



Two new species of *Paratanakia* (Teleostei: Cyprinidae) from Taiwan and mainland China

I-SHIUNG CHEN^{1,2,*} & JHY-YUN SHY^{3,*}

¹Institute of Marine Biology, National Taiwan Ocean University, Keelung, 202301, Taiwan, R.O.C.

iscfish@gmail.com; <https://orcid.org/0000-0002-4190-7720>

²Center of Excellence for the Oceans, National Taiwan Ocean University, Keelung, 202301, Taiwan, R.O.C.

³Department of Aquaculture, National Penghu University, 300 Liuhe Road, Magong City, Penghu 880011, Taiwan, R.O.C.

jyshy@gms.npu.edu.tw; <https://orcid.org/0000-0003-3998-4046>

*Corresponding authors

Abstract

Two new species of bitterling of *Paratanakia* were found and collected from Taiwan island and Fujian Province, mainland China recently. *Paratanakia fuvlidorsalis* n. sp. which is endemic in Taiwan island can be well distinguished from other congeners by the following unique combination of features: (1) fin ray counts: dorsal fin rays 3, 8; anal fin rays 3, 10; pectoral fin rays modally 1, 12; (2) squamation: lateral-line scales modally 34; and (3) its own specific dorsal fin color pattern in male. *Paratanakia julongjiangensis* n. sp. which is endemic in Fujian Province, mainland China can be well distinguished from other congeners by the following unique combination of features: (1) fin ray counts: dorsal fin rays 3, 9; anal fin rays 3, 11; pectoral fin rays modally 1, 12; (2) lateral-line scales modally 34; and (3) its own specific dorsal fin color pattern in male. The brief morphological comparison with close related species would be also addressed.

Key words: Bitterling, *Paratanakia*, new species, taxonomy, freshwater, Taiwan, China

Introduction

The genus *Paratanakia* was established by Chang, Chen and Mayden in 2014 based on *P. himantegus* (Günther, 1868). The species *P. himantegus* is comprised of two subspecies, *P. himantegus himantegus* and *P. himantegus chii*, forming a monophyletic clade (Chang *et al.* 2014). However, these subspecies were categorized as species in Li *et al.* (2017).

Paratanakia is a genus of small bitterling fish usually occur in the lower and middle reaches of river systems and lakes in southern China and Taiwan. So far, only *P. chii* (Miao, 1934) and *P. himantegus* have been listed as valid species in the world (Fricke *et al.* 2023). *P. chii* was considered widely distributed around southeastern coastal areas of China and northern Taiwan (Chen 2009; Chen *et al.* 2012). *P. himantegus* was considered endemic to Taiwan and was widely distributed in the low altitude inland waters of Taiwan (Chen *et al.* 2012). However, Wu (1977) proposed that *P. himantegus* was widely distributed in Zhejiang Province and Fujian Province in China as well as Taiwan.

More recently, Huang *et al.* (2024) reported a new species of *Paratanakia* from Guangdong Province, China with a rather large body length. More recently revised work from both Taiwan as well as Fujian Province, mainland China have revealed that two undescribed species for either locality would be turned to light. The aim of this paper is to document the current group with two new species both from Taiwan and Fujian Province, mainland China. The current new discovery would let the record of the speciose of genus *Paratanakia* up to 5. The brief morphological comparison of the two new species with other congeners would be also addressed here.

Materials and Methods

Specimen collection and preservation. All examined specimens were collected by hand net or fish traps. Specimens used for morphological studies were fixed in 10% formalin solution for three to five days, followed by 70% ethanol for long-term preservation. Tissue samples used for molecular analysis were preserved in 95% ethanol.

Morphological studies. All morphometric measurements followed Hosoya *et al.* (2002) and meristic counts followed Chen *et al.* (2009). All lengths used in this study are standard length (SL). All examined specimens were deposited at the National Taiwan Ocean University, Keelung (NTOUP). Abbreviated names of all institution codes followed Fricke and Eschmeyer (2023). The abbreviations used in this study are as follows: D: Dorsal fin rays; A: Anal fin rays; P1: Pectoral fin rays; P2: Pelvic fin rays; LL: Lateral-line scales; TR: Transverse scales; PreD: Pre-dorsal scales. Other comparative materials of congeneric species for morphological study is listed as Huang *et al.* (2024).

Systematics

Paratanakia fulvidorsalis sp. nov.

(黃鰭石鮒)
(Figs. 1–3)

Material examined

Holotype.—NTOUP-2010-10-301, 53.8 mm SL, male, Dashi, Taoyuan City, Tanshuei River basin, Taiwan, coll. I-S. Chen *et al.*, 15 Oct. 2010.

Paratypes.—NTOUP-2010-10-302, 4 specimens, 40.2–50.1 mm SL, collection date and other data same as above holotype.

Diagnosis

Paratanakia fulvidorsalis n. sp. which endemic in Taiwan can be well distinguished from other congeners by the following unique combination of features: (1) fin ray counts: dorsal fin rays 3, 8; anal fin rays 3, 10; pectoral fin rays modally 1, 12; (2) squamation: lateral-line scales modally 34; and (3) specific color pattern: dorsal fin gray with a broad shiny creamy yellow to orange yellow stripe, and with a thin grayish black margin in male.

Description

Dorsal fin rays 3, 8. Anal fin rays 3, 10. Pectoral fin rays 1, 12. Pelvic fin rays 1, 7. Lateral-line scales 33–34 (modally 34). Transverse scales 10. Pre-dorsal scales 12–13 (modally 13). Vertebral count 4+29=33 (n=5).

All body proportion listed in Table 1. Body compressed and roughly spindle shaped. The highest position of dorsal line located at the anterior margin of dorsal fin base. Head small, snout slightly prominent, tip slightly rounded. Mouth small, a pair of barbels at mouth corner. Eye large and located on lateral side of head. Belly slightly rounded in both sexes. Lateral-line complete and running slightly downward abruptly above the anus and along the ventral profile into middle of caudal fin base. Body covered with moderate-sized cycloid scales. Belly from inter-pectoral fin basal region extending backward to anal fin anterior base, always covered with cycloid scales.

Pectoral fin almost reaching anterior margin of pelvic fin when compressed in both sexes. Pelvic fin slightly rounded. Anterior margin of anal fin inserted below second branched ray of dorsal fin. The length of dorsal fin in male is distinctly longer than in female when compressed. Caudal fin deeply forked and rear margin of caudal fin lobe rounded. Two patches of turbucles appeared on snout in adult male, absent in female.



FIGURE 1. Alive male of *Paratanakia fulvidorsalis* from Tanshuei River basin, Taiwan



FIGURE 2. Alive female of *Paratanakia fulvidorsalis* from Tanshuei River basin, Taiwan.



FIGURE 3. *Paratanakia fulvidorsalis* n. sp., male, 53.8 mm SL, holotype, (above); male, 44.5 mm SL, male (middle); female, 43.2 mm SL, female (below), Dashi, Taoyuan City, Tanshuei River basin, Taiwan.

TABLE 1. Morphometric measurements of both *Paratanakia fulvidorsalis* and *Paratanakia julongjiangensis*.

Type Sex	<i>P. fulvidorsalis</i> n. sp.			<i>P. julongjiangensis</i> n. sp.		
	Holotype	Paratype	Paratype	Holotype	Paratype	Paratype
	M	M	F	M	M	M
Standard length	53.8	40.2	44.2	62.8	55.9	49.0
Percentage of head length (%)						
Head length	22.5%	23.0%	24.1%	21.5%	20.7%	22.2%
Body depth	36.4%	37.5%	39.8%	40.7%	41.8%	40.2%
Body width	18.6%	15.4%	16.5%	13.4%	13.4%	13.8%
Depth of caudal peduncle	14.2%	14.2%	14.1%	13.9%	15.9%	13.3%
Length of caudal peduncle	20.8%	18.0%	19.4%	19.7%	20.8%	19.2%
Predorsal length	56.7%	54.1%	55.9%	53.6%	57.8%	56.2%
Preanal length	58.3%	60.8%	56.6%	59.0%	59.2%	56.2%
Prepelvic length	43.1%	43.7%	45.0%	44.3%	46.9%	41.9%
Height of dorsal fin	15.4%	18.2%	17.3%	19.4%	19.4%	23.7%
Length of depressed dorsal	33.8%	34.4%	31.8%	47.6%	44.7%	45.8%
Length of dorsal fin base	19.8%	22.0%	22.1%	24.9%	22.5%	24.3%
Height of anal fin	11.5%	12.2%	12.4%	18.2%	12.9%	17.1%
Length of depressed anal	33.5%	30.2%	30.6%	37.8%	35.3%	40.0%
Length of anal fin base	21.9%	22.2%	24.1%	23.9%	23.4%	26.3%
Pectoral fin length	19.7%	19.6%	18.4%	18.0%	20.0%	15.9%
Pelvic fin length	16.3%	17.0%	17.1%	17.2%	18.1%	16.6%
Percentage of head length (%)						
Head depth	94.5%	95.8%	105.2%	88.6%	106.4%	89.9%
Head width	61.7%	64.7%	63.7%	60.7%	59.9%	62.4%
Snout length	24.2%	22.4%	21.5%	17.2%	23.9%	23.4%
Orbit diameter	36.9%	38.4%	35.4%	32.0%	36.0%	33.0%
Interorbital width	44.2%	42.8%	44.2%	47.0%	46.7%	45.6%

Coloration while fresh (Figs. 1–3)

Upper areas of head and body generally pale yellowish. Scales on upper area of body side with gray margin. Belly silver white. A distinct longitudinal blue stripe on posterior half of body, starting from caudal fin base and extending forward to the position on vertical above pelvic fin base. Middle belly from inter-pectoral region to anterior margin of anal fin is silver light blue in mature male, but silver white in female. Eye grayish white with light pinkish around the pupil in mature male, but grayish white in female. Caudal peduncle pinkish in male.

Color of all fins in male and female is completely different. In male, dorsal fin gray with a broad shiny creamy yellow to orange yellow stripe, and with a thin grayish black margin. Anal fin gray with yellowish to pinkish orange stripe, and with broad grayish black margin. Pectoral fin pale yellow. Pelvic fin pale white to grayish. Caudal fin yellow, central area with a longitudinal black stripe. In female, dorsal fin usually uniformly grayish, but some individuals with indistinct pale white stripe. Anal fin gray with yellowish to pinkish orange stripe, and with grayish black margin. Pectoral fin cream yellow. Pelvic fin grayish white. Caudal fin creamy yellow, central area with a broad longitudinal black bar.

Distribution. Currently known only from the lower reaches of Tanshuei River basins with very limited locality.

Etymology. The specific name, “*fulvodorsalis*” refers to the specific feature in adult male- “yellow (fulvus)” + “dorsal fin (dorsum)”.

TABLE 2. Frequency distribution of both *Paratanakia fulvidorsalis* and *Paratanakia julongjiangensis*.

	D			A						P1				P2		
	3, 8	3, 9	X	3, 9	3, 10	3, 11	3, 12	3, 13	X	1, 11	1, 12	1, 13	X	1, 6	1, 7	X
<i>P. fulvidorsalis</i> sp. nov.	5	-	8.0	-	5	-	-	-	10.3	-	5	-	12.0	-	5	7.0
<i>P. julongjiangensis</i> sp. nov.	-	3	9.0	-	-	3	-	-	11.0	1	5	-	11.8	-	3	7.0
<i>P. chi</i>	1	13	8.9	-	2	9	3	-	11.1	1	10	3	12.1	2	26	6.9
<i>P. haifengensis</i>	-	13	9.0	-	-	2	10	1	11.9	-	7	15	12.7	-	26	7.0
<i>P. himantegus</i>	15	-	8.0	1	13	1	-	-	10.0	11	13	3	11.7	-	30	7.0

	LL							TR			PreD			
	32	33	34	35	36	37	X	9	10	X	12	13	14	X
<i>P. fulvidorsalis</i> sp. nov.	-	2	8	-	-	-	33.8	-	5	10.0	1	4	-	12.8
<i>P. julongjiangensis</i> sp. nov.	-	-	5	1	-	-	34.2	-	3	10.0	-	3	-	13.0
<i>P. chi</i>	1	8	14	2	-	-	33.7	-	14	9.0	-	7	7	13.5
<i>P. haifengensis</i>	-	-	-	-	24	2	36.1	-	13	10.0	2	11	-	12.8
<i>P. himantegus</i>	10	15	5	-	-	-	32.8	2	13	9.9	1	7	7	13.4

Remarks

Among the member of the genus, *P. fulvidorsalis* **sp. nov.** is more similar to *P. chii* than any other species. However, *P. fulvidorsalis* **sp. nov.** can be well distinguished from *P. chii* by following features (meristic comparison seen in Table 2): (1) dorsal fin rays: 3, 8 vs. 3, 9; (2) anal fin rays: 3, 10 vs. modally 3, 11; and (3) dorsal fin pattern: a creamy yellow to orange yellow horizontal stripe in male vs. modally snow white in male. The great mitogenetic differentiation is also detected by Chen *et al.* (unpublished data).

Paratanakia julongjiangensis **sp. nov.**

(九龍江石鮒)
(Fig. 4)

Material examined

Holotype.—NTOUP-2005-03-351, 66.3 mm SL, male, Peinhe, Nanjin, lower reaches of Julongjiang River basin, Fujian Province, PR China, coll. I-S. Chen *et al.*, 11 March 2005.

Paratypes.—NTOUP-2005-05-352, 2 specimens, 48.9–55.9 mm SL, collection date and other data same as above holotype.

Diagnosis

Paratanakia julongjiangensis **n. sp.** which endemic in Fujian Province, mainland China can be well distinguished from other congeners by the following unique combination of features: (1) fin ray counts: dorsal fin rays 3, 9; anal fin rays 3, 11; pectoral fin rays modally 1, 12; (2) lateral-line scales modally 34; and (3) specific color pattern: dorsal fin gray with a broad shiny pinkish stripe, and with a very thin gray margin in male.

Description

Dorsal fin rays 3, 9. Anal fin rays 3, 11. Pectoral fin rays 1, 12. Pelvic fin rays 1, 7. Lateral-line scales 33–34 (modally 34). Transverse scales 10. Pre-dorsal scales 13. Vertebral count 4+30=34 (n=3).

Body proportion listed in Table 1. Body compressed, body depth very high and roughly spindle shaped. The highest position of dorsal line located at the anterior margin of dorsal fin base. Head small, snout slightly prominent, tip slightly rounded. Mouth small, a pair of barbels at mouth corner. Eye large and located on lateral side of head. Belly slightly rounded in both sexes. Lateral-line complete and running slightly downward abruptly above the anus and along the ventral profile into middle of caudal fin base. Body covered with moderate-sized cycloid scales. Belly from inter-pectoral fin basal region extending backward to anal fin anterior base, always covered with cycloid scales.

Pectoral fin almost reaching anterior margin of pelvic fin when compressed. Pelvic fin slightly rounded. Anterior margin of anal fin inserted below third branched ray of dorsal fin. The length of dorsal fin in male is distinctly longer than in female when compressed. Caudal fin deeply forked and rear margin of caudal fin lobe rounded. Two patches of turbucles appeared on snout in adult male.

Coloration while fresh. (Fig. 4)

All coloration based on three male of type series. Upper areas of head and body generally pale yellowish. Scales on upper area of body side with gray margin. Belly silver white. A distinct longitudinal blue stripe on posterior half of body, starting from caudal fin base and extending forward to the position below the second spine of dorsal fin. Middle belly from inter-pectoral region to anterior margin of anal fin is grayish black. Eye grayish white with white to pinkish around the pupil.

Dorsal fin gray with a broad shiny pinkish stripe, and with a very thin gray margin. Pectoral fin pale yellow. Pelvic fin white to gray. Caudal fin pinkish, central area with a broad, longitudinal black stripe. Anal fin gray with broad pinkish to pinkish orange stripe, and with broad grayish black margin. Pectoral fin cream light yellow. Pelvic fin grayish white.



FIGURE 4. *Paratanakia julongjiangensis* n. sp., male, 62.8 mm SL, holotype, Peinhe, Nanjin, lower reaches of Julongjiang River basin, Fujian Province, PR China.

Distribution. Currently known only from lower reaches of the Julongjiang river basin, Fujian Province, China.

Etymology. The specific name, “*julongjiangensis*” refers to the type locality of “Julongjiang river basin” in Fujian Province, China.

Remarks

Among the member of the genus, *P. julongjiangensis* sp. nov. is more similar to *P. haifengensis* Huang *et al.*, 2024 than any other species. However, *P. julongjiangensis* sp. nov. can be well distinguished from *P. haifengensis* by

following features (meristic comparison seen in Table 2): (1) anal fin rays: 3, 11 vs. modally 3, 12; (2) lateral line scales modally 34 vs. 36; (3) body depth: higher body as 40–42% vs lower body 32–35%; and (4) caudal-fin black bar: rather thick in male vs. narrow in male. The distinct mitogenetic differentiation is also detected by Chen *et al.* (unpublished data). It is very necessary to explore more different river basins (especially both Pearl River and Yangtsi River basins) to gather full picture of current genus in large mainland China.

Acknowledgments

This study was partially funded by NAMR, Kaohsiung and Water Resources Planning Branch, Water Resources Agency, Ministry of Economic Affairs, MOEA, Wufong, Taichung. The authors also wish to thank the Mr. Y.C. Yang & H.E. Li for their kindly help on taking the digital X-ray radiographs for all type and comparative materials of these cyprinid fishes. We are also very grateful for Dr. Yung-Ching Chang helping the color photos of alive fishes.

References

- Chang, C.H., Li, F. Shao, K.T., Lin, Y.S., Morosawa T., Kim, S., Koo, H., Kim, W., Lee, J.-S., He, S., Smith, C., Reichard, M., Miya, M., Sado, T., Uehara, K., Lavoué, S., Chen, W.J. & Mayden, R. (2014) Phylogenetic relationships of Acheilognathidae (Cypriniformes: Cyprinoidea) as revealed from evidence of both nuclear and mitochondrial gene sequence variation: evidence for necessary taxonomic revision in the family and the identification of cryptic species. *Molecular Phylogenetics and Evolution*, 81, 182–194.
<https://doi.org/10.1016/j.ympev.2014.08.026>
- Chen, I-S., Wu, J.H. & Huang, S.P. (2009) The taxonomy and phylogeny of the cyprinid genus *Opsariichthys* Bleeker (Teleostei: Cyprinidae) from Taiwan, with description of a new species. *Environmental Biology of Fishes*, 86, 165–183.
<https://doi.org/10.1007/s10641-009-9499-y>
- Chen, I-S. (2009) Indicator species of riverine fishes in Taiwan. Vol. 1. National Taiwan Ocean University Press, Keelung, 135 pp. [in Chinese]
- Chen, I-S., Tzeng, C.S. & Shao, K.T. (2012) Red data book of freshwater fishes in Taiwan. Forestry Bureau Press, Taipei, 242 pp. [in Chinese]
- Fricke, R., Eschmeyer, W.N. & Van der Laan, R. (eds) (2023) Eschmeyer's Catalog of Fishes: Genera, Species, References. Available from: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp> (accessed 26 October 2023)
- Günther, A. (1868) Catalogue of the fishes in the British Museum. *Catalogue of the Physostomi, containing the families Heteropygii, Cyprinidae, Gonorhynchidae, Hyodontidae, Osteoglossidae, Clupeidae, Chirocentridae, Alepocephalidae, Notopteridae, Halosauridae, in the collection of the British Museum*, 7, 1–512.
- Hosoya, K., Ashiwa, H., Wayanabe, M., Mizunguchi, K. & Okazaki, T. (2002) *Zacco sieboldii*, a species distinct from *Zacco temminckii*. *Ichthyological Research*, 50, 1–8.
<https://doi.org/10.1007/s102280300000>
- Huang, S.P., Cheng, Y.H., Shao, K.T. & Chen, I-S. (2024) A new species of *Paratanakia* (Teleostei: Cyprinidae) from Guangdong, China. *Zootaxa*, 5550 (1), 240–249.
<https://doi.org/10.11646/zootaxa.5550.1.24>
- Li, F., Liao, T.Y. Arai, R. & Zhao, L.J. (2017) *Sinorhodeus microlepis*, a new genus and species of bitterling from China (Teleostei: Cyprinidae: Acheilognathinae). *Zootaxa*, 4353 (1), 69–88.
<https://doi.org/10.11646/zootaxa.4353.1.4>
- Miao, C.P. (1934) Notes on the fresh-water fishes of the southern part of Kiangsu I. Chinkiang. *Contributions from the Biological Laboratory of the Science Society of China (Zoological Series)*, 10 (3), 111–244.
- Wu, H.W. (1977) *The cyprinid fishes of China. Volume 1*. People's Press, Shanghai, 230 pp. [in Chinese]