



***Rhinogobius maculagenys*, A new species of freshwater goby (Teleostei: Gobiidae) from Hunan, China**

QIANQIAN WU^{1,2}, XUEJIAN DENG^{1,2}, YANJIE WANG¹ & YONG LIU¹

¹College of Life Science, Hunan Normal University, Changsha, Hunan 410081, P. R. China

²Corresponding author. E-mail: linxiazhiheng2013@163.com; E-mail: dxj8871922@163.com

Abstract

A new freshwater goby, *Rhinogobius maculagenys* sp. nov., was collected from Hunan Province in Southern China. This species can be distinguished from all congeners by a combination of the following features: first dorsal fin with 6 spines; second dorsal fin with a single spine and 7–9 segmented rays; anal fin with a single spine and 6–8 segmented rays; pectoral fin with 16 segmented rays; 32–34 longitudinal scales; 9–13 transverse scales; 11+16=27 vertebrae; pore ω 1 missing; head and body yellowish brown; cheek and opercle yellowish brown with over 30 small orange spots, branchiostegal membrane yellow with over 10 small orange spots in males and white and spotless in females; first dorsal fin trapezoidal in males and nearly semicircular in females, with large bright blue blotch in front of second spine; spines 4 and 5 longest, rear tip extending to base of second branched ray of second dorsal fin in males when adpressed, but just reaching or not reaching anterior margin of second dorsal fin in females; caudal fin with 5–6 vertical rows of brown spots; flank with several longitudinal rows of blackish-brown spots; and belly pale white.

Key words: Xiangjiang, fish taxonomy, valid species, color pattern

Introduction

The freshwater gobies of the genus *Rhinogobius* Gill 1859 are widely distributed in East and Southeast Asia, including the Russian Far East, Japan, Korea, China, Taiwan, the Philippines, Vietnam, Laos, Cambodia, and Thailand (Chen *et al.* 1999a; Chen & Kottelat 2003; Chen & Kottelat 2005; Huang *et al.* 2016). The genus includes both amphidromous and landlocked species. In southern and southeastern mainland China, most species of *Rhinogobius* are non-diadromous, landlocked species (Takahashi & Yanagisawa 1999; Huang & Chen 2007).

Rhinogobius, originally described as a monotypic genus based on *R. similis* by Gill (1859) is currently known as the most species-rich freshwater goby genus, comprising 74 described and valid species, although several unnamed species are left unresolved (Suzuki *et al.* 2017).

The genus is divided into two distinct groups: one comprises only a single species, *R. similis* (Suzuki *et al.* 2015), whereas the other includes all remaining species. The latter group is divided into two distinct sub-groups. One, comprising 27 species, has lower counts of vertebrae (25–27, almost always 26), whereas the others, including 37 species, has almost always 27 or more vertebrae. No data about the vertebral counts are available for nine species of *Rhinogobius*, including *R. bedfordi* Regan 1908, *R. bucculentus* (Herre 1927a), *R. carpenteri* Seale 1910, *R. cliffordpopei* (Nichols 1925), *R. fukushimai* Mori 1934, *R. imfasciocaudatus* Nguyen & Vo 2005, *R. philippinus* (Herre 1927b), *R. shennongensis* (Yang & Xie 1983), and *R. sowerbyi* Ginsburg 1917.

There are 24 valid species of *Rhinogobius* with high vertebral counts (27–29) found in mainland China, as follows: *R. changtinensis* Huang & Chen 2007, *R. cheni* (Nichols 1931), *R. davidi* (Sauvage & Dabry de Thiersant 1874), *R. duospilus* (Herre 1935), *R. filamentosus* (Wu 1939), *R. genanematus* Zhong & Tzeng 1998, *R. henryi* (Herre 1938), *R. honghensis* Chen, Yang, & Chen 1999, *R. lentiginis* (Zheng & Wu 1985), *R. lindbergi* Berg 1933, *R. linshuiensis* Chen, Miller, Wu & Fang 2002, *R. liui* Chen & Wu 2008, *R. longyanensis* Chen, Cheng, & Shao 2008, *R. lungwoensis* Huang & Chen 2007, *R. multimaculatus* (Wu & Zheng 1985), *R. niger* Huang, Cheng, & Shao 2016, *R. parvus* (Luo 1989), *R. ponkouensis* Huang & Chen 2007, *R. szechuanensis* (Tchang 1939), *R.*

wangchuangensis Chen, Miller, Wu, & Fang 2002, *R. wangi* Chen & Fang 2006, *R. wuyanlingensis* Yang, Wu, & Chen 2008, *R. xianshuiensis* Chen, Wu, & Shao 1999, and *R. yaoshanensis* (Luo 1989).

There are 11 nominal species of *Rhinogobius* with high vertebral counts found in mainland Southeast Asia, as follows: *R. albimaculatus* Chen, Kottelat, & Miller 1999, *R. boa* Chen & Kottelat 2005, *R. chiengmaiensis* Fowler 1934, *R. lineatus* Chen, Kottelat, & Miller 1999, *R. maculicervix* Chen & Kottelat 2000, *R. mekongianus* (Pellegrin & Fang 1940), *R. milleri* Chen & Kottelat 2003, *R. nammaensis* Chen & Kottelat 2003, *R. sulcatus* Chen & Kottelat 2005, *R. taenigena* Chen, Kottelat, & Miller 1999 and *R. vermiculatus* Chen & Kottelat 2003. Additionally, valid species of *Rhinogobius* with high vertebral counts occur in Japan (*R. flumineus* [Mizuno 1960]) and Taiwan (*R. rubromaculatus* Lee & Chang 1996).

This paper describes a new species of the genus with a high vertebral count from the Hunan Province of mainland China, bringing the total number of species from the country in this group to 25.

Materials and methods

All examined specimens were collected by hand-net. Specimens were fixed in 10% formalin for three days and then placed in 75% ethanol for long-term storage. Body length was measured as standard length (SL). Measurements were made point-to-point with calipers to the nearest 0.01 mm. The type specimens of the new species are deposited in the Hunan Normal University, Changsha, Hunan (HUNNU). The morphological measurements follow Miller (1988) and Suzuki *et al.* (2017), and meristic counts follow Chen & Shao (1996). Osteological features were observed from radiographs. The vertebrae are composed of abdominal vertebra and coccygeal vertebra (with haemal spine). The terminology of cephalic sensory canals and the free neuromast organ (sensory papillae) is based on Huang & Chen (2007) and Wu & Zhong (2008). The method of Akihito *et al.* (1984) is used in describing the pattern of the interdigitation of the dorsal-fin pterygiophores and neural spines ("P-V"). The curatorial procedures for fish specimens follow Motomura & Ishikawa (2013).

In the description of meristic values, data from the holotype have an asterisk and the frequency of each count is given in parentheses following the relevant count. The meristic abbreviations are as follows: D1, first dorsal fin; D2, second dorsal fin.

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(Tables 1–2; Fig.1–4).

Holotype. HUNNULS2016-12-2801, male, 49.50 mm SL; Zhong Water, the upper reaches of Xiangjiang River, Lanshan Country, Hunan Province, China, 25°21'36.98"N112°11'6.55"E; collected by Qianqian Wu on 28 December 2016.

Paratypes. Fifteen specimens (seven males and eight females, 41.68–52.82 mm SL), same locality as holotype: HUNNULS2016-12-2802, male, 48.12 mm SL; HUNNULS2016-12-2803, male, 41.68 mm SL; HUNNULS2016-12-2804, male, 51.10 mm SL; HUNNULS2016-12-2805, male, 46.57 mm SL; HUNNULS2016-12-2806, male, 52.82 mm SL; HUNNULS2017-12-0602, male, 46.67 mm SL; HUNNULS 2017-12-0613, male, 39.85 mm SL; HUNNULS2016-12-2807, female, 44.87 mm SL; HUNNULS2016-12-2808, female, 46.22 mm SL; HUNNULS2016-12-2809, female, 47.31 mm SL; HUNNULS2016-12-2810, female, 47.87 mm SL; HUNNULS2016-12-2811, female, 44.89 mm SL; HUNNULS2016-12-2812, female, 46.77 mm SL; HUNNULS2017-12-0621, female, 49.79 mm SL; HUNNULS2017-12-0612, female, 44.50 mm SL.

Diagnosis. *Rhinogobius maculagenys* is distinguished from all congeners by a combination of the following features: second dorsal-fin rays I/7–9; anal-fin rays I/6–8; pectoral-fin rays 16; longitudinal scale series 32–34; transverse scale series 9–13; predorsal scale series 0; vertebral count 11+16=27; pore ω 1 missing; head and body yellowish brown; cheek and opercle yellowish brown with over 30 small orange spots, branchiostegal membrane yellow with over 10 small orange spots in males and white and spotless in females; first dorsal fin trapezoidal in males and nearly semicircular in females, with large bright blue blotch in front of second spine; spines 4 and 5 longest, rear tip extending to base of second branched ray of second dorsal fin in males when adpressed, but just reaching or not reaching anterior margin of second dorsal fin in females; caudal fin with 5–6 vertical rows of brown spots; flank with several longitudinal rows of blackish-brown spots; belly pale white.

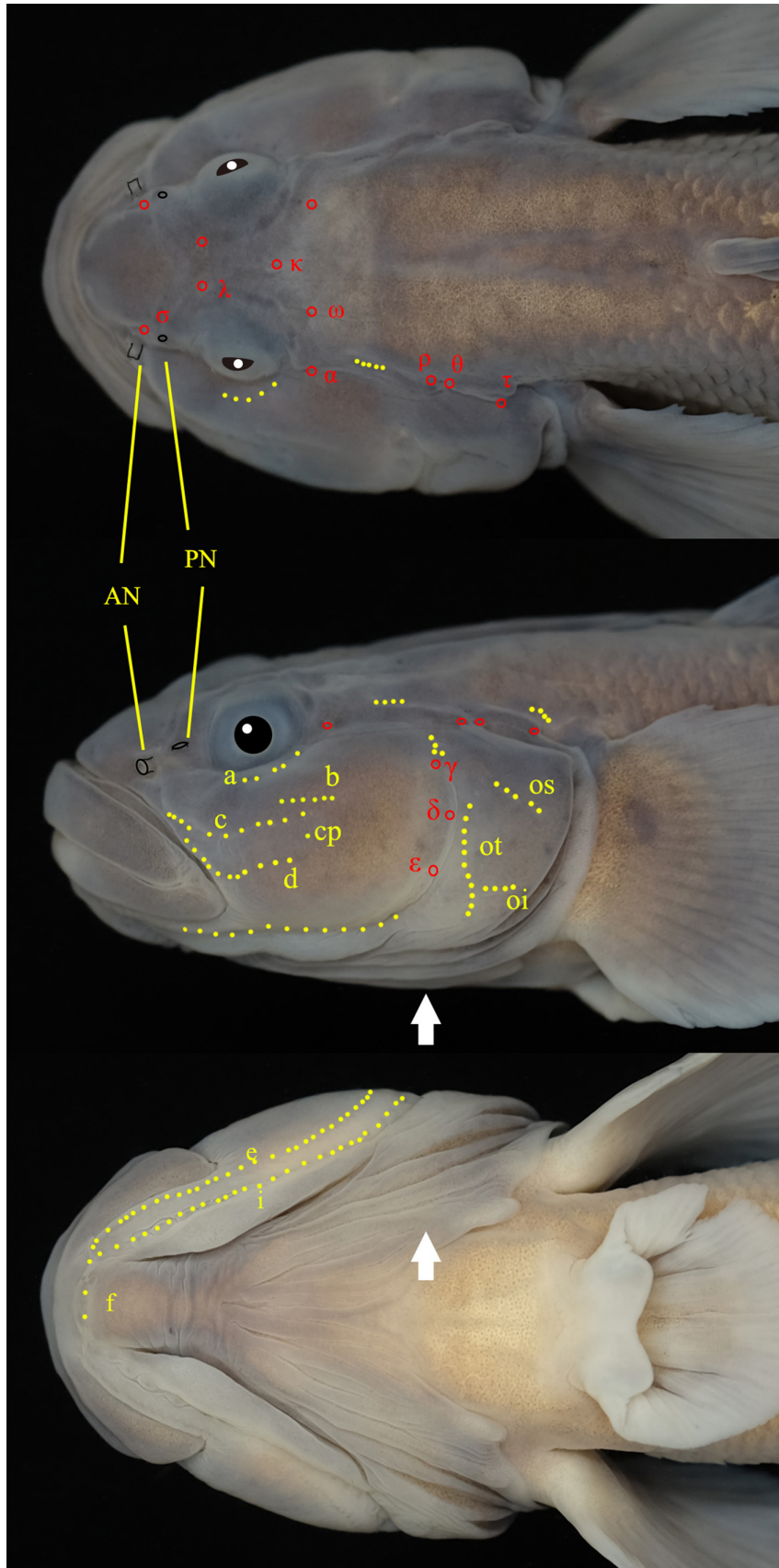


FIGURE 1 Dorsal (top), lateral (middle), and ventral (bottom) views of head of paratype of *Rhinogobius maculagenys* (HUNNULS2016-12-2806, male, 52.82 mm SL), showing cephalic sensory pores and papillae. Red circle with red letters indicate sensory canal pores; yellow dots indicated by yellow letters represent sensory papillae; white arrows show positions of dorsal and ventral most of gill opening. Abbreviations: AN, anterior nares pore; PN, posterior nares pore.



FIGURE 2 Alcohol-preserved specimens of *Rhinogobius maculagenys* sp. nov. from Hunan Province, China. **a**, HUNNULS2016-12-2801, holotype, male, 49.50 mm SL; **b**, HUNNULS2016-12-2811, paratype, female, 44.89 mm SL.



FIGURE 3 Freshly collected specimens of *Rhinogobius maculagenys* sp. nov. from Hunan Province, China. Lateral (**a**) and ventral (**c**) views of paratype, male, HUNNULS2017-12-0602, 46.67 mm SL; lateral (**b**) and ventral (**d**) views of paratype, female, HUNNULS2017-12-0621, 49.79 mm SL.

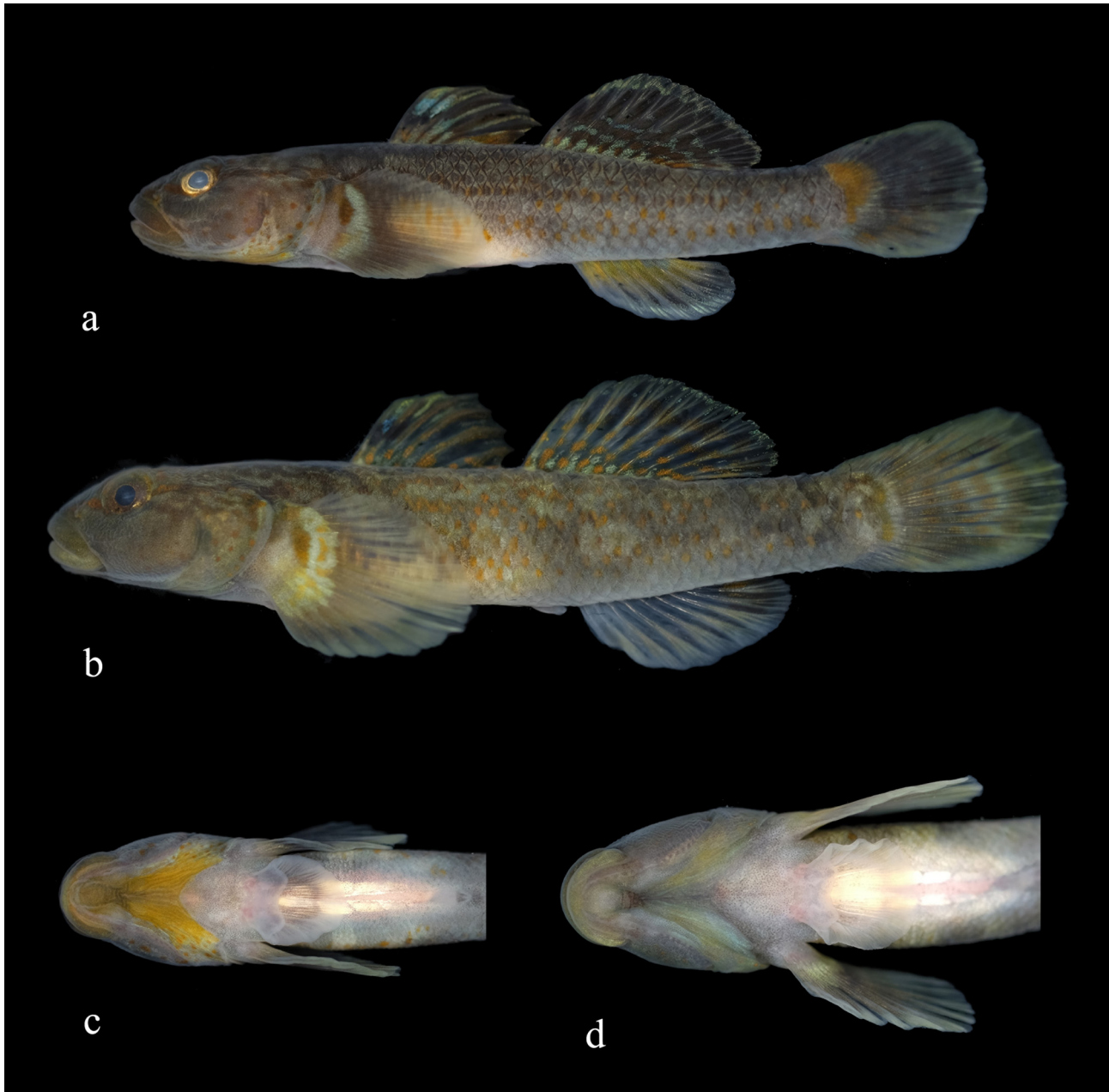


FIGURE 4 *Rhinogobius maculagenys* sp. nov. Lateral (a) and ventral (c) views of paratype, male, HUNNULS2017-12-0613, 39.85 mm SL; lateral (b) and ventral (d) views of paratype, female, HUNNULS2017-12-0612, 44.50 mm SL.

Description. First dorsal-fin rays VI* (16); second dorsal-fin rays I/7 (1), I/8 (10) or I/9* (5); anal-fin rays I/6 (2), I/7* (13), I/8 (1); pectoral-fin rays 16* (16); pelvic-fin rays I/5* (16); branched caudal fin-rays 8+7* (5); longitudinal scales 32 (2), 33*(13), or 34 (1); transverse scales 9* (3), 10 (8), 11(1), 12 (3), or 13 (1); scales between origin of dorsal and pectoral fin 6 (2), 7* (12), or 8 (2); predorsal scales 0* (16); P-V 3/II IIII 0/9* (5); vertebral counts 11+16=27* (5); gill rakers 9+20 (1).

Morphometric data presented in Table 1. Body slender, sub-cylindrical anteriorly and compressed posteriorly. Head moderately large, eye high and large, lips thick. Upper lip more prominent than lower lip. Mouth oblique, corner of mouth extending to vertical of anterior margin of orbit in males, almost reaching the vertical of anterior margin of orbit in females. Both jaws with 3–4 rows of conical and inwardly curved teeth. Anterior nares short tubes, posterior nares with round openings. Gill opening extends ventrally reaching middle vertical line of operculum.

TABLE 1. Morphometric data of *Rhinogobius maculagenys* sp. nov.

No. HUNNULS	201616122801	2016122802	2016122803	2016122804	2016122805	2016122806	201712602	2017120613
Type	Paratypes							
sex	Holotype				male			
	49.50	48.12	41.68	51.10	46.57	52.82	46.67	39.85
Standard length(mm)		27.6	29.5	28.4	28.1	29.3	25.2	27.2
% in Standard length								
Head length	29.3	36.8	35.7	36.9	36.4	33.6	36.3	36.1
Predorsal length	35.5	56.3	57.9	57.6	55.9	54.1	58.3	55.0
Snout to origin of 2nd dorsal fin	55.2	64.4	62.2	62.9	61.2	62.7	63.6	62.8
Snout to origin of anal fin	60.7	56.6	56.8	57.7	57.2	56.7	56.0	55.7
Snout to anus	56.2	26.7	28.6	27.9	28.4	26.9	27.7	25.6
Prepelvic length	28.0	22.2	23.8	24.5	24.0	25.1	25.1	24.5
Caudal-peduncle length	22.7	9.7	10.5	10.9	10.4	10.4	9.9	10.2
Caudal-peduncle depth	10.9	17.9	18.8	19.3	18.6	17.7	15.8	15.6
Base of 1st dorsal-fin length	18.3	21.5	18.1	17.5	17.2	20.2	18.2	20.9
Base of 2nd dorsal-fin length	20.5	14.3	14.1	13.1	13.1	12.5	10.9	12.9
Base of anal-fin length	13.1	23.7	22.9	23.2	24.0	23.9	21.7	19.9
Caudal-fin length	23.1	25.2	26.4	24.3	23.7	23.6	24.3	23.7
Pectoral-fin length	24.9	14.9	17.1	14.0	15.4	14.4	15.3	14.7
Pelvic-fin length	16.1	18.5	17.7	20.1	16.9	18.1	15.3	15.6
Body depth ap pelvic-fin origin	17.6	14.8	15.8	15.0	14.9	17.6	14.2	15.1
Body depth at anal-fin origin	16.1	9.4	11.9	13.0	10.6	12.6	10.1	11.7
Body width at anal-fin origin	11.4	30.3	28.7	30.4	29.9	28.9	29.0	27.4
Pelvic fin origin to anus	27.9							
% in Head length								
Snout length	31.7	31.7	29.0	38.7	35.2	34.3	42.4	35.9
Eye diameter	19.6	20.3	19.4	19.4	18.5	20.2	26.9	21.4
Cheek depth	25.4	25.3	26.2	28.9	29.3	26.6	38.6	37.5
Postorbital length	51.2	56.2	53.1	54.5	53.9	52.2	50.9	54.5
Head width(maximum)	66.0	69.2	67.5	77.5	75.6	72.8	81.2	69.1
Interorbital width	11.7	10.9	14.9	8.3	10.2	9.5	14.3	9.4
Lower jaw length	34.4	33.3	35.7	36.5	36.7	34.0	42.2	33.4
% in Caudal-peduncle length								
Caudal-peduncle depth	48.3	43.9	44.3	44.6	43.4	41.3	39.4	41.7

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TABLE 1. (Continued)

No. HUNNULS	2016122807	2016122808	2016122809	2016122810	2016122811	2016122812	2017120621	2017120612
Type	Paratypes							
sex	female							
Standard length(mm)	44.87	46.22	47.31	47.87	44.89	46.77	49.79	44.50
% in Standard length								
Head length	29.5	29.5	28.0	28.7	28.8	28.1	24.7	26.2
Predorsal length	37.0	35.7	35.0	37.6	36.3	35.3	34.5	37.0
Snout to origin of 2nd dorsal fin	57.3	57.1	57.0	58.7	57.6	55.3	54.4	56.9
Snout to origin of anal fin	63.7	63.8	63.0	64.8	64.4	62.8	60.2	64.4
Snout to anus	58.0	56.9	56.6	57.8	58.6	57.7	54.5	57.7
Prepelvic length	26.3	27.7	25.7	26.4	26.8	27.2	24.6	27.6
Caudal-peduncle length	20.5	23.6	22.0	22.6	24.9	23.4	25.6	23.8
Caudal-peduncle depth	12.0	11.6	10.8	11.2	10.9	10.6	9.7	10.3
Base of 1st dorsal-fin length	18.3	19.8	17.3	17.2	15.1	17.4	18.1	15.3
Base of 2nd dorsal-fin length	23.0	18.8	18.9	19.7	18.2	24.0	21.6	18.9
Base of anal-fin length	15.0	11.9	13.5	13.0	12.1	15.0	13.2	13.8
Caudal-fin length	24.1	22.3	23.0	24.6	24.1	22.4	21.1	22.9
Pectoral-fin length	25.5	23.7	24.2	26.5	25.2	25.3	24.5	25.4
Pelvic-fin length	16.6	13.0	15.3	15.8	15.7	14.8	14.6	16.9
Body depth at pelvic-fin origin	20.4	18.4	18.0	16.8	17.8	16.5	15.7	16.9
Body depth at anal-fin origin	17.2	15.8	16.3	16.9	15.3	15.0	14.8	14.9
Body width at anal-fin origin	13.9	13.5	11.4	11.2	11.8	11.6	11.5	12.4
Pelvic fin origin to anus	32.1	28.6	32.2	31.8	31.4	30.9	30.0	30.2
% in Head length								
Snout length	30.7	30.9	29.4	31.5	29.3	30.6	37.5	40.1
Eye diameter	25.3	23.4	23.3	20.3	20.0	19.3	22.6	26.5
Cheek depth	23.6	24.3	24.5	25.5	25.4	26.7	43.4	42.5
Postorbital length	49.5	50.1	55.0	52.1	52.0	51.4	55.6	58.6
Head width(maximum)	75.9	69.6	71.1	69.8	70.7	74.0	81.7	81.1
Interorbital width	8.9	6.2	7.7	5.5	6.4	12.3	15.3	14.7
Lower jaw length	28.0	28.2	28.7	29.1	26.2	28.3	34.3	31.5
% in Caudal-peduncle length								
Caudal-peduncle depth	58.5	48.9	49.1	49.4	43.8	45.3	37.8	43.4

TABLE 2. Comparisons of 46 species of *Rhinogobius* with high or unknown vertebral counts from mainland Southeast Asia, China, Japan, and Taiwan.

Species	Vertebrae	Predorsal scales	Distal tip of D1 of male(when the fin adpressed)	Vertical dark lines or rows of dark spots on caudal fin	Head pore patterns	Sources
<i>R. albimaculatus</i>	28	6–11	3rd or 4th*	present	$\omega 1$ deficiency	Chen <i>et al.</i> 1999
<i>R. bedfordi</i>	unknown	unknown	to 6th*	present	unknown	Suzuki <i>et al.</i> 2017
<i>R. boa</i>	27	11–12	to origin**	present	$\omega 1$ deficiency	Chen & Kottelat 2005
<i>R. bucculentus</i>	unknown	8–10	not to origin**	absent	unknown	Suzuki <i>et al.</i> 2017
<i>R. carpenteri</i>	unknown	0–few	to 1st*	absent	unknown	Suzuki <i>et al.</i> 2017
<i>R. changtinensis</i>	27	0–2	to 2nd*	present	$\omega 1$ deficiency	Huang & Chen 2007
<i>R. cheni</i>	27	0–11	not to origin**	unknown	$\omega 1$ deficiency	Huang <i>et al.</i> 2016
<i>R. chiengmaiensis</i>	28	3–4	not to origin**	unknown	$\omega 1$ deficiency	Huang <i>et al.</i> 2016
<i>R. cliffordpopei</i>	unknown	0	to 1st*	present	$\omega 1$ deficiency	Wu & Zhong 2008
<i>R. davidi</i>	28	0–4	to origin**	unknown	most deficiency	Wu & Zhong 2008
<i>R. duospilus</i>	27	11–13	to origin**	unknown	$\omega 1$ deficiency	Wu & Zhong 2008
<i>R. filamentosus</i>	27	8–11	beyond base end**	present	$\omega 1$ deficiency	Wu & Zhong 2008
<i>R. flumineus</i>	27	5–7	2nd, 3rd, or 4th*	unknown	$\omega 1$ deficiency	Huang <i>et al.</i> 2016
<i>R. fukushimai</i>	unknown	2–6	to 1st or 2nd*	present	unknown	Wu & Zhong 2008
<i>R. genematus</i>	27	0	beyond origin**	present	$\omega 1$ deficiency	Zhong & Tzeng 1998
<i>R. henryi</i>	28	0	not to origin**	unknown	$\omega 1$ deficiency	Huang <i>et al.</i> 2016
<i>R. honghensis</i>	28	0–4	to 1st*	present	$\omega 1$ deficiency	Chen <i>et al.</i> 1999
<i>R. infasciocaudatus</i>	unknown	4	beyond origin**	absent	unknown	Suzuki <i>et al.</i> 2017
<i>R. lentiginis</i>	27	0	to 4th*	present	completed deficiency	Wu & Zhong 2008
<i>R. lindbergi</i>	27	0	not to origin**	present	$\omega 1$ and δ deficiency	Wu & Zhong 2008
<i>R. lineatus</i>	28	6–7	to origin**	absent	$\omega 1$ deficiency	Chen <i>et al.</i> 1999
<i>R. linsuiensis</i>	28	7–11	not to origin**	present	$\omega 1$ deficiency	Chen <i>et al.</i> 2002
<i>R. litui</i>	29	0	beyond origin**	present	$\omega 1$ deficiency	Wu & Zhong 2008
<i>R. longyanensis</i>	27	7–8	to 1st*	absent	$\omega 1$ deficiency	Chen <i>et al.</i> 2008
<i>R. lungwoensis</i>	28	3–7	to origin**	present	$\omega 1$ deficiency	Huang & Chen 2007
<i>R. maculagenys</i>	27	0	to 2nd*	present	$\omega 1$ deficiency	Present study
<i>R. maculicervix</i>	28	0–11	not to origin**	unknown	$\omega 1$ deficiency	Huang <i>et al.</i> 2016
<i>R. mekongianus</i>	28	4–6	to 1st*	present	$\omega 1$ deficiency	Chen <i>et al.</i> 1999

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TABLE 2. (Continued)

Species	Vertebrae	Predorsal scales	Distal tip of D1 of male (when the fin addressed)	Vertical dark lines or rows of dark spots on caudal fin	Head pore patterns	Sources
<i>R. milleri</i>	27	8-9	to 2nd*	absent	ω1 deficiency	Chen & Kottelat 2003
<i>R. multimaculatus</i>	29	0	beyond origin**	present	ω1 deficiency	Wu & Zhong 2008
<i>R. nannaensis</i>	28	5-7	to origin**	absent	ω1 deficiency	Chen & Kottelat 2003
<i>R. niger</i>	27-28	0-1	not to origin**	absent	ω1 deficiency	Huang <i>et al.</i> 2016
<i>R. parvus</i>	27	1-4	to origin**	present	ω1 deficiency	Wu & Zhong 2008
<i>R. philippinus</i>	unknown	12-14	not to origin**	absent	unknown	Suzuki <i>et al.</i> 2017
<i>R. ponkouensis</i>	28	4-5	to origin**	present	ω1 deficiency	Huang & Chen 2007
<i>R. rubromaculatus</i>	27	3-5	not to origin**	unknown	ω1 deficiency	Wu & Zhong 2008
<i>R. shennongensis</i>	unknown	5-6	to 3rd or 4th*	present	unknown	Wu & Zhong 2008
<i>R. sowerbyi</i>	unknown	6-8	unknown	absent	unknown	Suzuki <i>et al.</i> 2017
<i>R. sulcatus</i>	27	8-11	to 1st*	present	ω1 deficiency	Chen & Kottelat 2005
<i>R. szechuanensis</i>	27	0	to 4th or 5th*	present	completed deficiency	Wu & Zhong 2008
<i>R. taenigena</i>	27	10-11	to origin**	absent	ω1 deficiency	Chen <i>et al.</i> 1999
<i>R. vermiculatus</i>	28	7-11	to 1st or 2nd*	unknown	ω1 deficiency	Chen & Kottelat 2003
<i>R. wangchuanensis</i>	27	3-6	to origin**	absent	ω1 deficiency	Chen <i>et al.</i> 2002
<i>R. wangi</i>	27	8-9	to 1st*	present	ω1 deficiency	Chen & Chen 2006
<i>R. wuyanlingensis</i>	27	7-9	not to origin**	present	ω1 and δ deficiency	Yang <i>et al.</i> 2008
<i>R. xianshuiensis</i>	27	5-7	beyond origin**	present	completed	Chen, Wu, <i>et al.</i> 1999
<i>R. yaoshanensis</i>	28	14-15	beyond origin**	present	ω1 deficiency	Wu & Zhong 2008

Abbreviations: D1, first dorsal fin; D2, second dorsal fin; *, segmented ray base of D2; **, of D2. Completed, cephalic canal pores consisting of σ, λ, κ, ω, ω1, α, ρ, θ, τ, γ, δ and ε; most deficiency, cephalic canal pores consisting of σ, κ and α; completed deficiency, without cephalic canal pores.

Fins. First dorsal fin trapezoidal in males and nearly semicircular in females; spines 4 and 5 longest, rear tip extending to base of second branched ray of second dorsal fin in males when adpressed, just reaching or not reaching anterior margin of second dorsal fin in females. Anal fin origin inserted below third and fourth branched soft ray of second dorsal fin. Pectoral fin broad, rear tip not extending to vertical of anus when adpressed in both sexes. Pelvic fin disc rounded, spinous ray with pointed membranous lobe. Caudal fin elliptical, posterior edge rounded with 5–6 vertical rows of brown spots.

Scales. Body covered with moderately large ctenoid scales. Opercle, preopercle, prepelvic area, and pectoral-fin base always scaleless.

Head canals. Nasal extension of anterior oculoscapular canal with terminal pores σ located in vertical between anterior and posterior nares. Anterior interorbital sections of oculoscapular canal separated with paired pore λ . A single pore κ in posterior region. Pore ω present near posterior edge of eye. Pore $\omega 1$ absent. Lateral section of anterior oculoscapular canal with pore α and terminal pore ρ . Posterior oculoscapular canal with two terminal pores θ and τ . Gap between anterior and posterior oculoscapular canals smaller than the length of posterior oculoscapular canal. Preopercular canals present with three pores: γ , δ , and ε .

Sensory papillae. Row *a* oblique and uniserial, composed of loosely-arranged papillae, extending anteriorly to orbit. Row *b* longitudinal, extending anteriorly to a vertical through posterior margin of eye; its length slightly shorter than orbit diameter. Row *c* and *d* composed of densely-arranged papillae. Row *c* extending posteriorly to a vertical through posterior margin of eye. Row *d* extending posteriorly to vertical of posterior margin of pupil, approximately equivalent to orbit diameter. Row *cp* comprised of single papilla. Row *f* comprised of paired papillae. Opercular papilla with *ot*, *oi*, and *os*; anterior end of row *oi* well-separated from a vertical row *ot*.

Coloration of fresh specimens. Head and body yellowish brown (some specimens head and body dark yellowish brown) in both sexes. Body scale pockets with brown margins, darker on dorsal half. Flank always with several longitudinal rows of blackish-brown round spots, some females with fewer rows. Belly pale white. Dorsum of snout with pair of thin, reddish-orange lines united at tip. Cheek and opercle yellowish brown with over 30 small orange spots in both sexes; branchiostegal membrane yellow with over 10 small orange spots in males, membranes white, and spotless in females. First dorsal fin with dark brown spinous rays and transparent fin membrane. First dorsal fin with large bright blue blotch in front of second spine in both sexes. Second dorsal-fin membrane orange to translucent with 5 or 6 horizontal rows of dark brown spots. Anal-fin ray 1/3 near the base yellow, distal 2/3 region black, outer margin white; fin membrane black in males, pale yellow to whitish in females. Caudal-fin base with large black brown blotch, fin membrane between rays pale yellow with 5–6 vertical rows of brown spots in both sexes. Pectoral fin grayish, basal portion with semicircular milky-yellow background and single horizontal, brown bar and row of blackish-brown spots or arc lines; distal 2/3 region grayish black in males and females. Pelvic-fin membrane grayish.

Distribution and habitat. The species is only known from Zhong Water, in the upper reaches of the Xiangjiang River on Lanshan County, Hunan Province. This species may be endemic within this basin.

Etymology. The specific name, *maculagenys*, from the Latin *macula* meaning spot and *genys* meaning cheek, in reference to the diagnostic feature of round orange spots on cheek. To be treated as a noun in apposition.

Comparison. *Rhinogobius maculagenys*, with 27 vertebrae, belongs to a group of 37 nominal species of *Rhinogobius* having 27 or more vertebrae. Forty-six congeners having high or unknown vertebral counts are listed in Table 2 with selective characters. *Rhinogobius maculagenys* can be easily distinguished from all but 6 species (viz. *R. changtinensis*, *R. cliffordpopei*, *R. ganematus*, *R. honghensis*, *R. liui*, and *R. multimaculatus*) by having the following combination of characters: 0 predorsal scales; a head pore pattern lacking only pore $\omega 1$; first dorsal-fin spines 4 and 5 longest in males, reaching to the base of the second branched ray of the second dorsal fin when adpressed; and 5 or 6 distinct vertical rows of brown spots on the caudal fin.

Rhinogobius maculagenys can be distinguished from *R. changtinensis*, *R. ganematus*, and *R. cliffordpopei* by cheek color patterning (cheeks with spots in *R. maculagenys* vs. cheeks with stripes in *R. changtinensis* and *R. ganematus*, and cheeks without stripes or spots in *R. cliffordpopei*). *Rhinogobius maculagenys* can be distinguished from *R. honghensis* by the following features: cheeks with over 30 small orange spots in both sexes (vs. cheeks with 65–70 brown spots in males and no spots in female *R. honghensis*), longitudinal scale series 32–34 (vs. 28–29), and lower number of vertebrae (27 vs. 28). *Rhinogobius maculagenys* can be distinguished from *R. liui* by the following features: body with several longitudinal rows of blackish-brown spots (vs. 8–11 lateral black-brown blotches), lower number of vertebrae (27 vs. 29), pectoral-fin rays (16 vs. 19), anal-fin rays (1/7 vs. 1/8), and

longitudinal scale series (32–34 vs. 36–39). *Rhinogobius maculagenys* can be distinguished from *R. multimaculatus* by the following features: cheeks with over 30 spots (vs. with many tiny black spots), flank with several longitudinal rows of blackish-brown spots (vs. spots present regularly on base of the scales) longitudinal scale series (32–34 vs. 34–37), pectoral-fin base with a light grayish yellow semicircular mark (vs. with many tiny black spots), and lower number of vertebrae (27 vs. 29).

Comments. The color of the head and body is dark yellowish brown on some fresh specimens, while the holotype is substantially lighter. Colors of the species appear to adapt to the environment. For example, individuals that shelter under aquatic plants or stones for some time appear darker. The exact mechanism of this environmental adaptability is unclear and is of interest in future study.

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