



Formosaneleotris hualienensis, a new genus and species of inland water sleeper (Teleostei: Eleotridae) from eastern Taiwan

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Abstract

A very unusual sleeper gobioid fish was obtained from netting in the inland waters of the Hualien River basin in eastern Taiwan. This new genus and species of sleeper has only been collected from Taiwan. *Formosaneleotris hualienensis* n. gen. & n. sp. can be well distinguished from other sleepers by a unique combination of the following characters: (1) fins: no first dorsal fin; second dorsal fin I/8; anal fin I/8; pectoral fin 13–14; (2) squamation: entirely body naked; (3) vertebral count: 10 + 14 = 24; (4) branchiostegal rays 6; (5) head lacking any canal and pore with longitudinal-like infraorbital sensory papillae; and (6) specific coloration: body and head bloody red entirely; one thin deep red infraorbital stripe to upper lip.

Key words: New genus, new sleeper, *Formosaneleotris*, fish taxonomy, Taiwan

Introduction

Gobioid fishes are a significant part of the benthic fauna in both freshwater and marine habitats. The sleepers have less species diversity in Taiwanese waters than gobiid fishes within Gobioidae (Chen & Fang 1999; Akihito *et al.* 2002).

In Taiwan, several important sleeper genera have been formally recorded in Taiwanese freshwater and estuarine habitats, including: *Belobranchus* Bleeker, 1856b; *Bostrychus* Lacepède, 1801; *Bunaka* Herre, 1927; *Butis* Bleeker, 1856a; *Eleotris* Scopoli, 1777; *Hypseleotris* Gill, 1863; *Giuris* Sauvage, 1880 (previously used *Ophieleotris* Aurich, 1938); *Ophiocara* Gill, 1863 (Chen & Fang 1999; Akihito *et al.* 2013). More recently, a new marine species of sleeper of the genus *Xenisthmus* Snyder, 1908 was described (Chen *et al.* 2022).

During our extensive survey of freshwater and inland-water fish biodiversity, we collected a rare gobioid species from the Hualien River basin in eastern Taiwan. This species is quite unusual and cannot be placed in any of the existing genera of this family. The aim of this paper is to formally describe the new discovery of the genus and species of inland-water sleeper in Taiwan for the first time.

Material & Methods

Type specimens of the new gobies were collected by netting along the river bank in Hualien, eastern Taiwan. All counts and measurements were taken from specimens that were finally preserved in 70% ethanol. Morphometric methods follow Miller (1988), and meristic methods follow Akihito *et al.* (1984), Chen and Shao (1996), and Chen *et al.* (1999). The terminology for the cephalic sensory canals and free neuromast organs (sensory papillae) is from Wongrat and Miller (1991), based on Sanzo (1911). Meristic abbreviations are as follows: A = anal fin; C = caudal fin; D2 = second dorsal fin; LR = longitudinal scale rows; P = pectoral fin; PreD = predorsal scales; TR = transverse scale series from second dorsal to anal fins; V = pelvic fin; and VC = vertebral count. All fish lengths are expressed by standard length (SL). The type specimen is deposited in the Pisces collection of National Taiwan Ocean University, Keelung (NTOUP).

Systematics

Formosaneleotris new genus

The diagnosis and detailed description are in the following species section.

Formosaneleotris hualienensis new species

(花蓮臺塘鱧)

(Figs. 1–2)

Material examined: Holotype.—NTOUP-2006-03-458, 44.2 mm SL, Aug. 20, 2001, coll. I-S. Chen & J-L. Huang, Jian Village, Hualien River basin, Hualien County, Taiwan, ROC.

Diagnosis. The new genus and new species of current sleeper, *Formosaneleotris hualienensis* can be well distinguished from other remaining genera of sleepers by the following unique combination of characters: (1) fins: no first dorsal fin; second dorsal fin I/8; anal fin I/8; pectoral fin 13–14; (2) squamation: entirely body naked; (3) vertebral count: 10 + 14 = 24; (4) branchiostegal rays 6; (5) head lacking any canal and pore with longitudinal like sensory papillae; and (5) specific coloration: body and head bloody red entirely; one thin deep red infraorbital stripe to upper lip.

Description. Body proportions listed in Table 1. Body very elongate and cylindrical anteriorly; turning rather compressed posteriorly. Head rather depressed anteriorly and somewhat cylindrical posteriorly. Branchiostegal rays 6. Mouth oblique and rather large, maxillary extending beyond middle vertical of eye. Lower jaw more prominent than upper jaw on anterior tip of head. Interorbital rather wide. Both jaws with 3–4 rows of conical teeth. Tongue rounded. Gill-opening restricted, extending ventrally close but not reaching middle vertical of opercle. Vertebral count: 10 + 14 = 24.

Fins.—Entirely lacking first dorsal fin; D2 I/8; A I/8; P 13–14; V I/5. D2 and A with middle rays slightly higher. P median large and elongate, no upper or lower free rays. V well separated, somewhat small, no frenum, no connecting membrane. Caudal fin large and elliptical with somewhat truncate distal margin.

Scales.—Entire body and head naked without scales. LR 0; TR 0; PreD 0.

Head lateral-line system (Fig. 1)

Canals.—No head canal and pore.

Sensory papillae.—Infraorbital papillae with longitudinal row *a*. highly dense set of row *b*. Row *c* longitudinal. Row *d* interrupted in row *dl* extension along upper jaw. Row *z* very long. Row *f* with 2 transverse papillae. Row *z* very long. Row *ot*, *oi*, *os* well separated.

Coloration while fresh. (Fig. 2) Body and head bloody red entirely. One thin deep red infraorbital stripe to upper lip. No distinct dark mark on body and fins.

Etymology of genus.—The new generic name, *Formosaneleotris*, refers to the type locality of the current new genus of “sleeper” that is only found in the river basins of Taiwan. The classical name of Taiwan is also called “Formosa”.

Etymology of species.—The new specific name, *hualienensis*, refers to the type locality of the current new species of sleeper from the “Hualien” River basin of Taiwan.

Remarks.—Among all genera of sleepers that possess six branchiostegal rays, none are lacking the first dorsal fin like the new genus, *Formosaneleotris*. This new genus also has the lowest vertebral count (VC 10+14=24) among the thousands of species in the gobioid fish family. The unique “deep red color” of this sleeper is also not seen in other gobioid fishes. This species is found in inland water habitats of river basins, coexisting with schools of *Anguilla* spp. larvae that ascend to lowland freshwater habitats in eastern Taiwan. This species could be a good example of convergent evolution of body shapes and appearances in benthic gobioids in the lower reaches of rivers for both discrete groups: *Luciogobius* from gobies and this *Formosaneleotris* from plesiomorphic sleepers. In contrast, *Luciogobius* tends to have a higher vertebral count of 36–42 while *Formosaneleotris* has a lower count of just 24, setting a record of the lowest count among all gobioid fishes.

It would be interesting to discover additional fish samples to understand the detailed phylogenetic aspects through molecular biological analysis of its own mtDNA sequences.

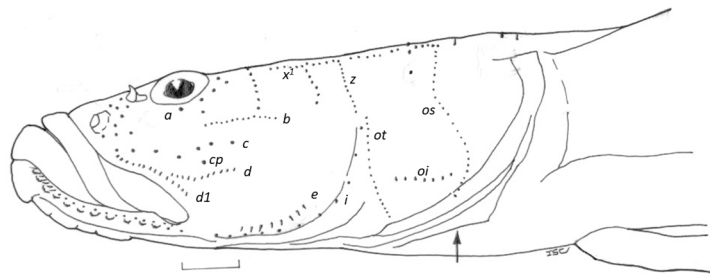


FIGURE 1. Head lateral-line system of *Formosaneleotris hualienensis*, holotype, 44.2 mm SL, Hualien River basin, Hualien County, Taiwan. (Bar = 1 mm).



FIGURE 2. *Formosaneleotris hualienensis*, holotype, 44.2 mm SL, Hualien River basin, Taiwan. (above: alive fish; below: preserved specimens).

TABLE 1. Morphometry of *Formosaneleotris hualienensis* from Hualien, Taiwan.

Type	Holotype
No. of samples	1
Sex	M
Standard length (mm)	44.2
% in SL	
Head length	24.0%
Snout to 2nd dorsal fin origin	62.5%
Snout to anal fin origin	62.8%
Snout to anus	58.2%
Prepelvic length	23.7%
Caudal peduncle length	22.2%
Caudal peduncle depth	7.7%
Second dorsal fin base	15.1%
Anal fin base	12.8%
Caudal fin length	20.4%
Pectoral fin length	15.6%
Pelvic fin length	12.5%
Body depth of pelvic fin origin	7.7%
Body depth of anal fin origin	7.7%
Body width of anal fin origin	6.1%
Pelvic fin origin to anus	37.3%
% in HL	
Snout length	31.9%
Eye diameter	12.8%
Postorbital length	68.1%
Cheek depth	17.0%
Head width in upper gill-opening	41.5%
Head width in maximum	44.7%
Bony interorbital width	17.0%
Lower jaw length	45.7%
% in Caudal peduncle length	
Caudal peduncle depth	34.5%

Acknowledgments

The author is deeply thankful to his dear friend, Mr. J.L. Huang from Hualien County, for his immense support and assistance during several fish collection trips. These trips were specifically for the collection of some very unusual sleeper and other gobioid species in the Hualien River, Hualien County.

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