Zootaxa 5550 (1): 320–327
https://www.mapress.com/zt/

Article

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

https://doi.org/10.11646/zootaxa.5550.1.32
http://zoobank.org/urn:lsid:zoobank.org:pub:CA43A365-5B9C-44B8-B7FC-BCFEE44150C1

A new ricefish of genus *Oryzias* (Teleostei: Adrianichthyidae) from western Taiwan

I-SHIUNG CHEN[1,2,*] & HONG-THIH LAI[3,*]
[1]*Institute of Marine Biology, National Taiwan Ocean University, Keelung, 202301, Taiwan, R.O.C.*
[2]*Center of Excellence for the Oceans, National Taiwan Ocean University, Keelung, 202301, Taiwan, R.O.C.*
[3]*Department and Graduate Institute of Aquatic Biosciences, National Charyi University, No. 300, Xuefu Rd., Luliao Village, Charyi City, 600355, Taiwan, R.O.C.*
**Corresponding authors:* *iscfish@gmail.com;* *https://orcid.org/0000-0002-4190-7720*
tylai@mail.ncyu.edu.tw; *https://orcid.org/0000-0003-4459-0682*

Abstract

The new brackish ricefish were collected recently from western Taiwan which has been identified as the species new to science. The new species, *Oryzias chenglongensis* **n. sp.** can be well distinguished from other congeners by the following unique combination of features: (1) fin-ray counts: dorsal-fin rays 6 (6 seen in holotype); anal-fin rays 19–20 (19); pelvic-fin rays 6 (6); pectoral-fin rays 10 (10); principle caudal-fin rays i,4/5,i (i,4/5,i); (2) body compressed laterally with body depth at pelvic origin 24.0–24.3 (24.3), body depth at anal fin origin 15.5–20.4 (20.4); (3) the dorsal-fin origin inserted almost at the vertical of 14th anal-fin rays, membrane between dorsal-fin 5th and 6th rays without distinct notch in adult male; and (4) body translucent, light yellowish green or brown, scattered with minute melanophores, a narrowly dotted, longitudinal black line along the middle forward to vertical above pelvic fin; T-shape black mark of caudal fin base in male; operculum and pre-pectoral region slivery, no any silvery scales on lateral body, lip color grayish or creamy yellow and eye bluish silvery dorsally. The diagnostic characters, and comparison with related species would be also provided.

Key words: New species, fish fauna, *Oryzias*, fish taxonomy, brackish, conservation, Taiwan

Introduction

The ricefishes, adrianichthyid fishes of atherinomorph order Beloniformes, comprise about 31 small nominal species till 2010 (Herder & Chapuis 2010; Magtoon 2010; Parenti & Hadiaty 2010). In the last comprehensive revision of Adrianichthyidae by Parenti (2008), the ricefishes had been clarified into two genera based on a phylogenetic analysis: *Adrianichthys* with four species and *Oryzias* with 24 species. They can be found from Central, East and southeast Asia and Indian subcontinent; as well as south along Indo-Australian Archipelago across Wallace's line toward Timor, Sulawesi of Indonesia (Kottelat 1990a, b).

After 2010, there are more discoveries of new rice-fishes come to science including during those 2012–2018 in six new-species fish publication series as followings: *Oryzias eversi* Herder, Hadiaty & Nolte, 2012 from Sulawesi, Indonesia; *Oryzias sakaizumii* Asai, Senou & K. Hosoya, 2012 from western Honshu, Japan; *Oryzias asinua* Parenti, Hadiaty, Lumbantobing & Herder, 2013 as well as *Oryzias wolasi* Parenti, Hadiaty, Lumbantobing & Herder, 2013 from Sulawesi, Indonesia; *Oryzias soerotoi* Mokodongan, Tanaka & Yamahira, 2014 from Central Sulawesi, Indonesia; and more recently *Oryzias dopingdopingensis* Mandagi, Mokodongan, Tanaka & Yamahira, 2018 from central Sulawesi, Indonesia. Among them, all the type localities for above newly described ricefishes were found mostly at either lentic or lotic freshwater habitats of tropical southeastern Asia.

In Taiwan, the native, freshwater ricefish had been discovered with very limited distribution range of northeastern Taiwan which identified as so-called either *Oryzias latipes* (Temminck and Schelegel, 1846) or *Oryzias latipes sinensis* Chen, Uwa & Chu, 1989 before (Chen and Fang, 1999; Tzeng, *et al.*, 2006; Chen, 2009). Tzeng *et al.*, (2006) indicated that the phylogenetic tree revealed that the rice fish population in Taiwan clusters with Chinese populations, which suggests that they belong to the same Chinese subspecies, *Oryzias latipes sinensis* Chen, Uwa

 Accepted by M.-F. Yeh: 2 Nov. 2024; published: 10 Dec. 2024

& Chu, 1989. However, the species has also even been considered as valid discrete species, *Oryzias sinensis* from southern China by other systematic ichthyologists (Kottelat 1998, 2001, 2013; Parenti 2008).

However, the Taiwanese freshwater ricefish from northern Taiwan have been considered and identified as the member of *Oryzias sinensis* complex with still retaining some mitogenetic divergences among them (Tzeng, *et al.*, 2006). Then, it is needed to revise this entire species complex from all geographical ranges of this Chinese ricefish from the single clumping name, freshwater Chinese rice fish, *Oryzias sinensis* complex in the near feature.

Materials and Methods

Fish specimens were preserved in 70% ethanol after fixation in 10% formalin except some fin-clips samples preserved directly in 95% ethanol for further mitogenetic analysis. Meristic counts and morphometric measurements generally follow Hubbs and Lagler (2004). All measurements are either expressed as a range of percentage of standard length (SL) or head length (HL). Vertebral and fin-ray counts were made mainly from X-ray radiographs from fish specimens. The type and some comparative materials were deposited in the Pisces collection of National Taiwan Ocean University, Keelung (NTOUP).

Systematics

Oryzias chenglongensis new species

(Figs. 1–4)

FIGURE 1. *Oryzias chenglongensis* **n. sp.**, male, NTOUP-2018-06-310; 24.8 mm SL, Chenglong wetland, Yunlin County, Taiwan.

FIGURE 2. *Oryzias chenglongensis* **n. sp.**, female, NTOUP-2018 -06-311, 26.6 mm SL, Chenglong wetland, Yunlin County, Taiwan.

Holotype.—NTOUP-2018-06-310; 24.8 mm SL, coll. I-S. Chen; Chenglong wetland, Yunlin County, Taiwan, ROC.

Paratypes.—NTOUP-2018-06-311; 3 specimens, 23.5–26.6 mm SL, coll. I-S. Chen; Chenglong wetland, Yunlin County, Taiwan, ROC. NTOUP-2018-02-312, 15.2–24.5 mm SL, 20 specimens, coll. I-S. Chen; Chenglong wetland, Yunlin County, Taiwan, ROC.

Diagnosis

The new species, *Oryzias chenglongensis* can be well distinguished from other congeners by the following unique combination of features: (1) fin-ray counts: dorsal-fin rays 6 (6 seen in holotype); anal-fin rays 19–20 (19); pelvic-fin rays 6 (6); pectoral-fin rays 10 (10); principle caudal-fin rays i,4/5,i (i,4/5,i); (2) body compressed laterally with body depth at pelvic origin 24.0–24.3 (24.3), body depth at anal fin origin 15.5–20.4 (20.4); (3) the dorsal-fin origin inserted almost at the vertical of 14th anal-fin rays, membrane between dorsal-fin 5th and 6th rays without distinct notch in adult male; and (4) body translucent, light yellowish green or brown, scattered with minute melanophores, a narrowly dotted, longitudinal black line along the middle forward to vertical above pelvic fin; T-shape black mark of caudal fin base in male; operculum and pre-pectoral region slivery, no any silvery scales on lateral body, lip color grayish or creamy yellow and eye bluish silvery dorsally.

Description

Body proportions as their detailed morphometry were summarized in Table 1. Dorsal-fin rays 6 (6 seen in holotype); anal-fin rays 19–20 (19); pelvic-fin rays 6 (6); pectoral-fin rays 10 (10); principle caudal-fin rays i,4/5,i (i,4/5,i), and vertebral counts 29–30 (30).

Small species, with maximum size of available specimens examined as 26.6 mm SL. Head moderate large, with head length 22.8–24.5 (22.8) depressed dorsoventrally; eye very large, eye diameter 34.8–41.3 (39.9); snout very short, snout length 22.8–25.9 (22.8). Body compressed laterally, robust anteriorly and slender posteriorly, body depth at pelvic origin 24.0–24.3 (24.3), body depth at anal fin origin 15.5–20.4 (20.4). No greatly pronounced abdominal concavity between pelvic fins and anterior part of anal fin in female. Mouth terminal, up-turned; tip of upper lip about the horizontal line crossing the upper margin of pupil, lower jaw projecting forward beyond upper jaw, each jaws in having minute conical teeth; lips slightly fleshy. Dorsal body profile relatively straight from head to mid-dorsum and curving from mid-dorsum to dorsal-fin origin; ventral profile as a gentle arch from head to anal-fin origin.

Dorsal profile of head concave. Cheek very limited by large eye. Orbit not projecting toward the dorsal profile. Gill slit opening to superior margin of pectoral-fin base; isthmus located inferior to posterior margin of eye.

Scales relatively large and deciduous, cycloid. No scales on rostral zone. Cephalic lateral-line system absent on dorsal, lateral, jugular of head. Nostril opens upper jaw posterosuperior, and lachrymal in front of eye opens near anterior margin.

Dorsal fin situated for posteriorly, the dorsal-fin origin inserted almost at the vertical of 14th anal-fin rays. Membrane between dorsal-fin 5th and 6th rays without distinct notch in adult male. Dorsal fin rays may elongate with growth in male. Pelvic fin abdominal. Anal fin base rather long, 28.3–30.1 (29.8); membrane margin between each anal-fin ray indented in male, somewhat and slightly concave in female. Pectoral fin rays expended medially. Last pelvic-fin ray connected along less than one-half its length to body forming connecting membrane. Caudal fin truncate, median to posterior 1/3 part branched.

Males with a short, tubular urogenital papilla; female with an enlarged bilobed fleshy, urogenital papilla.

TABLE 1. Morphometry of *Oryzias chenglongensis* **n. sp.** from Taiwan.

	Holotype	Paratype	Paratype
	Male	Female	Female
Standard length (mm)	24.8	26.6	23.8
% in Standard length			
Body depth at pelvic fin origin	24.3%	24.0%	24.2%
Body depth at anal fin origin	20.4%	19.2%	15.5%
Body width	16.2%	16.6%	18.3%
Body depth	22.8%	24.5%	23.8
Caudal peduncle depth	9.1%	8.8%	8.2%
Caudal peduncle length	13.9%	13.5%	13.8%
Height of dorsal fin	18.8%	12.7%	15.6%
Dorsal-fin base	8.6%	7.6%	8.7%
Height of anal fin	14.6%	13.3%	14.3%
Anal-fin base	29.8%	28.3%	30.1%
Pelvic fin length	11.9%	13.7%	14.2%
Pectoral-fin lrngth	18.8%	17.5%	17.7%
Predorsal length	79.2%	79.2%	77.0%
Preanal length	59.0%	60.3%	59.5%
Prepelvic length	44.9%	46.8%	45.5%
Length from Pectoral fin basee to pelvic fin base	16.8%	17.2%	16.6%

.....continued on the next page

TABLE 1. (Continued)

	Holotype	Paratype	Paratype
	Male	Female	Female
Length from dorsal fin basee to caudal fin base	14.3%	15.8%	16.9%
% in Head length			
Head width	66.6%	54.8%	70.2%
Eye diameter	36.9%	35.8%	34.8%
Postorbital length	39.9%	41.3%	40.0%
Snout length	22.8%	23.9%	25.9%
Interorbital width	33.1%	35.2%	39.1%
Caudal peduncle depth/length	65.5%	65.5%	59.4%

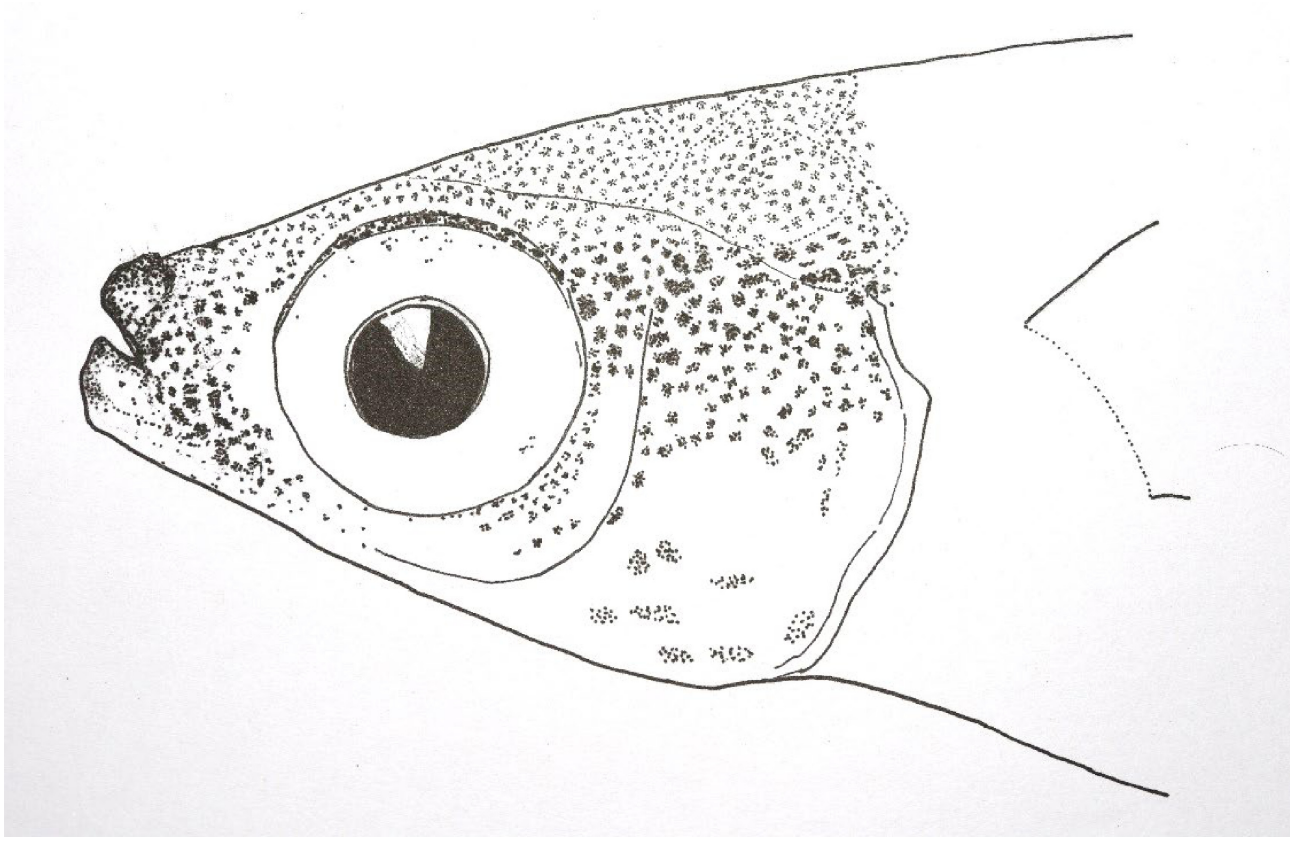

FIGURE 3. Head profile and pigmentation pattern of *Oryzias chenglongensis*, holotype.

Coloration in life

Body translucent, light yellowish green or brown, scattered with minute melanophores can be seen alive and preservative, a conspicuous, narrowly dotted, longitudinal black line along the middle forward to vertical above pelvic fin. T-shape black mark of caudal fin base in male. Belly wall, peritoneum slivery, somewhat subrectangular in both sexes. Operculum and pre-pectoral region slivery. No any silvery scales on lateral body. Lip color grayish or somewhat creamy yellow. Eye bluish silvery dorsally, silvery ventrally with some brilliant yellow dots.

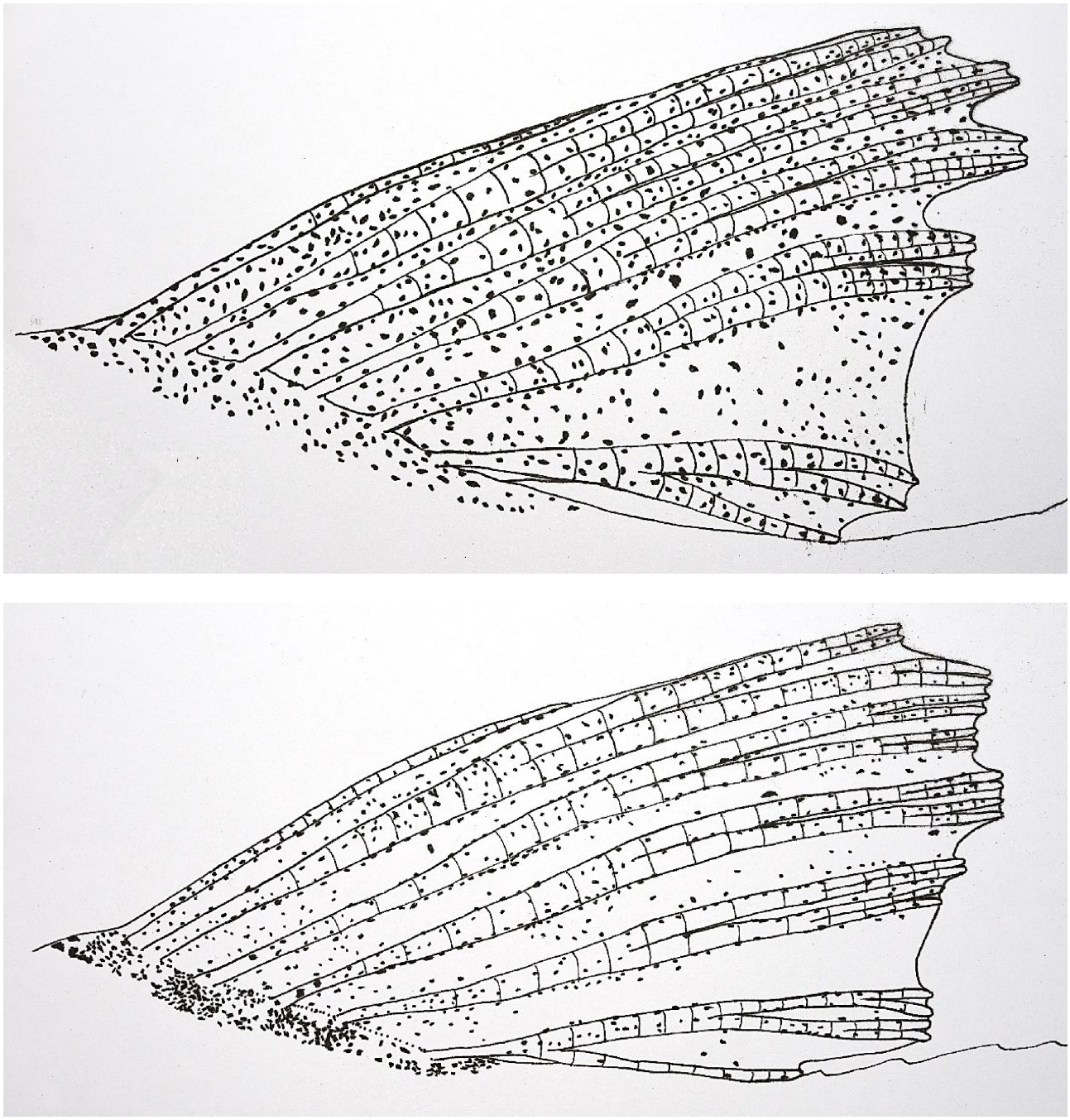

FIGURE 4. Dorsal-fin pigmentation pattern of *Oryzias chenglongensis* , holotype (above) and *Oryzias curvinotus* (below).

Generally, all fins and belly colored pale white to pale yellow. Caudal fin with yellowish dorsal and ventral submarginal stripes and the stripes darker with melanophores as well as distal yellowish margin in male. Dorsal edge of dorsal and pectoral fins, distal region of pelvic and anal fins with yellow bands. Entire pelvic fin yellowish in male. Pelvic and anal fin with widely scattered tiny melanophores. Caudal fin membrane with about 4 hairline longitudinal stripes.

Coloration while specimens in preservative similar above and all brilliant coloration and translucent part entirely faded, body generally light yellowish brown except the melanophores and some larger deep black marks.

Distribution and habitats

Although the type specimens of *Oryzias chenglongensis* eventually described and collected from the Yunlin County of western Taiwan, it can be also found from Chairyi and Tainan by some photo image evidences of local people without well preserved specimens. It is highly possible to be an endemic species around Taiwan island.

It can be considered that the brackish ricefish might be existed in the wetlands of western Taiwan (at least ranging from Yunlin southward to Taiwan) although the current population may be very low and rare. This new species merely collected from brackish habitat around 20–30 for salinity. The recorded localities from both Chiaryi and Tainan are also the brackish habitats of wetlands and estuaries. In our breeding experiment, this fish can also survive well in fresh water, it might be more widely distributed around the lowland freshwater to brackish region around Taiwan.

Etymology

The specific name, *chenglongensis*, is referred to names of the fish holotype locality collected "Chonglong wetland", western Taiwan although its available geographical range may from Yun-lin, Chiar-yi, to Tai-nan of western Taiwan.

Conservation

Due the very rare of current new species in wild survey in western Taiwan, we only kept very limited individuals into type series. Its habitat has also faced the great ecological threat from at least two invasive species of American killifishes. Almost other fish individuals of new species have been kept for conservation reason and reproduce their further off spring and save its limited stock at NTOU, Keelung for avoiding great aquatic ecological threat from this endangered species becoming extinction.

Remarks

Among the nearby ricefish around Far East (including China, Taiwan, Korea, and Japan), this new species, *Oryzias chenglongensis* seems to be more similar to *Oryzias curvinotus* complex with only *O. curvinotus* than *Oryzias latipes* with both *O. latipes* and *O. sakaizumii* in this geographical region (even mitogenetic analysis also congruent to Takehana *et al.*, 2003, 2004) although they are belonging to sister clades.

However, the new species of rice fish, *Oryzias chenglongensis* can be well distinguished from the mostly close related Chinese species, *Oryzias curvinotus* (Nichols & Pope, 1927) by the following several features:

(1) anal fin ray insertion vertical to dorsal fin origin as 14^{th} ray vs. 15^{th}–16^{th} ray;

(2) rear tip of dorsal fin base anterior to anal fin last ray vs. both rear tips of dorsal and anal fins terminating about same vertical line;

(3) lower caudal peduncle depth vs. higher caudal peduncle depth;

(4) mouth terminal with tip of upper lip at horizontal line of upper margin of pupil vs. mouth superior with tip of upper lip slightly above horizontal line of upper margin of orbit ;(5) coloration pattern: lip color grayish or somewhat creamy yellow vs. orange red; the black longitudinal line extending forward above ventral fin vs. the line not extending beyond the vertical of anus; caudal fin base with T-shape black mark in male vs. no such mark.

In our unpublished the mitogenetic data, its molecular phyloengy was also shown the great similarity with *O. curvinotus* rather than others including both *O. latipes* and *O. sinensis.* The detailed phylogenetic relationship among Asiatic ricefishes would be discussed in near future while gathering more taxa of ricefish for reconstructing their phylogenetic aspect among Chinese and Taiwanese waters.

Acknowledgements

The authors wish to thank the help of Mr. Tonisman Harefa, NTOU, Keelung for helping the molecular biological work for accessing the mitogonomic sequences from ricefishes. The authors wish to thank for support of the conservation project from Agriculture Council.

References

Asai, T., Senou, H. & Hosoya. K. (2012) *Oryzias sakaizumii*, a new ricefish from northern Japan (Teleostei: Adrianichthyidae). *Ichthyological Exploration of Freshwaters*, 22, 289–299.

Chen, I-S. & Fang, L.S. (1999) *The freshwater and estuarine fishes of Taiwan*, National Museum of Marine Biology and Aquarium Press, Pingutng, 287 pp. [in Chinese]

Chen, I-S. (2009) *The Indicator Species of Riverine Fishes in Taiwan. Vol. I, Primary Freshwater Fishes*, National Taiwan Ocean University Press, Keelung (2009). [In Chinese]

Chen, Y.R., Uwa, H. & Chu, X.L. (1989) Taxonomy and distribution of the genus *Oryzias* in Yunnan, China (Cyprinodontiformes: Oryziidae). *Acta Zootaxonomica Sinica*, 14, 239–246. [In Chinese, English summary]

Herder, F. & Chapuis, S. (2010) *Oryzias hadiatyae*, a new species of ricefish (Atherinomorpha: Beloniformes: Adrianichthyidae) endemic to Lake Masapi, Central Sulawesi, Indonesia. *Raffles Bulletin of Zoology*, 58, 269–280.

Herder, F., Hadiaty, R.K. & Nolte, A.W. (2012) Pelvic-fin brooding in a new species of riverine ricefish (Atherinomorpha: Beloniformes: Adrianichthyidae) from Tana Toraja, Central Sulawesi, Indonesia. *Raffles Bulletin of Zoology*, 60, 467–476.

Kottelat, M. (1998) Fishes of the Nam Theun and Xe Bangfai basins, Laos, with diagnoses of twenty-two new species (Teleostei: Cyprinidae, Balitoridae, Cobitidae, Coiidae and Odontobutidae). *Ichthyological Exploration of Freshwaters*, 9, 1–128.

Kottelat, M. (2001) *Freshwater fishes of northern Vietnam. A preliminary check-list of the fishes known or expected to occur in northern Vietnam with comments on systematics and nomenclature*. Environment and Social Development Unit, East Asia and Pacific Region. The World Bank, 123 pp.

Kottelat, M. (2013) The fishes of the inland waters of southeast Asia: a catalogue and core bibiography of the fishes known to occur in freshwaters, mangroves and estuaries. *Raffles Bulletin of Zoology Supplement*, 27, 1–663.

Magtoon, W. (2010) *Oryzias songkhramensis*, a new species of ricefish (Beloniformes; Adrianichthyidae) from northeast Thailand and central Laos. *Tropical Natural History*, 10, 107–129.

Mandagi, I.F., Mokodongan, D.F., R. Tanaka, R. & Yamahira, K. (2018) A new riverine ricefish of the genus *Oryzias* (Beloniformes, Adrianichthyidae) from Malili, Central Sulawesi, Indonesia. *Copeia*, 106, 297–304.
https://doi.org/10.1643/CI-17-704

Mokodongan, D. F., Tanaka, R. & Yamahira, K. (2014) A new ricefish of the genus *Oryzias* (Belontiformes, Adrianichthyidae) from Lake Tiu, central Sulawesi, Indonesia. *Copeia*, 2014, 561–567.
https://doi.org/10.1643/CI-13-081

Nichols, J.T. & Pope, C.H. (1927) The fishes of Hainan. *Bulletin of the American Museum of Natural History*, 54, 321–394.

Parenti, L.R. & Hadiaty, R.K. (2010) A new, remarkably colorful, small ricefish of the genus *Oryzias* (Beloniformes, Adrianichthyidae) from Sulawesi, Indonesia. *Copeia*, 2010, 268–273.
https://doi.org/10.1643/CI-09-108

Parenti, L.R., Hadiaty, R.K., Lumbantobing, D.N. & Herder, F. (2013) Two new ricefishes of the genus *Oryzias* (Atherinomorpha: Beloniformes: Adriachthyidae) augment the endemic freshwater fish fauna of southeastern Sulawesi, Indonesia. *Copeia*, 2013, 403–414.
https://doi.org/10.1643/CI-12-114

Parenti, L.R. (2008) A phylogenetic analysis and taxonomic revision of ricefishes, *Oryzias* and relatives (Beloniformes, Adrianichthyidae). *Zoological Journal of the Linnean Society*, 154, 494–610.
https://doi.org/10.1111/j.1096-3642.2008.00417.x

Takehana, Y., Nagai, N., Matsuda, M., Tsuchiya, K. & Sakaizumi, M. (2003) Geographic variation and diversity of the Cytochrome b gene in Japanese wild populations of medaka, *Oryzias latipes*. *Zooloigcal Science*, 20, 1279–1291.
https://doi.org/10.2108/zsj.20.1279

Takehana, Y., Uchiyama, S., Matsuda, M., Jeon, S.R. & Sakaizumi, M. (2004) Geographic variation and diversity of the Cytochrome b gene in wild populations of medaka (*Oryzias latipes*) from Korea and China. *Zooloigcal Science*, 21, 483–491.
https://doi.org/10.2108/zsj.21.483

Temminck, C.J. & Schlegel, H. (1846) Pisces. *In*: Siebold, P.F. de (ed.), *Fauna Japonica, sive descriptio animalium, quae in itinere per Japoniam suscepto annis 1823-1830 collegit, notis, observationibus et adumbrationibus illustravit Ph. Fr. de Siebold*. Lugduni Batavorum, Leiden, Parts 10–14, 173–69.

Tzeng, C.S., Lin, Y.S., Lin, S.M., Wang, T.Y. & Wang, F.Y. (2006) The phylogeography and population demographics of selected freshwater fishes in Taiwan. *Zoological Studies*, 45(3), 283–297.

Wu, H.L. (Ed.) (2008) *Fauna Sinica, Osteichthyes Perciformes (V) Gobioidei.* Science Press, Beijing, 951 pp.