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A new species of bagrid catfish genus *Tachysurus* (Teleostei: Bagridae) from Wu River basin in central Taiwan

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Abstract

A new species of freshwater bagrid catfishes, *Tachysurus* (Teleostei: Bagridae) were collected from Wu river basin in central Taiwan. The new species, *Tachysurus flumendraco* **n. sp.** is most similar to Taiwanese endemic, *T. adiposalis* (Oshima, 1919) than any other congeneric species in eastern Asia. It can be well distinguished by the following unique combination of features: (1) dorsal fin rays II + 8; (2) anal fin rays: modally 3 + 18 = 21; (3) spine of pectoral fin with posterior serrations modally 18; (4) vertebral count usually 5 + 43–44; and (5) specific coloration pattern: body and head entirely bright creamy yellow to golden yellow, dorsal half of head and trunk with light brown; all 4 pairs of barbels creamy white to snow white; adipose fin creamy yellow to brownish yellow; anal fin creamy yellow with lighter basal skin; and caudal fin creamy yellow with distal black margin. The brief morphological comparison with close related species would be also addressed.

Key words: New catfish, freshwater fish, fish taxonomy, Taiwan

Introduction

The freshwater bagrid catfishes are the major component of aggressive predators in freshwater ecosystem of the eastern Asia (Chen & Fang 1999; Ng 2009). The genus *Tachysurus* Lacépède, 1803, is an East Asian endemic group of small- to medium-sized (Ng & Freyhof 2007) bagrid catfishes and includes more than 40 valid species from the Amur River basin in the Far East of Russia to the Red River basin in southern China and northern Vietnam (Zheng & Dai 1999; Ferraris 2007; Ng 2009; Watanabe 2010).

However, the species taxonomy of this current genus is poorly understood (Cheng *et al.* 2021), particularly for species from mainland China, mainly due to highly morphological conservatism, sexual dimorphism, ontogenetic changes, allometric growth and geographical variation. Previous research has indicated that some currently recognized species of *Tachysurus* actually contain hidden species (Li *et al.* 2005; Cheng *et al.* 2008, 2021; Ng 2009). It is apparent that the taxonomy of currently recognized widespread *Tachysurus* species needs to be revaluated.

In Taiwan, the current group can be divided in to *T. brevianalis* group and *T. adiposalis* group although they treated under *Pseudobagrus* previously (Chen & Fang 1999). Among *T. brevianalis* group, they can be treated as *T. brevianalis brevianalis* (Regan, 1908) and *T. brevianalis taiwaiensis* (Oshima, 1919). Among them, the *T. adiposalis* group is poorly understood by their own taxonomic status among different river basins of Taiwan.

More recently, careful examination revealed that the *T. adiposalis* complex outside the type locality still need to be rechecked in detail not only molecular mitogenetic affinity but also morphological reevaluation for them.

The aim of this paper is to document the cryptic species of freshwater catfish turning new to science which it was long-term misidentified by fish ecologists in central Taiwan so-called as *T. adipodalis* or mid-identified as *T. brevianalis*. The morphological comparison with close related species would be also addressed.

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Materials & Methods

All fish specimens were collected either by casting-net or fish-traps. The morphometric measurements of these catfishes used in this study are presented in Table 1. These measurements were following the methods of Cheng *et al.* (2008). The dorsal, anal, caudal, pectoral fin rays as well as vertebral count are counted in detail from the digital X-ray radiograph. Fish specimens examined herein are deposited in the Pisces collections of National Taiwan Ocean University, Keelung, Taiwan (NTOUP).

TABLE 1. Morphometry of two species of *Tachysurus* from Taiwan.

	T. flumendraco **n. sp.** (n = 7)		*T. adiposalis* (n = 6)	
	Range	Mean	Range	Mean
Standard length	128.4–176.8		148.8–194.7	
%SL				
Body depth at anus	12.9–15.3%	14.1%	11.7–14.4%	12.8%
Predorsal length	30.5–34.1%	32.4%	28.8–34.1%	32.0%
Preanal length	56.1–61.7%	59.5%	53.6–61.5%	57.2%
Prepelvic length	46.1–54.0%	49.5%	44.6–49.7%	46.7%
Prepectoral length	18.0–22.8%	20.5%	17.5–21.7%	19.5%
Length of dorsal-fin spine	10.7–14.4%	12.5%	7.8–12.4%	10.3%
Length of dorsal-fin base	8.9–11.4%	9.7%	8.1–9.1%	8.7%
Length of pectoral-fin spine	10.4–13.3%	11.8%	9.5–12.5%	11.1%
Pectoral length	12.2–16.8%	13.9%	12.4–15.4%	13.7%
Pelvic-fin length	8.8–10.9%	9.6%	9.4–11.9%	10.7%
Length of anal-fin base	17.4–20.9%	18.5%	19.7–22.5%	21.4%
Height of adipose fin	2.9–4.5%	3.8%	3.7–4.7%	4.1%
Adipose to caudal distance	14.7–20.3%	17.1%	15.4–18.9%	17.2%
Length of caudal peduncle	19.0–20.6%	19.8%	18.3–21.3%	20.1%
Depth of caudal peduncle	6.4–7.7%	7.0%	6.3–7.5%	6.9%
Head length	21.2–25.6%	23.5%	20.2–23.3%	21.7%
%HL				
Head depth	54.0–59.6%	56.8%	51.5–61.0%	55.8%
Head width	65.1–78.8%	72.9%	70.9–82.9%	75.0%
Snout length	25.0–32.0%	27.5%	29.7–36.0%	31.8%
Interorbital width	25.5–32.0%	29.9%	31.5–39.8%	34.5%
Eye diameter	8.5–12.7%	9.9%	8.8–10.9%	9.9%
Mouth width	36.0–46.8%	39.9%	39.0–46.2%	43.7%
Length of nasal barbel	18.5–23.8%	21.4%	11.8–18.0%	14.4%
Length of maxillary barbel	28.2–34.8%	31.9%	30.8–48.8%	38.0%
Length of inner mandibular barbel	12.1–17.7%	13.9%	9.5–15.2%	12.8%
Length of outer mandibular barbel	22.3–29.4%	27.4%	16.6–24.1%	19.8%

Systematics

***Tachysurus flumendraco* n. sp.**
(龍鮠)
(Figs. 1–2)

Holotype

NTOUP-2022-10-121, 128.4 mm SL, Oct. 12, 2022, Coll. I-S. Chen, Koshin village, Wu River basin, Nantou County, Taiwan.

Paratypes

NTOUP-2022-07-120, 9 specimens, 138.6–176.8 mm SL, Aug. 16, 2022, Coll. M.F. Yeh, Koshin village, Wu River basin, Nantou County, Taiwan.

Diagnosis

The new species, *Tachysurus flumendraco* can be distinguished from all congeneric species by the following unique combination of characters: (1) dorsal fin rays II + 8; (2) anal fin rays: modally 3 + 18 = 21 ; (3) spine of pectoral fin with posterior serrations modally 18; (4) vertebral count usually 5 + 43–44; and (5) specific coloration pattern: body and head entirely bright creamy yellow to golden yellow, dorsal half of head and trunk with light brown; all 4 pairs of barbels creamy white to snow white; adipose fin creamy yellow to brownish yellow; anal fin creamy yellow with lighter basal skin; and caudal fin creamy yellow with distal black margin.

FIGURE 1. *Tachysurus flumendraco* **n. sp.**, holotype, 128.4 mm SL, Wu river basin, Nantou, Taiwan, ROC. (upper lobe of caudal fin broken by fighting while alive).

Description

Morphometric measurements taken from the holotype (128.4 mm SL) and 9 paratypes (138.6–176.8 mm SL) summarized in Table 1.

Dorsal profile rising gradually from snout tip to dorsal-fin origin, then turning lower from there to posterior end of adipose-fin base, even to the lowest section of caudal peduncle. Posterior of the section the profile getting higher up to base of dorsal procurrent rays of caudal-fin.

Ventral surface of head flattened; ventral profile of body straight ventrally except that of caudal peduncle. Lateral line complete, straight, mid-lateral in position. Vertebral count usually 5 + 43–44 (4 in 5+43; 3 in 5+44; 1 in 5+45; 1 in 5+46).

Head depressed, broad, and covered with thin skin. Snout broadly rounded in dorsal view and blunt in lateral view, its length much longer than eye diameter. Eyes large, elliptical, covered with thick membrane, and anterolateral in head, visible when viewed dorsally with slightly convex and wide interorbital space. Mouth inferior, small and

transverse. Upper jaw anteriorly protruded, much longer than lower jaw in length; mouth opening narrower than interorbital space. Teeth villiform, in irregular rows on all tooth- bearing surfaces. Gill opening wide, extending from the post-temporal region to beyond isthmus.

Barbels in four pairs; nasal barbels small, thread-like, not reaching beyond anterior margin of eye, and maxillary barbels slender, much exceeding posterior margin of eye. Mandibular barbels in two pairs, thick, short; inner barbels positioned in transverse row at level of posterior naris, extending beyond anterior margin of eye, and outer barbels much longer than eye diameter, just extending to posterior margin of eye.

Dorsal fin with II spines which first one very tiny with 7 soft branched rays, first spine inserted nearer pectoral-fin origin than anal fin origin. Dorsal-fin origin closer to vertical of pectoral-fin insertion than vertical of pelvic-fin insertion, Dorsal-fin spine slender, with smooth anterior margin and smoothly posterior margin, longer than pectoral-fin spine. Dorsal-fin with first branched ray longest, shortest in posterior one.

Distal margin of dorsal-fin rays almost straight. Nuchal plate triangular, with pointed tip.

Adipose fin very low but long and slender, inserted anterior to vertical through anal-fin origin, with convex distal margin.

Anal fin base rather long, modally 3 (tiny rays) + 18 (normal rays) (18–19). Among the normal rays with modally 3 unbranched rays and 15 branched rays. Anal fin inserted posterior to adipose-fin origin. Anal-fin origin nearer to caudal-fin base than to tip of snout. Distal margin of anal fin somewhat convex; anterior rays shorter.

Pectoral fin with one spine I and modally 7 (8) soft branched rays, inserted slightly anterior to vertical of upper tip of gillopening. Its rear tip extending to or almost to posterior vertical of dorsal-fin base. Pectoral-fin spine very strong, sharply pointed at tip, about equal to length of dorsal-fin spine, with a smooth anterior margin and modally 18 strong serrations along posterior margin.

Pelvic fin with 1 unbranched and 5 soft branched rays, inserted closer to posterior end of anal-fin base than snout tip. Tip of pelvic fin when depressed still not extending beyond anal-fin origin.

Pelvic-fin distal margin convex.

Caudal fin with 8 + 9 principal rays, dorsal procurrent rays modally 18 (1 in 17; 6 in 18; 2 in 19); ventral procurrent rays modally 18 (1 in 17; 7 in 18; 1 in 19); emarginate with middle rays longest in both lobes; both lobes rather rounded in distal margin, with upper lobe slightly longer than lower lobe; procurrent rays extending far from its fin base. Lowest section of caudal peduncle behind posterior end of anal-fin base.

Coloration in fresh preservatives

Body and head entirely bright creamy yellow to golden yellow, dorsal half of head and trunk with light brown to grayish brown tone but basically yellow. A vertical brown bar on posterior region of opercle. Isthmus pinkish yellow. Mouth creamy white. All 4 pairs of barbels creamy white to snow white.

Dorsal fin spine with brown anterior region and its membrane light yellow and translucent. Adipose fin creamy yellow to brownish yellow.

Anal fin creamy yellow with lighter basal skin. Caudal fin creamy yellow to grayish yellow, with distal black margin. The upper lobe with a narrow white edge. Pectoral fin spine brownish yellow and its membrane translucent with light yellow background. Pelvic fins translucent with light yellow or creamy yellow background.

Distribution

Currently only known from the middle and upper reaches of the Wu River basin at Taichung City, Janhua County, Nantou County in Taiwan.

Etymology

The specific name, *flumendraco*, is derived from the Latin words *flumen* (= **river**) and *draco* (= **dragon**), in allusion to specific local common name in Taiwanese dialect as “Ng-Gang-Ling” meaning as “Yellow **River Dragon**”.

FIGURE 2. Dorsal and ventral view of head in *Tachysurus flumendraco* **n. sp.**, holotype, 128.4 mm SL, Wu river basin, Nantou County, Taiwan.

TABLE 2. Distribution frequency of vertebral count for two species of *Tachysurus* from Taiwan.

	Vertebral count				
	5 + 43	5+44	5+45	5+46	X
***T. flumendraco* n. sp.**	4	3	1	1	5+43.9
T. adiposalis	1	1	4	1	5+44.7

TABLE 3. Distribution frequency of anal fin rays for two species of *Tachysurus* from Taiwan.

	Anal fin			
	3+18	3+19	3+20	X
***T. flumendraco* n. sp.**	7	2	-	3+18.8
T. adiposalis	-	6	1	3+19.1

FGIURE 3. Alive coloration of *Tachysurus adiposalis*, 183.6 mm SL, Tanshuei River basin, Taoyuan City, Taiwan.

Remarks

T. flumendraco **n. sp.** is more similar to *T. adiposalis* (Oshima, 1919) than any other congeneric species. However, *T. flumendraco* **n. sp.** can be well distinguished from *T. adiposalis* (Oshima, 1919) endemic to Tanshuei River basins by the following combination of features: (1) anal fin rays: modally 3+18 vs. 3+19; (2) vertebral count usually 5+43-44 vs. modally 5+45; and (3) specific coloration: all body bright creamy yellow vs. entirely blackish gray. The detailed molecular approach by mitogenetic sequence comparison just done by Tran and Chen (2024) is also provided the solid evidence for supporting the discrete species with very isolated, conspicuous mitogenetic differentiation of two species among *T. adiposalis* complex.

The new species, *T. flumendraco* **n. sp.** which is endemic to Wu river basin in central Taiwan, it is very interested findings is well far away from the type locality of *T. adiposalis* which is endemic to Tanshuei River basin in northern Taiwan. It is highly possible to have a common ancestor from Fujian Province in very earlier stage before postglacial colonization.

It is rather necessary to explore more freshwater fish fauna of Fujian Province through one by one river basins to reveal the real species diversity of current genus, through more surveys for slender catfish group—*T. adiposalis* species complex in Fujian Province, southern China and Taiwan.

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