



Taiwanese fish collection donated by Masamitsu Oshima to Kyoto University, currently deposited in the Kyoto University Museum

Mizuki MATSUNUMA^{1,*}, Kyoji FUJIWARA², Masaharu MOTOKAWA^{2,*}, Kazumi HOSOYA³

1. Maizuru Fisheries Research Station, Field Science Education and Research Center, Kyoto University, Maizuru, Japan, Nagahama, Maizuru, Kyoto 625-0086, Japan. 2. The Kyoto University Museum, Kyoto University, Yoshida-honmachi, Sakyo-ku, Kyoto 606-8317, Japan. 3. Kindai University, 3327-2 Naka-machi, Nara 631-0052, Japan. *Corresponding authors' emails: MMA: k1139853@kadai.jp; MMo: motokawa.masaharu.6m@kyoto-u.ac.jp

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ABSTRACT: Masamitsu Oshima made significant contributions to the taxonomy of Taiwanese fishes in the early 20th century. Although many of the type series of Taiwanese fishes originally described by him are now housed in US institutions, there are no verified collections of Taiwanese fishes amassed by Oshima. During a survey of the historical fish collection at the Kyoto University Museum, we discovered 39 lots comprising 96 specimens (representing 39 species in 18 families) of freshwater fishes collected in Taiwan between 1916 and 1920, and donated to Kyoto University by Oshima around 1921. The collection included specimens identified by Oshima as taxa originally described by himself, including *Labeo jordani* Oshima, 1919; *Scaphesthes tamusiensis* Oshima, 1919; *Spinibarbus hollandi* Oshima, 1919; *Culter aokii* Oshima, 1919; *Phoxiscus kikuchii* Oshima, 1919; *Gnathopogon iijimae* Oshima, 1919; *Pseudobagrus adiposalis* Oshima, 1919; *Pseudobagrus taiwanensis* Oshima, 1919; *Rhinogobius formosanus* Oshima, 1919; and *Mugil anpinensis* Oshima, 1922, as well as several endangered taxa, including the now-extinct native Taiwanese population of *Plecoglossus altivelis* (Temminck and Schlegel, 1846). An overview of the collection is provided, and the possible type status of examples of nominal species described by Oshima is discussed. Morphological notes on Taiwanese *P. altivelis* are given for comparison with the Chinese subspecies. Although no specimens were found to qualify as types, the rediscovered collection provides valuable historical information on the freshwater fish fauna of early 20th-century Taiwan.

KEY WORDS: freshwater fishes, ichthyology, museum specimen, Taiwan.

INTRODUCTION

Oshima, Masamitsu (1884–1965) [大島正滿] described 67 new fish species belonging to 26 families from China, Taiwan, and Japan between 1919 and 1961. Of these, 40 new species were described from Taiwan, including 13 marine and 27 freshwater taxa (Ho and Shao, 2011; Fricke and Eschmeyer, 2025). Fifteen of these are currently recognized as valid species, including the Formosan Landlocked Salmon *Oncorhynchus masou formosanus* Jordan & Oshima, 1919. Oshima's contribution to the Taiwanese fish taxonomy was discussed by Gwo (2017).

Oshima graduated from Tokyo Imperial University in 1908. Upon his appointment to the Government-General of Taiwan [臺灣總督府] in 1907–1924 (Japan had colonized Taiwan at that time), Oshima began collecting and studying Taiwanese fishes, alongside his research on termites. Subsequently, he had an opportunity to study abroad, and in June 1917, after crossing the Pacific Ocean en route to London, he landed in San Francisco where he visited Stanford University. David S. Jordan, founding president of the university, advised Oshima that research in Europe would be difficult amid the turmoil of World War I, and suggested that he remain at Stanford instead. Consequently, Oshima conducted taxonomic research on Taiwanese fishes in the Zoology Laboratory at Stanford University, where he earned his master's degree in 1918

(Gwo, 2017).

Oshima's research on Taiwanese fishes culminated in a series of papers published between 1919 and 1929. Oshima (1919) based his descriptions of new species primarily on single specimens in most cases, although he included data from supplementary material (identifiable only from collection location), usually in an unnumbered text table. Clearly, Oshima considered the former as primary types, although he did not explicitly designate them as holotypes. Therefore, because each nominal species-group taxon was based on more than one specimen, all of the examined specimens were considered as syntypes, and subsequent designation of lectotypes in each case was appropriate (ICZN, 1999: Art. 74.1) (see Eschmeyer, 1998). Most of the type series of new species described by Oshima are now held in institution collections in the US, although some were reserved for the Government Institute of Science, Government-General of Taiwan, but were apparently considered lost (Ho and Shao, 2011). In addition, the whereabouts of some other type specimens remain unknown, and no collections of Oshima fish specimens, including types, are currently known to be held in any Taiwanese institutions (Ho and Shao, 2011).

The Kyoto University Museum, established in 1997 as a university museum under Kyoto University, houses biological specimens transferred in 2000 from the former Zoological Department of the university's Faculty of



Science (currently Department of Zoology, Graduate School of Science). Among these, 39 lots of Taiwanese fish specimens, donated by Oshima around 1921, were found, including ten species that had been originally identified by Oshima as taxa he had described. The collection also included several endangered freshwater species, such as the Ayu *Plecoglossus altivelis* (Temminck & Schlegel, 1846), the native population of which is now extinct in Taiwan (Yang *et al.*, 2017). Details of Oshima's Taiwanese fish collection at Kyoto University are reported here, with the possible type status of some specimens discussed, and morphological characteristics of the Taiwanese *P. altivelis* specimens described.

MATERIALS AND METHODS

All of the specimens had been preserved in formalin solution until 2022, although some had dried out, and several had a greenish coloration, likely caused by copper ions leaching from the metal eyelet of the original specimen label. All were transferred to 70% ethanol, and deposited in the Kyoto University Museum, Kyoto University under the catalog numbers FAKU 211170–211208, 212003–212005. Species identifications followed Akihito *et al.* (2013) for *Eleotris* (Eleotridae), Chen *et al.* (2008) and Peng *et al.* (2024) for *Candidia* and *Opsariichthys* (Xenocyprididae), Chen and Yeh (2024a) for *Hemimyzon* (Balitoridae), and Chen and Yeh (2024b) for *Rhinogobius* (Gobiidae). Synonymies and familial classification of each species generally follow Fricke *et al.* (2025). Institutional codes follow Fricke and Eschmeyer (2025). Type specimen information for taxa originally described by Oshima (1919, 1922) was taken from Ho and Shao (2011). Complete information on the specimens is provided as Supplemental material Table S1, and photographs of specimens and labels in Supplemental material Fig. S1.

RESULTS AND DISCUSSION

A total of 39 lots comprising 96 specimens were identified to 39 species of 18 families, each species represented by a single lot, with each lot containing between one and ten individuals (Table 1). All species are primary (e.g., Cyprinidae) or secondary (Mugilidae) freshwater fishes sensu Myers (1938, 1949), having been collected by M. Oshima, Aoki, Takeo [青木赳雄], or Matsuda, Eiji [松田英二] between 1916 and 1920 from various localities in Taiwan. Aoki, a technician employed by the Government-General of Taiwan at that time, assisted Oshima with fish sampling, and is also recognized as the first person to recognize the Formosan Landlocked Salmon (Gwo, 2019). Matsuda, a teacher of Ako Public school, assisted Oshima during field surveys at Ako [阿猴] (= Pingtung) (Oshima, 1920). Both the

cyprinid fish *Lissochilichthys matsudai* and coral snake *Hemibungarus matsudai* were named after Matsuda by Oshima.

The specimens were stored in a variety of glass jars including original labels from the “Government Institute of Science (臺灣總督府研究所)” of Taiwan (Fig. 1), which included the following fields: “Catalog number (番號),” “Scientific name (學名),” “Japanese name (和名),” “Locality (產地),” “Date (採集年月),” “Collector (採集者),” and “Remarks (摘要).” The catalog number field was blank in all lots, and other fields were incomplete in some cases.

An additional label was affixed to the exterior of each jar. These labels are in different formats: one simply transcribed information from the original label, and the other indicated that the specimens were donated by Oshima to the Zoology Laboratory in 1921. It is likely that these outer labels were prepared when the specimens were received at Kyoto University. Several label formats were apparent, suggesting that the specimens had been sent by Oshima to the Zoology Laboratory in multiple separate shipments during 1921 or shortly thereafter, although no documentation regarding such donations has been retained.

In April 1921, the Faculty of Science at Kyoto University established the Second Division (Physiology and Ecology) within the Department of Zoology. Kawamura, Tamiji [川村多實二] was promoted to professor the following month. As a zoologist specializing in freshwater biology, he was likely involved at that time in expanding the department's biological collections. It is possible that he requested Oshima to donate freshwater fish specimens from Taiwan. The recording of multiple collection dates on Oshima's specimen labels suggests that he divided previously collected, unregistered material into lots, and sent representative specimens of as many species as possible to Kyoto University. It is notable that the fish collection at The University of Tokyo (ZUMT; now stored in The University Museum), with a long history of collections, like Kyoto University, also received Taiwanese fish specimens from Oshima and Aoki (Koeda *et al.*, 2022).

List of specimens

The following list includes the species name originally identified by Oshima (followed by the current valid name or reidentification if necessary), catalog number at Kyoto University, number of specimens, size, locality (original spelling taken from labels), date and collector (more detailed information provided as Supplemental materials). Abbreviations used in the list of specimens include: “KU (Kyoto University) specimen”, “SL (standard length)”, and “TL (total length)”.

The collection includes specimens which were originally identified as nominal species described by

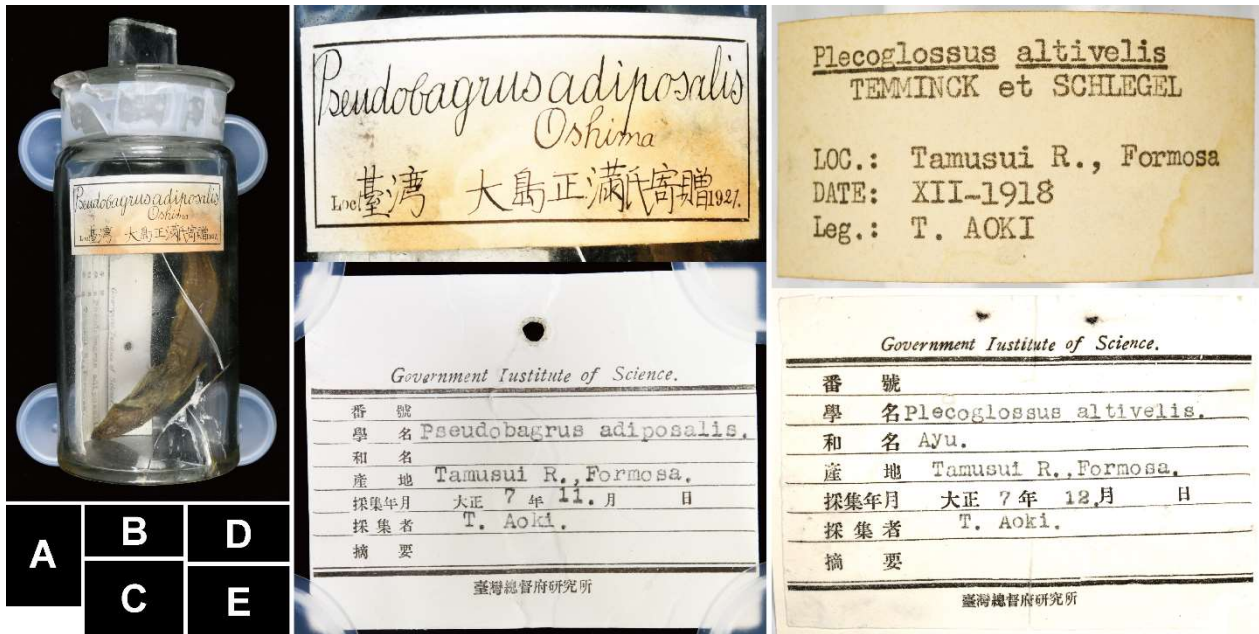


Fig. 1. Specimen jar and labels of Masamitsu Oshima's Taiwanese fish collection at Kyoto University. **A.** Whole view of specimen jar of *Pseudobagrus adiposalis* (FAKU 211191). **B–C.** Label attached on jar, indicating [Loc. Taiwan. Gift from Masamitsu Oshima. 1921] and label of "Government Institute of Science", indicating collection date as November 1918 [corresponds to Taishō [大正] 7], stored with specimen of the *P. adiposalis*. **D–E.** Label attached on jar and label of "Government Institute of Science" stored with specimens of *Plecoglossus altivelis* (FAKU 211194).

Oshima (1919, 1922) (Table 1). No specimens had any type status, as discussed below. Morphological characteristics of *P. altivelis* specimens are briefly described for comparison with the Chinese subspecies, *Plecoglossus altivelis chinensis* Wu & Shan in Shan *et al.* (2005).

Family Anguillidae

1. *Anguilla japonica* Temminck & Schlegel, 1846

Fig. 2A

KU specimen: FAKU 211170, 1 specimen, 306.5 mm TL, Toko [東港], 20 Apr. 1920, M. Oshima.

Family Cobitidae

2. *Cobitis taenia* Linnaeus, 1758 **Fig. 2B** = synonym of *Cobitis sinensis* Sauvage & Dabry de Thiersant, 1874 **KU specimens:** FAKU 211171, 2 specimens, 70.8–71.2 mm SL, Lake Candidius [日月潭], 18 Mar. 1919.

Remarks: The present identification is tentative because species boundaries within *C. sinensis* remain unclear. Recent molecular studies have suggested the presence of cryptic species within the morphospecies *C. sinensis* (Chiang *et al.*, 2010, 2013).

3. *Misgurnus anguillicaudatus* (Cantor, 1842) **Fig. 2C** **KU specimens:** FAKU 211172, 6 specimens, ca. 52–106 mm SL, Lake Candidius, 12 Mar. 1919, M. Oshima.

Family Balitoridae

4. *Hemimyzon formosanus* (Boulenger, 1894) **Fig. 2D** **KU specimen:** FAKU 211178, 1 specimen, 61.0 mm SL, Kunanau River [古樓, 屏東], 2 Feb. 1919, E. Matsuda.

Remarks: The present specimen was identified as *H.*

formosanus by having three unbranched and seven branched dorsal-fin rays, following Chen and Yeh (2024a).

Family Cyprinidae

5. *Barbodes paradoxus* (Günther, 1868) **Fig. 2E**

= valid as *Acrossocheilus paradoxus*

KU specimen: FAKU 211173, 1 specimen, ca. 47 mm SL, Heito [屏東], 5 Dec. 1916, T. Aoki.

6. *Cyprinus carpio* Linnaeus, 1758 **Fig. 2F**

KU specimen: FAKU 211175, 1 specimen, 131.2 mm SL, Lake Candidius, 16 Mar. 1919, M. Oshima.

7. *Labeo jordani* Oshima, 1919. **Fig. 3A**

= synonym of *Cirrhinus molitorella* (Valenciennes, 1844)

Type specimens: Lectotype: FMNH 59089 (formerly CM 8226), Hatchery at Shori [霄裡], Taiwan. Paralectotype: CAS-SU 18302, 1 specimen, locality same as lectotype, sent by M. Oshima.

KU specimen: FAKU 211177, 1 specimen, 160.8 mm SL, Nankan River [南崁溪], 5 Mar. 1919, M. Oshima.

Remarks: Oshima (1919: 205) stated that the description of *Labeo jordani* was based on a single specimen (340 mm TL) from the hatchery at Shori, Taiwan, but provided counts and measurements for two specimens (340–209 mm TL) in an unnumbered table on page 206. It is uncertain whether or not the 340-mm TL specimen listed in that table corresponded to the described specimen. Notwithstanding, that specimen was later designated as the lectotype by Eschmeyer (1998), the single paralectotype at CAS being confirmed by Ho and Shao (2011).

The publication date of Oshima (1919) is somewhat unclear. In volume XII (numbers 2–4) of the *Annals of*



Table 1. List of specimens in Masamitsu Oshima's Taiwanese fish collection at Kyoto University.

FAKU	Family	Original identification	Present identification	N	Locality	Date	Collector
211170	Anguillidae	<i>Anguilla japonica</i> Temminck & Schlegel, 1846	<i>Anguilla japonica</i>	1	Toko [基隆]	20 Apr. 1920	M. Oshima
211171	Cobitidae	<i>Cobitis taenia</i> Linnaeus, 1758	<i>Cobitis sinensis</i> Sauvage & Dabry de Thiersant, 1874	2	Lake Candidius [日月潭]	18 Mar. 1919	unknown
211172	Cobitidae	<i>Misgurnus anguillicaudatus</i> (Cantor, 1842)	<i>Misgurnus anguillicaudatus</i>	6	Lake Candidius [日月潭]	12 Mar. 1919	M. Oshima
211178	Ballitoridae	<i>Hemimyzon formosanus</i> (Boulenger, 1894)	<i>Hemimyzon formosanus</i>	1	Kunau River [古樓, 屏東]	2 Feb. 1919	E. Matsuda
211173	Cyprinidae	<i>Barbodes paradoxus</i> (Günther, 1868)	<i>Acrossocheilus paradoxus</i>	1	Heito [屏東]	5 Dec. 1916	T. Aoki
211175	Cyprinidae	<i>Cyprinus carpio</i> Linnaeus, 1758	<i>Cyprinus carpio</i>	1	Lake Candidius [日月潭]	16 Mar. 1919	M. Oshima
211177	Cyprinidae	<i>Labeo jordani</i> Oshima, 1919	<i>Cirrhinus molitorella</i> (Valenciennes, 1844)	1	Nankan River [南崁溪]	5 Mar. 1919	M. Oshima
211179	Cyprinidae	<i>Scaphesthes tamuensis</i> Oshima, 1919	<i>Scaphesthes barbata</i> (Pellegrin, 1908)	2	Mokkui River [木瓜溪]	13 May 1920	M. Oshima
211180	Cyprinidae	<i>Spinibarbus hollandi</i> Oshima, 1919	<i>Spinibarbus hollandi</i>	1	Kuaren River [花蓮河]	18 May 1919	M. Oshima
211181	Xenocyprididae	<i>Chanodichthys macrops</i> Günther, 1868	<i>Sinibrama macrops</i>	1	Tamusui River [淡水河]	Dec. 1916	T. Aoki
211174	Xenocyprididae	<i>Chanodichthys macrops</i> Günther, 1868	<i>Chanodichthys erythropterus</i> (Basilewsky, 1855)	3	Lake Candidius [日月潭]	16 Mar. 1919	M. Oshima
211172	Xenocyprididae	<i>Culter aokii</i> Oshima, 1919	<i>Chanodichthys erythropterus</i> (Basilewsky, 1855)	2	Lake Candidius [日月潭]	15 Mar. 1919	M. Oshima
211183	Xenocyprididae	<i>Cultricus kneri</i> (Kreyenberg & Pappenheim, 1908)	<i>Hemiculter leucisculus</i> (Basilewsky, 1855)	4	Lake Candidius [日月潭]	10 Mar. 1919	M. Oshima
211184	Xenocyprididae	<i>Hypophthalmichthys molitrix</i> (Valenciennes, 1844)	<i>Hypophthalmichthys molitrix</i>	1	Lake Candidius [日月潭]	unknown	M. Oshima
211185	Xenocyprididae	<i>Phoxiscus kikuchii</i> Oshima, 1919	<i>Aphyocypris kikuchii</i>	10	Ritan, Datto [裡冷, 台東]	23 May 1920	M. Oshima
211186	Xenocyprididae	<i>Zacco platypus</i> (Temminck & Schlegel, 1846)	<i>Opsarichthys evolans</i> (Jordan & Evermann, 1902)	3	Tamusui River [淡水河]	Nov. 1917	T. Aoki
211187	Xenocyprididae	<i>Zacco temminckii</i> (Temminck & Schlegel, 1846)	<i>Candidia barbata</i> (Regan, 1908)	5	Burokokei, Giran [武老坑溪, 宜蘭]	8 July 1918	T. Aoki
211188	Acheilognathidae	<i>Acheilognathus himantegus</i> Günther, 1868	<i>Paratanakia</i> sp.	2	Taihoku [台北]	Dec. 1916	M. Oshima
211176	Gobiionidae	<i>Gnathopogon ijimae</i> Oshima, 1919	<i>Squalidus ijimae</i>	2	Rihikutsu, Horisha [埔里社]	3 Mar. 1919	M. Oshima
211189	Gobiionidae	<i>Hemibarbus labeo</i> (Pallas, 1776)	<i>Hemibarbus labeo</i>	1	Taihoku [台北]	21 Dec. 1919	M. Oshima
211190	Gobiionidae	<i>Pseudorasbora parva</i> (Temminck & Schlegel, 1846)	<i>Pseudorasbora parva</i>	5	[花蓮港]*	13 May 1920	M. Oshima
211191	Bagridae	<i>Pseudobagrus adposalis</i> Oshima, 1919	<i>Tachysurus adposalis</i>	1	Tamusui River [淡水河]	Nov. 1918	T. Aoki
211192	Bagridae	<i>Pseudobagrus taiwanensis</i> Oshima, 1919	<i>Tachysurus taiwanensis</i>	1	Shishito, Musha [獅子頭, 霧社]	5 Mar. 1919	M. Oshima
211193	Siluridae	<i>Parasilurus asotus</i> Linnaeus, 1758	<i>Silurus asotus</i>	1	Lake Candidius [日月潭]	Oct. 1916	T. Aoki
211194	Plecoglossidae	<i>Plecoglossus altivelis</i> (Temminck & Schlegel, 1846)	<i>Plecoglossus altivelis</i>	4	Tamusui River [淡水河]	Dec. 1918	T. Aoki
211195	Eleotridae	<i>Eleotris oxycephala</i> Temminck & Schlegel, 1845	<i>Eleotris melanosoma</i> Bleeker, 1853	1	[台灣]*	unknown	unknown
211196	Gobiidae	<i>Rhinogobius candidianus</i> (Regan, 1908)	<i>Rhinogobius candidianus</i>	4	Lake Candidius [日月潭]	15 Mar. 1920	M. Oshima
211197	Gobiidae	<i>Rhinogobius formosanus</i> Oshima, 1919	<i>Rhinogobius sp.</i>	1	Nankan River [南崁溪]	4 March 1919	M. Oshima
211198	Gobiidae	<i>Rhinogobius giurinus</i> (Rutter, 1897)	<i>Rhinogobius similis</i> Gill, 1859	3	Shimo-tamusui River [下淡水河=高屏溪]	20 Dec. 1916	T. Aoki
211199	Synbranchidae	<i>Fluta alba</i> (Zuiew, 1793)	<i>Monopteris albus</i>	1	Lake Candidius [日月潭]	12 Mar. 1920	M. Oshima
211200	Osphronemidae	<i>Polyacanthus opercularis</i> (Linnaeus, 1758)	<i>Macropodus opercularis</i>	2	Taihoku [台北]	Dec. 1917	M. Oshima
211202	Channidae	<i>Channa formosana</i> Jordan & Evermann, 1902	<i>Channa asiatica</i> (Linnaeus, 1758)	2	Lake Candidius [日月潭]	10 Mar. 1920	M. Oshima
211201	Channidae	<i>Ophicephalus tadius</i> Jordan & Evermann, 1902	<i>Channa maculata</i> (Lacepède, 1801)	2	Rihikutsu, Horisha [埔里社]	3 Mar. 1920	M. Oshima
211203	Poecilidae	<i>Gambusia affinis</i> (Baird & Girard, 1853)	<i>Gambusia affinis</i>	7	Shori [壽裡]	unknown	T. Aoki
211204, 212003, 212004	Mugilidae	<i>Liza arpinensis</i> (Oshima, 1922)	<i>Planiliza subviridis</i> species complex	3	Toko [基隆]	23 Dec. 1920	M. Oshima
211205, 212005	Mugilidae	<i>Liza troschei</i> (Bleeker, 1858)	<i>Planiliza macrolepis</i> (Smith, 1846) and <i>Planiliza subviridis</i> species complex	2	Toko [基隆]	23 Dec. 1920	M. Oshima
211206	Mugilidae	<i>Mugil carinatus</i> Valenciennes, 1836	<i>Planiliza carinata</i>	3	Toko [基隆]	20 Apr. 1920	M. Oshima
211207	Mugilidae	<i>Mugil japonicus</i> Temminck & Schlegel, 1845	<i>Mugil cephalus</i> Linnaeus, 1758	1	Tainan [台南]	16 Apr. 1920	M. Oshima
211208	Kuhliidae	<i>Kuhlia marginata</i> (Cuvier, 1829)	<i>Kuhlia marginata</i>	2	Shinchiku [新竹]	15 Dec. 1918	T. Aoki

*Original label missing

Nominal species originally described by Oshima (1919, 1922) highlighted in bold face

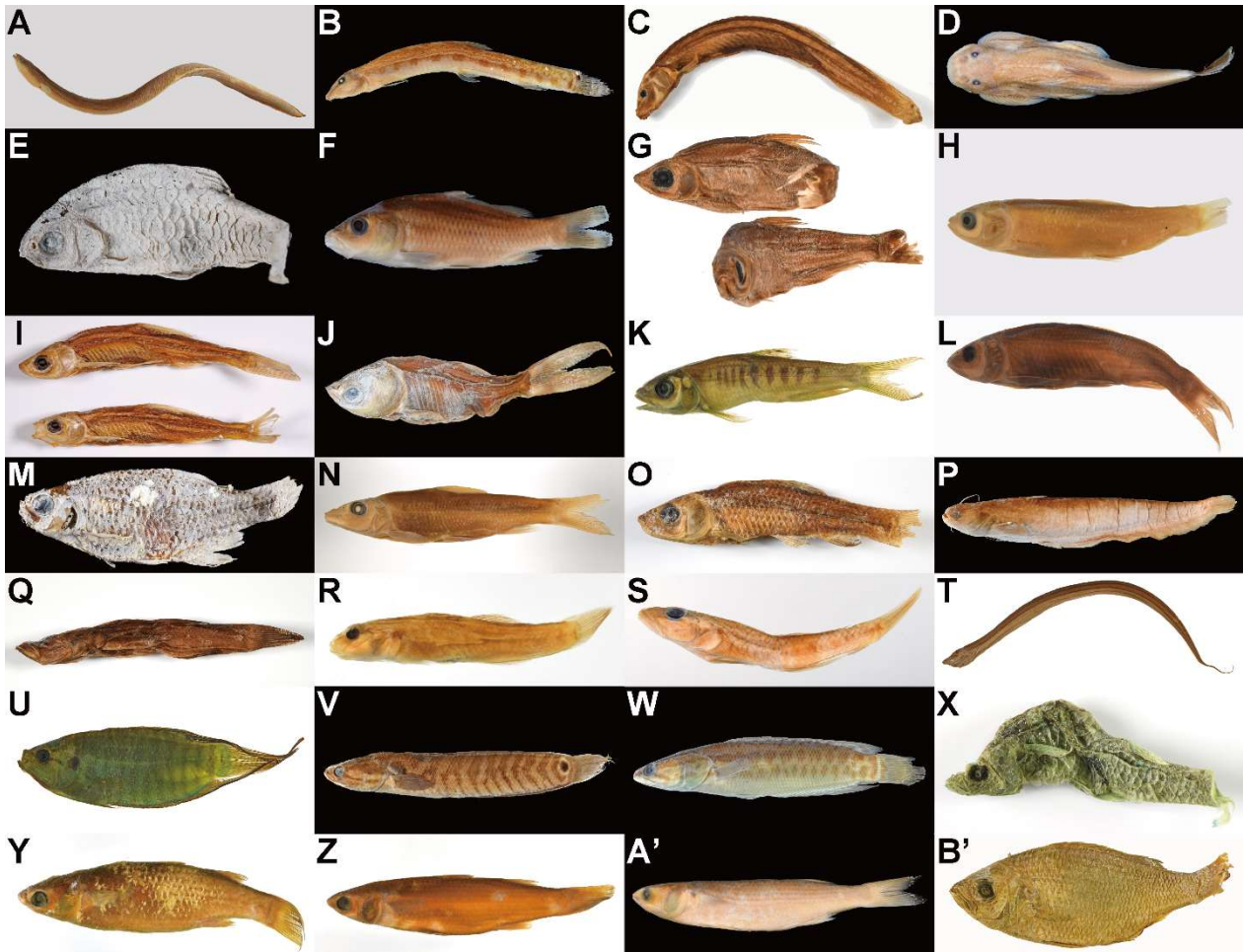


Fig. 2. Specimens from Masamitsu Oshima's Taiwanese fish collection at Kyoto University, representing non-Oshima species (shown with original identification; see also **Table 1**). **A.** *Anguilla japonica*, FAKU 211170; **B.** *Cobitis taenia*, FAKU 211171 (1 of 2 specimens); **C.** *Misgurnus anguillicaudatus*, FAKU 211172 (1 of 6); **D.** *Hemimyzon formosanus*, FAKU 211178; **E.** *Barbodes paradoxus*, FAKU 211173; **F.** *Cyprinus carpio*, FAKU 211175; **G.** *Chanodichthys macrops*, FAKU 211181; **H.** *Ctenopharyngodon idellus*, FAKU 211174 (1 of 3); **I.** *Cultricus kneri*, FAKU 211183 (2 of 4); **J.** *Hypophthalmichthys molitrix*, FAKU 211184; **K.** *Zacco platypus*, FAKU 211186 (1 of 3); **L.** *Zacco temminckii*, FAKU 211187 (1 of 5); **M.** *Acheilognathus himantegus*, FAKU 211188 (1 of 2); **N.** *Hemibarbus labeo*, FAKU 211189; **O.** *Pseudorasbora parva*, FAKU 211190 (1 of 5); **P.** *Parasilurus asotus*, FAKU 211193; **Q.** *Eleotris oxycephala*, FAKU 211195; **R.** *Rhinogobius candidianus*, FAKU 211196 (1 of 4); **S.** *Rhinogobius giurinus*, FAKU 211198 (1 of 3); **T.** *Fluta alba*, FAKU 211199; **U.** *Polyacanthus opercularis*, FAKU 211200 (1 of 2); **V.** *Channa formosana*, FAKU 211202 (1 of 2); **W.** *Ophicephalus tadianus*, FAKU 211201 (1 of 2); **X.** *Gambusia affinis*, FAKU 211203 (1 of 7); **Y.** *Liza troschellii*, FAKU 211205 (1 of 2); **Z.** *Mugil carinatus*, FAKU 211206 (1 of 3); **A'.** *Mugil japonicus*, FAKU 211207; **B'.** *Kuhlia marginata*, FAKU 211208 (1 of 2).

the Carnegie Museum, Jordan (1919) appeared on pages 329–342, immediately following Oshima (1919) on pages 169–328. Subsequently, Jordan (1920: 568, 570) in *The Genera of Fishes, Part IV* stated that both Oshima (1919) and Jordan (1919) were published on 16 December 1919. Likewise, Holland (1920), in the Annual Report of the Director of the Carnegie Museum, indicated that both papers were issued in December 1919, and later researchers have generally followed this date.

However, the footnotes throughout volume XII (nos. 2–4) include serial numbers and dates, beginning on page 33 as “3—Dec. 2, 1919” and ending on page 321 as “22—Jan. 12, 1920.” In Oshima's (1919) portion, the first page (p. 169) bears the date “12—Dec. 16, 1919,” and page 448

321, “22—Jan. 12, 1920.” The dates on pages 289 and 305 read “20—Jan. 12, 1919” and “21—Jan. 12, 1919,” but the year is likely an error for 1920. The date on the first page (Dec. 16, 1919) agrees with that cited by Jordan (1920) as the publication date for Oshima (1919).

These serial numbers and dates in the footnotes most likely indicate the publication management schedule, suggesting that the actual issue date of Oshima (1919) may have been in early 1920. Holland (1920) mentioned that the museum's publication schedule was confused and delayed due to World War I at that time. Nonetheless, since the dates refer to the bound volume, individual papers may have been distributed earlier.

The present KU specimen, identified as “*Labeo*



jordani", was collected from the Nankan River, a locality not mentioned in the original description of the nominal species. Nor did the specimen SL match those given for the type specimens. Therefore, it has no type status.

8. *Scaphesthes tamusuiensis* Oshima, 1919 **Fig. 3B**
= synonym of *Scaphesthes barbatula* (Pellegrin, 1908).

Type specimens: Lectotype: FMNH 59091 (formerly CM 8228), Tamusui River [淡水河], near Shinten [新店], Taiwan, Dec. 1916, T. Aoki. Paralectotypes (all from Taiwan): CAS-SU 23013, 3 specimens, Tamusui River; CAS-SU 23058, 1 specimen, Choso River [頂雙溪], M. Oshima; CAS-SU 23117–23118, 2 specimens, Giran, M. Oshima.

KU specimens: FAKU 211179, 2 specimens, 67.6–93.0 mm SL, Mokkui River [木瓜溪], 13 May 1920, M. Oshima.

Remarks: Oshima (1919: 210) stated that the description of *S. tamusuiensis* was based solely on a 230-mm TL specimen, which was later designated by Eschmeyer (1998) as the lectotype. Oshima (1919: 210, unnumbered table) also provided counts and measurements of 3 specimens (183, 200 and 230 mm TL) from the Tamusui River, 1 specimen (255 mm) from the Choso River, 1 specimen (102 mm) from the Giran River [宜蘭溪], 1 specimen (80 mm) from Heirinbi [坪林], and 2 specimens (78 and 90 mm) from Taishu [丹林]. Although some inconsistency exists between Oshima's unnumbered table and the above paralectotype data, Ho and Shao (2011) recognized the CAS-SU specimens as the type series.

The present KU specimens of "*S. tamusuiensis*" were collected from the Mokkui River which was not mentioned in the original description of the nominal species. Also, the specimens were collected on 13 May 1920, after the publication date of Oshima (1919). Therefore, the specimens have no type status.

9. *Spinibarbus hollandi* Oshima, 1919 **Fig. 3C**

Type specimens: Lectotype: FMNH 59095 (formerly CM 8233), Sobun River [曾文溪], near Tabani [Yujing; 玉井]. Paralectotypes: CAS-SU 23060, 1 specimen, locality same as lectotype, sent by M. Oshima.

KU specimen: FAKU 211180, 1 specimen, 162.1 mm SL, Kuaren River [花蓮河], 18 May 1919, M. Oshima.

Remarks: Oshima (1919: 218) stated that the description of *S. hollandi* was made from a single specimen (340 mm TL) from the Sobun River, near Tabani, collected by T. Aoki in December 1916. He also mentioned four specimens from the same locality, and provided counts and measurements of two specimens (215 and 340 mm TL) also from the Sobun River, in an unnumbered table. Although the exact number of syntypes is uncertain, the described specimen was designated by Eschmeyer (1998) as the lectotype; one paralectotype at CAS was confirmed by Ho and Shao (2011).

Since the KU specimen was collected from the Kuaren River which was not mentioned in the original description of *S. hollandi*, it has no type status.

Family **Xenocyprididae**

10. *Chanodichthys macrops* Günther, 1868 **Fig. 2G**

= valid as *Sinibrana macrops*

KU specimen: FAKU 211181, 1 specimen, ca. 174 mm SL, Tamusui River, Dec. 1916, T. Aoki.

11. *Ctenopharyngodon idellus* (Valenciennes, 1844)

Fig. 2H

= valid as *Ctenopharyngodon idella*

KU specimens: FAKU 211174, 3 specimens, 61.6–101.5 mm SL, Lake Candidius, 16 Mar. 1919, M. Oshima.

12. *Culter aokii* Oshima, 1919

Fig. 3D

= synonym of *Chanodichthys erythropterus* (Basilewsky, 1855).

Type specimens: Lectotype: FMNH 59110 (formerly CM 8248), Lake Candidius, Aug. 1916, T. Aoki. Paralectotypes: CAS-SU 23057, 1 specimen, Lake Candidius, probably in 1916, sent by M. Oshima.

KU specimens: FAKU 211182, 2 specimens, 157.5–190.4 mm SL, Lake Candidius, 15 Mar. 1919, M. Oshima.

Remarks: Oshima (1919: 251) stated that the description of *C. aokii* was based solely on a 280-mm TL specimen from Lake Candidius, collected by T. Aoki in August 1916. He additionally provided counts and measurements of two specimens (254 and 280 mm TL) from that locality. However, the exact number of syntypes is uncertain. The lectotype was designated by Eschmeyer (1998); one paralectotype was confirmed by Ho and Shao (2011).

The two KU specimens were also collected from the type locality. However, the largest specimen (ca. 220 mm TL) is much smaller than the three specimens mentioned by Oshima (1919), and the two former have no type status.

13. *Cultricus kneri* (Kreyenberg & Pappenheim, 1908)

Fig. 2I

= synonym of *Hemiculter leucisculus* (Basilewsky, 1855)

KU specimens: FAKU 211183, 4 specimens, ca. 58–65 mm SL, Lake Candidius, 10 Mar. 1919, M. Oshima.

14. *Hypophthalmichthys molitrix* (Valenciennes, 1844)

Fig. 2J

KU specimen: FAKU 211184, 1 specimen, ca. 108 mm SL, Lake Candidius, date unknown, M. Oshima.

15. *Phoxiscus kikuchii* Oshima, 1919

Fig. 3E

= valid as *Aphyocypris kikuchii*. **Type specimen:** Holotype: FMNH 59099 (formerly CM 8237), Bokusekikaku [璞石閣 = 玉里, 花蓮], Taiwan, Y. Kikuchi.

KU specimens: FAKU 211185, 10 specimens, ca. 20–30 mm SL, Riran, Daito [裡冷, 台東], 23 May 1920, M. Oshima.

Remarks: *Phoxiscus kikuchii* was originally described by Oshima (1919), based on a single specimen (= holotype). Therefore, the KU specimens have no apparent type status.

16. *Zacco platypus* (Temminck & Schlegel, 1846)

Fig. 2K

= reidentified as *Opsariichthys evolans* (Jordan & Evermann, 1902)

KU specimens: FAKU 211186, 3 specimens, 77.0–87.5 mm SL, Tamusui River, Nov. 1917, T. Aoki.

Remarks: The KU specimens were identified as *O. evolans* by having 44 lateral-line scales and a small mouth,



the posterior margin of the maxilla just reaching a vertical through the anterior margin of the orbit. Ma *et al.* (2006) reported that *Z. platypus* was introduced to Taiwan from Japan within the past 20 years (since the 1980s).

17. *Zacco temminckii* (Temminck & Schlegel, 1846)

Fig. 2L

= reidentified as *Candidia barbata* (Regan, 1908)

KU specimens: FAKU 211187, 5 specimens, 65.4–86.0 mm SL, Burokokei, Giran [武老坑溪, 宜蘭], 8 July 1918, T. Aoki.

Family **Acheilognathidae**

18. *Acheilognathus himantegus* Günther, 1868 Fig. 2M

= reidentified as *Paratanakia* sp.

KU specimens: FAKU 211188, 2 specimens, ca. 41–43 mm SL, Taihoku [台北], Dec. 1916, M. Oshima.

Remarks: The present specimens have iii + 8 dorsal-fin rays and iii + 9 or 10 anal-fin rays, and appear most closely related to *Paratanakia himantegus* (Günther, 1868) or *Paratanakia fulvidorsalis* Chen & Shy, 2024. However, precise identification is not possible due to their poor preservation.

Family **Gobionidae**

19. *Gnathopogon iijimae* Oshima, 1919

Fig. 3F

= valid as *Squalidus iijimae*.

Type specimen: Holotype: FMNH 59096 (formerly CM 8234), Tozen River [頭前溪, 新竹], Taiwan, Dec. 1916, T. Aoki.

KU specimens: FAKU 211176, 2 specimens, ca. 37–38 mm SL, Rihikutsu, Horisha [埔里社], 3 Mar. 1919, coll. by M. Oshima.

Remarks: *Gnathopogon iijimae* was described by Oshima (1919), based on a single specimen (= holotype). The KU specimens have no apparent type status.

20. *Hemibarbus labeo* (Pallas, 1776)

Fig. 2N

KU specimen: FAKU 211189, 1 specimen, 132.3 mm SL, Taihoku, 21 Dec. 1919, M. Oshima.

21. *Pseudorasbora parva* (Temminck & Schlegel, 1846)

Fig. 2O

KU specimens: FAKU 211190, 5 specimens, ca. 43–50 mm SL, “花蓮港” on the KU label (original label missing), 13 May 1920, M. Oshima.

Family **Bagridae**

22. *Pseudobagrus adiposalis* Oshima, 1919

Fig. 3G

= valid as *Tachysurus adiposalis*

Type specimens: Lectotype: FMNH 59079 (formerly CM 8216), Tamsui River, near Shinten, Dec. 1915, T. Aoki. Paralectotypes: CAS-SU 23176, 4 specimens, Tamsui River; CAS-SU 23009, 1 specimen, Sobun River; CAS-SU 23122, 1 specimen, Heirinbi.

KU specimen: FAKU 211191, 1 specimen, ca. 124 mm SL, Tamsui River, Nov. 1918, T. Aoki.

Remarks: The description of *P. adiposalis* was based on a single specimen (172 mm TL) from the Tamsui River (collected by T. Aoki in December, 1915), although counts and measurements of 7 specimens (141–310 mm TL) from the Tamsui River (5 specimens), Heirinbi (1), and the Sobun River (1) were given by Oshima (1919: 182, unnumbered table). In addition, Oshima (1919: 182)

included the Taito River in the distribution of the species. Eschmeyer (1998) subsequently designated one of the specimens as lectotype, and Ho and Shao (2011) confirmed 6 paralectotypes in the CAS-SU collection.

Although the KU specimen was collected from the type locality of *P. adiposalis* in November 1918, before the publication date for Oshima (1919), it is unlikely to have been included in the original type series for the species. A 172-mm TL specimen from the Tamsui River mentioned in Oshima’s (1919) unnumbered table may have been the specimen described in detail (= lectotype), bringing to five the number of type specimens from that locality now existing at FMNH and CAS.

23. *Pseudobagrus taiwanensis* Oshima, 1919 Fig. 3H

= valid as *Tachysurus taiwanensis*

Type specimens: Lectotype: FMNH 59078 (formerly CM 8215), Tozen River, near Taishu, Dec. 1916, T. Aoki. Paralectotypes: CAS-SU 23128, 2 specimens, Shinchiku [新竹]; CAS-SU 23124, 3 specimens, Taito [Dadu River; 大肚溪].

KU specimen: FAKU 211192, 1 specimen, 88.8 mm SL, Shishito, Musha [獅子頭, 霧社], 5 Mar. 1919, M. Oshima.

Remarks: Oshima (1919: 180) stated that the description of *P. taiwanensis* was based on a single specimen (152 mm TL) collected by T. Aoki in December 1916, but also provided counts and measurements of 3 specimens (152, 52 and 50 mm TL), one each from the Tozen River, Shinchiku, and the Daito River (Oshima, 1919: 181, unnumbered table). Later, the Tozen River specimen was designated as lectotype by Eschmeyer (1998), and subsequently Ho and Shao (2011) regarded the above 5 specimens in the CAS-SU collection as paralectotypes [“paratypes” in Ho and Shao (2011)]. However, the inconsistency in number and locality of specimens between Ho and Shao (2011) and Oshima (1919) is presently unable to be resolved due to limited information.

The KU specimen was collected from Shishito, a locality not mentioned in Oshima’s (1919) description of *P. taiwanensis*. Therefore, the specimen has no apparent type status.

Family **Siluridae**

24. *Parasilurus asotus* Linnaeus, 1758

Fig. 2P

= valid as *Silurus asotus*

KU specimen: FAKU 211193, 1 specimen, 252.0 mm SL, Lake Candidius, Oct. 1916, T. Aoki.

Family **Plecoglossidae**

25. *Plecoglossus altivelis* (Temminck & Schlegel, 1846)

Fig. 4

KU specimens: FAKU 211194, 4 specimens, 86.0–121.4 mm SL, Tamsui River, Dec. 1918, T. Aoki.

Remarks: *Plecoglossus altivelis* is distributed in northeastern Asia, including the Japanese Archipelago, Taiwan, and the coasts of the Korean Peninsula, Mainland China (Liaoning, Hebei, Shandong, Zhejiang, Fujian, and Guangxi provinces), and northern Vietnam

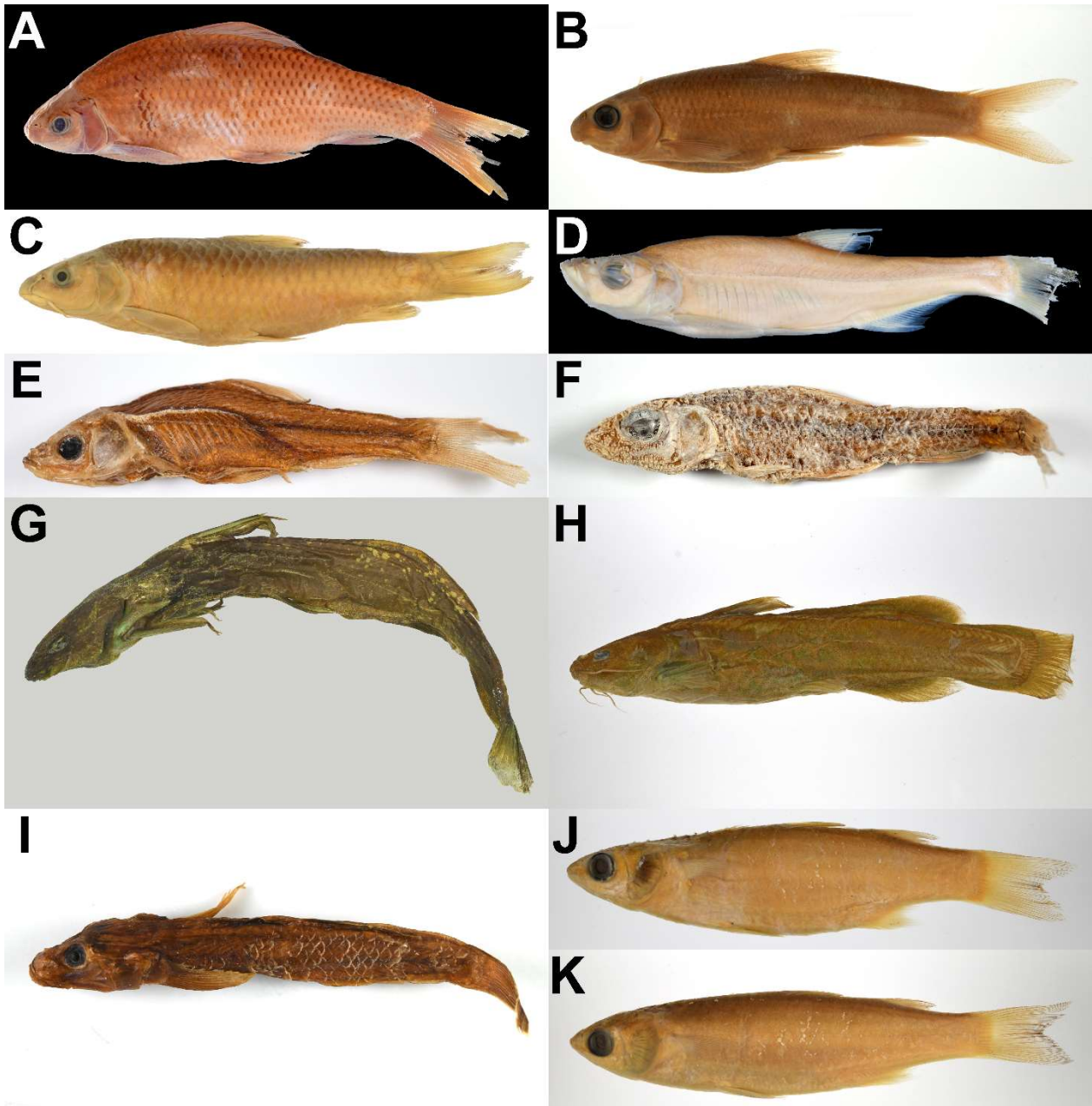


Fig. 3. Specimens from Masamitsu Oshima's Taiwanese fish collection at Kyoto University, representing nominal species described by Oshima (1919, 1922) (shown with original identification; see also **Table 1**). **A.** *Labeo jordani* Oshima, 1919, FAKU 211177; **B.** *Scaphesthes tamusuiensis* Oshima, 1919, FAKU 211179 (1 of 2 specimens); **C.** *Spinibarbus hollandi* Oshima, 1919, FAKU 211180; **D.** *Culter aokii* Oshima, 1919, FAKU 211182 (1 of 2); **E.** *Phoxiscus kikuchii* Oshima, 1919, FAKU 211185 (1 of 10); **F.** *Gnathopogon iijimae* Oshima, 1919, FAKU 211176 (1 of 2); **G.** *Pseudobagrus adiposalis* Oshima, 1919, FAKU 211191; **H.** *Pseudobagrus taiwanensis* Oshima, 1919, FAKU 211192; **I.** *Rhinogobius formosanus* Oshima, 1919, FAKU 211197; **J, K.** *Liza anpinensis* (Oshima, 1922), FAKU 211204 (**J**) and FAKU 212004 (**K**).



Fig. 4. *Plecoglossus altivelis* from Masamitsu Oshima's Taiwanese fish collection at Kyoto University, FAKU 211194, 1 of 4 specimens, 129.5 mm SL, Tamusui River, Dec. 1918.

(Shan *et al.*, 2005; Tran *et al.*, 2012). The native Taiwanese population subsequently became extinct, the present population being reintroduced from Japan in 1984 (Chen *et al.*, 2003; Yang *et al.*, 2017). Oshima (1919, 1920) reported that the original population of the species occurred in rivers of northern Taiwan, mainly in the Tamusui [淡水河] and Nankan [南崁溪] rivers in the



northeast, but also in the Sansan [三棧溪] and Takkiri (now Liwu River [立霧溪]) rivers in Hualien County, eastern Taiwan. The present four KU specimens were collected from the Tamusui River in 1918.

Three subspecies of *P. altivelis* are currently recognized (Nishida, 1988; Shan *et al.*, 2005; Yagishita and Kume, 2021): the nominate subspecies *P. a. altivelis*, distributed in the Osumi Islands and the main islands of Japan (Kyushu to Hokkaido) as well as the Korean Peninsula; the Ryukyu subspecies *P. a. ryukyensis*, from Okinawa and Amami-oshima islands in the Ryukyu Islands; and the Chinese subspecies *P. a. chinensis*, along the Chinese coast. However, the taxonomic validity of *P. a. chinensis* has been frequently questioned (see Tran *et al.*, 2012).

The taxonomic status of the native Taiwanese *P. altivelis* population remains unclear. In the original description of *P. a. chinensis*, Shan *et al.* (2005) relied solely on meristic characters of specimens collected in 1979, the native Chinese population being critically endangered and strictly protected, precluding access to fresh tissue samples for DNA analysis. For the same reason, no native Taiwanese *P. altivelis* specimens were examined by Shan *et al.* (2005), although they regarded the Taiwanese population as belonging to the Chinese subspecies.

Comparisons of meristic counts among the KU Taiwanese specimens and the three subspecies described by Nishida (1988) and Shan *et al.* (2005) are provided in Supplemental Material Table S2. A consideration of the diagnostic characters distinguishing *P. a. chinensis* from *P. a. altivelis* showed that the Taiwanese specimens possessed 12 or 13 comb-like teeth on the upper jaw [11–15 (mode 12) in *P. a. chinensis*, 12–16 (14) in *P. a. altivelis*] and 11 or 12 comb-like teeth on the lower jaw [10–14 (11) and 12–16 (14), respectively]. These values fall within the range reported for *P. a. chinensis* and partially overlap with those of *P. a. altivelis*. However, the largest KU specimen (121.4 mm SL) had 61 total vertebrae, resembling *P. a. altivelis* (60–63) rather than *P. a. chinensis* (54–58) (the vertebral number of the smaller KU specimen could not be determined from X-ray photographs due to the condition of the specimen).

Although the subspecific classification of native Taiwanese *P. altivelis* remains unresolved, the KU specimens represent valuable historical material for future taxonomic and conservation studies of the species in Taiwan.

Family Eleotridae

26. *Eleotris oxycephala* Temminck & Schlegel, 1845

Fig. 2Q

= reidentified as *Eleotris melanosoma* Bleeker, 1853

KU specimen: FAKU 211195, 1 specimen, ca. 91 mm SL, precise locality and date unknown (original label missing).

Family Gobiidae

27. *Rhinogobius candidianus* (Regan, 1908) Fig. 2R

KU specimens: FAKU 211196, 4 specimens, 29.4–41.8 mm SL, Lake Candidius, 15 Mar. 1920, M. Oshima.

28. *Rhinogobius formosanus* Oshima, 1919 Fig. 3I
= reidentified as *Rhinogobius* sp.

Type specimen: Holotype: FMNH 59135 (formerly CM 8273), Shinchiku, Dec. 1916, T. Aoki.

KU specimen: FAKU 211197, 1 specimen, ca. 43 mm SL, Nankan River, 4 Mar. 1919, M. Oshima.

Remarks: Oshima (1919) originally described *R. formosanus* from a single specimen (= holotype) and did not mention any additional material. The KU specimen has no type status. Precise identification of the present specimen was not possible due to its poor preservation.

29. *Rhinogobius giurinus* (Rutter, 1897) Fig. 2S

= synonym of *Rhinogobius similis* Gill, 1859

KU specimens: FAKU 211198, 3 specimens, 37.3–45.0 mm SL, Shimo-tamusui River [下淡水河 = 高屏溪], 20 Dec. 1916, T. Aoki.

Family Synbranchidae

30. *Fluta alba* (Zuiew, 1793) Fig. 2T

= valid as *Monopterus albus*

KU specimen: FAKU 211199, 1 specimen, 261.2 mm SL, Lake Candidius, 12 Mar. 1920, M. Oshima.

Family Osphronemidae

31. *Polyacanthus opercularis* (Linnaeus, 1758)

Fig. 2U

= valid as *Macropodus opercularis*

KU specimens: FAKU 211200, 2 specimens, 45.8–50.5 mm SL, Taihoku, Dec. 1917, M. Oshima.

Family Channidae

32. *Channa formosana* Jordan & Evermann, 1902

Fig. 2V

= synonym of *Channa asiatica* (Linnaeus, 1758)

KU specimens: FAKU 211202, 2 specimens, 129.2–144.0 mm SL, Lake Candidius, 10 Mar. 1920, M. Oshima.

33. *Opficephalus tadianus* Jordan & Evermann, 1902

Fig. 2W

= synonym of *Channa maculata* (Lacepède, 1801)

KU specimens: FAKU 211201, 2 specimens, 104.8–128.5 mm SL, Rihikutsu, Horisha, 3 Mar. 1920, M. Oshima.

Family Poeciliidae

34. *Gambusia affinis* (Baird & Girard, 1853)

Fig. 2X

KU specimens: FAKU 211203, 7 specimens, ca. 14–37 mm SL, Shori, date unknown, T. Aoki.

Family Mugilidae

35. *Liza anpinensis* (Oshima, 1922) Fig. 3J, K

= reidentified as *Planiliza* cf. *subviridis* type A sensu Yoshigou (2022) (FAKU 211204); *Planiliza* cf. *subviridis* type B sensu Yoshigou (2022) (FAKU 212003, FAKU 212004)

Type specimens: Holotype: FMNH 59143 (formerly CM 8281), Anpin [安平], M. Watanabe. Paratypes: 4 specimens, whereabouts unknown.

KU specimens: FAKU 211204, 94.5 mm SL, FAKU 212003, 142.8 mm SL, FAKU 212004, 108.5 mm SL, Toko, 23 Dec. 1920, M. Oshima.

Remarks: Oshima (1922) reviewed the mugilid fishes from Taiwan, describing four new species. In that paper, he consistently used the terms “Type” or “Type



specimen” for a single specimen (technically regarded as the holotype) used for the description of the new species, as well as providing the Carnegie Museum catalog number for such specimens.

The holotype of *Mugil anpinensis*, collected by M. Watanabe from Anpin (near Tainan [台南]), is now deposited at FMNH. In addition, Oshima (1922: 247) mentioned under “Habitat” that he examined 2 specimens from Anpin and 3 from the Kwaren River [Hualien; 花蓮] at Kada [賀田], Kwareno. The 2 specimens from Anpin most likely included the holotype, the other 4 specimens being regarded as paratypes (see Eschmeyer, 1998; Ho and Shao, 2011).

The collection locality (Toko) of the KU specimens was not mentioned in the original description of *M. anpinensis*, and no evidence exists to suggest their possible type status.

The 3 specimens of *L. anpinensis* in the KU collection include one (now registered as FAKU 211204; **Fig. 3J**) reidentified by Fukuchi *et al.* (2025) as *Planiliza cf. subviridis* type A sensu Yoshigou (2022), and two (FAKU 212003 and FAKU 212004; **Fig. 3K**), as *Planiliza cf. subviridis* type B sensu Yoshigou (2022).

36. *Liza troschelii* (Bleeker, 1858) **Fig. 2Y**
= reidentified as *Planiliza macrolepis* (Smith, 1846) (FAKU 211205); *Planiliza cf. subviridis* type A sensu Yoshigou (2022) (FAKU 212005)

KU specimens: FAKU 211205, 170.2 mm SL, FAKU 212005, 134.0 mm SL, Toko, 23 Dec. 1920, M. Oshima.

Remarks: The original KU lot of *L. troschelii* included 2 specimens, one specimen (now registered as FAKU 211205; **Fig. 2Y**) reidentified as *Planiliza macrolepis*, and the other (FAKU 212005), as *Planiliza cf. subviridis* type A sensu Yoshigou (2022) (I. Fukuchi pers. comm.).

37. *Mugil carinatus* Valenciennes, 1836 **Fig. 2Z**
= valid as *Planiliza carinata*

KU specimens: FAKU 211206, 3 specimens, 114.0–129.1 mm SL, Toko, 20 Apr. 1920, M. Oshima.

Remarks: Oshima (1922: 248) noted that his description of *M. japonicus* was based on a single specimen held in the Carnegie Museum, collected at Tainan Fish Market (near Toko) by himself on April 20, 1920. The KU specimens were probably collected by Oshima at the same time.

38. *Mugil japonicus* Temminck & Schlegel, 1845 **Fig. 2A'**

= synonym of *Mugil cephalus* Linnaeus, 1758

KU specimen: FAKU 211207, 1 specimen, 238.2 mm SL, Tainan, 16 Apr. 1920, M. Oshima.

Family Kuhlidae

39. *Kuhlia marginata* (Cuvier, 1829) **Fig. 2B'**

KU specimens: FAKU 211208, 2 specimens, ca. 122–128 mm SL, Shinchiku, 15 Dec. 1918, T. Aoki.

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