this new species is more similar to *Rhinogobius yangminshanensis* rather than *Rhinogobius rubromaculatus* group (also included both *Rhinogobius baborinisanensis* Chen & Yeh, 2024; *Rhinogobius macromaculatus* Chen & Yeh, 2024) than any other congeneric species with same dorsal fin formula as I/9 from Taiwan.

However, *Rhinogobius chongnkangensis* **sp. nov.** eventually can be well distinguished from *Rhinogobius yangminshanensis* Chen *et al.*, 2022a by the following features: (1) longitudinal scales: longitudinal scale rows usually 32–33 vs. longitudinal scale 30–31; (2) predorsal scales: modally 14 vs. 12; (3) cheek spots: always representing smaller orange spots ones of cheek around 1/6–1/10 size of pupil diameter in male vs. about equal to 1/3 of pupil diameter in male; (4) smaller size of mouth: rear edge of mouth extending to midline of anterior margin of orbit and anterior edge of pupil in male vs. rear edge of mouth extending to vertical of anterior margin of pupil in male; (5) more spotty in first dorsal fins: usually 7–10 reddish brown to deep brown spots in basal first dorsal fin membrane in male vs. 3–4 larger spots in male; and (6) pectoral fin vertical stripe: usually in having distinct snow white bar in male vs. somewhat bluish in male.

Our unpublished research data of mtDNA D-loop sequences has also revealed that great mitogenetic differentiation between them, the detailed molecular phylogenetic relationship with more recently described data would be reconstructed in coming working paper (Chen, unpublished data).

Acknowledgements

The authors wish to thank the partial research grant support from the Water Resources Planning Branch, Water Resources Agency, Ministry of Economic Affairs WRA, MOEA, Wufong, Taichung City, Taiwan for aquatic biodiversity survey including fishes and crustaceans of Western Taiwan.

References

Akihito, P., Hayashi, M. & Yoshino, T. (1984) Suborder Gobioidei. *In*: Masuda, H., Amaoka, K., Araga, C., Uyeno, C.T. & Yoshino, T. (Eds.), *The Fishes of Japanese Archipelago*. Tokai University Press, Tokyo, pp. 228–289.

Akihito, P., Iwata, A., Sakamoto, K. & Ikeda, Y. (1993) Suborder Gobioidei. *In*: Nakabo, T. (Ed.), *Fishes of japan with pictorial keys to the species*. Tokai University Press, Tokyo, pp. 997–1392. [in Japanese]

Akihito, Sakamoto, K., Ikeda, Y. & Sugiyama, K. (2002) Suborder Gobioidei. *In*: Nakabo, T. (Ed.), *Fishes of Japan with pictorial keys to the species*. *2nd English Edition*. Tokai University Press, Tokyo, pp. 1139–1310.

Aonuma, Y. &d Chen, I-S. (1996) Two new species of *Rhinogobius* (Pisces, Gobiidae) from Taiwan. *Journal of Taiwan Museum*, 49, 7–13.

Chen, I-S. (2009) *The indicator species of riverine fishes in Taiwan. Vol. II. Diadromous fishes*. National Taiwan Ocean University Press, Keelung, 95 pp. [in Chinese]

Chen, I-S., Cheng, Y.H. & Shao, K.T. (2008) Anew species of *Rhinogobius* (Teleostei: Gobiidae) from the Julongjiang Basin in Fujian Province, China. *Ichthyological Research*, 55, 335–343.
https://doi.org/10.1007/s10228-008-0045-2

Chen, I-S. & Fang, L.S. (1999) *The freshwater and estuarine fishes of Taiwan.* National Museum of Marine Biology and Aquarium Press, Pingtung. [in Chinese]

Chen, I-S. & Fang, L.S. (2006) Anew species of *Rhinogobius* (Teleostei: Gobiidae) from the Hanjiang basin, in Guangdong Province, China. *Ichthyological Research*, 53, 247–253.
https://doi.org/10.1007/s10228-006-0342-6

Chen, I-S., Kottelat, M. & Miller, P.J. (1999a) Freshwater gobies of the genus *Rhinogobius* from the Mekong basin in Thailand and Laos, with descriptions of three new species. *Zoological Studies*, 38, 19–32.

Chen, I-S. & Kottelat, M. (2000). *Rhinogobius maculicervix*, a new species of goby from the Mekong basin in northern Laos. *Ichthyological* E*xplorations of Freshwaters*, 11, 81–87.

Chen, I-S. & Kottelat, M. (2003). Three new freshwater gobies of the genus, *Rhinogobius* (Teleostei: Gobiidae) from northeastern Laos. *The Raffles Bulletin of Zoology*, 51, 87–95.

Chen, I-S. & Kottelat, M. (2005) Four new freshwater gobies of the genus *Rhinogobius* (Teleostei: Gobiidae) from northern Vietnam. *Journal of Natural History*, 39, 1407–1429.
https://doi.org/10.1080/00222930400008736

Chen, I-S. & Miller, P.J. (1998) Redescription of *Gobius davidi* (Teleostei:Gobiidae) and comparison with *Rhinogobius lentiginis*. *Cybium*, 22, 211–221.

Chen, I-S. & Miller, P.J. (2008) Two new species of freshwater gobies of genus *Rhinogobius* (Teleostei: Gobiidae) in southern China, around the northern region of the South China Sea. *The Raffles Bulletin of Zoology*, Supplement 19, 225–232.

Chen, I-S. & Miller, P. J. (2013) A new freshwater goby of *Rhinogobius* (Teleostei: Gobiidae) from Hainan Island, southern China. *Journal of Marine Science and Technology Supplement*, 21, 124–129.

Chen, I-S., Miller, P.J. & Fang, L.S. (1998) Anew species of freshwater goby from Lanyu (Orchid Island), Taiwan. *Ichthyological Explorations of Freshwaters*, 9, 255–261.

Chen, I-S., Miller, P.J., Wu, H.L. & Fang, L.S. (2002) Taxonomy and mitochondrial sequence evolution in non-diadromous species of *Rhinogobius* (Teleostei:Gobiidae) of Hainan Island, southern China. *Marine and Freshwater Research*, 53, 259–273.
https://doi.org/10.1071/MF01167

Chen, I-S. & Shao, K.T. (1996) A taxonomic review of the gobiid fish genus *Rhinogobius* Gill, 1859, from Taiwan with descriptions of three new species *Zoological Studies*, 35, 200–214.

Chen, I-S., Wang, S.C. & Shao, K.T. (2022a) A new freshwater gobiid species of *Rhinogobius* Gill, 1859 (Teleostei: Gobiidae) from northern Taiwan. *Zootaxa*, 5189 (1), 29–44.
https://doi.org/10.11646/zootaxa.5189.1.6

Chen, I-S., Wang, S.C., Chen, K.W. & Shao, KT. (2022b) A new freshwater goby of *Rhinogobius lingtongyanensis* (Teleostei, Gobiidae) from the Dongshi river basin, Fujian Province, southeastern China. *Zootaxa*, 5189 (1), 18–28.
https://doi.org/10.11646/zootaxa.5189.1.5

Chen, I-S., Wu, H.L. & Shao, K.T. (1999b) A new species of *Rhinogobius* (Teleostei: Gobiidae) from Fujian Province, China. *Ichthyological Research*, 46, 171–178.
https://doi.org/10.1007/BF02675435

Chen, I-S., Yang, J.X. & Chen, Y.R. (1999c) A new species of *Rhinogobius* (Teleostei: Gobiidae) from the Honghe Basin,Yunnan Province. *Acta Zoologica Taiwanica,* 10, 45–52.

Chen, I-S. & Yeh, M.F. (2024) Two new freshwater gobiid species of *Rhinogobius* Gill, 1859 (Teleostei: Gobiidae) from Taiwan. *Zootaxa*, 5550 (1), 333–353.
https://doi.org/10.11646/zootaxa.5550.1.34

Chu, Y.T. & Wu, H.L. (1965) A preliminary study of the zoogeography of gobioid fishes of China. *Oceanography and Liminology, Sinica*, 7, 122–140. [in Chinese]

Gill, T.N. (1859) Notes on a collection of Japanese fishes by Dr. J. Morrow. *Proceedings of Academy of Natural Sciences Philadelphia*, 11, 144–159.

Herre, A.W.C.T. (1927) Gobies of Philippines and China Sea. *Monographs of the Bureau of Science, Manila,* 2, 1–352.
Huang, S.P. & Chen, I-S. (2007) Three new species of *Rhinogobius* Gill, 1859 (Teleostei: Gobiidae) from the Hanjiang basin, southern China. *The Raffles Bulletin of Zoology*, Supplement 14, 101–110.
Iguchi, K. & Mizuno, N. (1991) Mechanism of embryonic drift in the amphidromous goby, *Rhinogobius brunneus*. *Environmental Biology of Fishes*, 31, 295–300.
https://doi.org/10.1007/BF00000694
Lee, S.C. & Chang, L.T. (1996) A new goby, *Rhinogobius rubromaculatus* (Teleostei: Gobiidae), from Taiwan. *Zoological Studies*, 3, 30–35.
Li, F. & Zhong J.S. (2007) A new *Rhinogobius* species from Zhejiang Province, China (Teleostei: Gobiidae). *Zoological Research*, 28, 539–544. [in Chinese with English summary]
Li, F., Zhong, J.S. & Wu, H.L. (2007) A new species of the genus *Rhinogobius* from Fujian Province, China (Teleostei: Gobiidae). *Acta Zootaxanomica Sinica*, 3, 981–985. [in Chinese]
Masuda, Y., Ozawa, T. & Enami, S. (1989) Genetic differentiation among eight color types of the freshwater goby, *Rhinogobius brunneus*, from western Japan. *Japanese Journal of Ichthyology*, 36, 30–41.
https://doi.org/10.1007/BF02905670
Miller, P.J. (1998) New species of *Coryrogobius*, *Thorogobius*, and *Wheelerigobius* from West Africa (Teleostei: Gobiidae). *Journal of Natural History*, 22, 1245–1262.
https://doi.org/10.1080/00222938800770761
Mizuno, N. (1960) Description of a new freshwater goby from Japan. *Memoirs of the College of Science, University of Kyoto*, Series B, 27, 117–119.
Sanzo, L. (1911) Distribuzione delle papille cutanee (organi ciatiforme) e suo valore sistematico nei gobi. *Mitteilungen aus der zoologischen Sation zu Neapel*, 20, 249-328.
Suzuki, T., Chen, I-S. & Senou, H. (2011) A new species of *Rhinogobius* Gill, 1859 (Teleostei: Gobiidae) from the Bonin islands, Japan. *Journal of Marine Science and Technology*, 19, 693–701.
https://doi.org/10.51400/2709-6998.2213
Takahashi, S. & Okazaki, T. (2002) A new lentic form of the Yoshinobori species complex, *Rhinogobius* spp. from Lake Biwa, Japan, compared with lake-river migrating *Rhinogobius* sp. OR. *Ichthyological Research*, 49, 333–339.
https://doi.org/10.1007/s102280200049
Wang, S.C. & Chen, I-S. (2022) A new freshwater goby, *Rhinogobius lianchengensis* (Teleostei: Gobiidae) from the Minjiang river basin, Fujian Province, China. *Zootaxa*, 5189 (1), 45–56.
https://doi.org/10.11646/zootaxa.5189.1.7
Wongrat, P. & Miller, P.J. (1991) The innervation of head neuromast rows in eleotridine gobies (Teleostei: Gobioidei). *Journal of Zoology*, 225, 27–42.
https://doi.org/10.1111/j.1469-7998.1991.tb03799.x
Wu, H.L. & Ni, Y. (1986) Gobiidae. *In*: Anonnymous (Ed.), *The freshwater and estuarine fishes of hainan Island.* Guangdong Science and Technology Press, Guangzhou, pp. 259–314. [in Chinese]
Wu, H.L., Zhong, J.S. & Chen, I-S. (2009) Taxonomic research of the gobioid fishes (Perciformes: Gobioidei) in China. *Korean Journal of Ichthyology*, 21, 63–72.
Yang, J.Q., Wu, H.L. & Chen, I-S. (2008) A new species of *Rhinogobius* (Teleostei: Gobiidae) from Feiyunjiang basin in Zhejiang Province, China. *Ichthyological Research*, 55, 379–385.
https://doi.org/10.1007/s10228-008-0076-8
Zheng, M.L. & Wu, H.L. (1985) A study of freshwater gobiid fishes of Zhejiang Province, China, with descriptions of two new species," *Acta Zootaxanomica Sinica*, 10, 328–333. [in Chinese with English summary]