

Record of a flathead fish, *Rogadius pristiger* (Cuvier, 1829) (Platycephalidae) from Taiwan

Katsuya Kimura^{1*}, Megumi Takagishi¹, Toshio Kawai², Hisashi Imamura^{2,3}, Hsuan-Ching Ho⁴, Taketeru Tomita⁵, Fumiya Tanaka⁶ and Gento Shinohara^{7,8}

¹Laboratory of Marine Biology and Biodiversity (Systematic Ichthyology), Graduate School of Fisheries Sciences, Hokkaido University, 3-1-1 Minato-cho, Hakodate, Hokkaido 041-8611, Japan

²Fisheries Science Center, The Hokkaido University Museum, 3-1-1 Minato-cho, Hakodate, Hokkaido 041-8611, Japan

³Laboratory of Marine Biology and Biodiversity (Systematic Ichthyology), Faculty of Fisheries Sciences, Hokkaido University, 3-1-1 Minato-cho, Hakodate, Hokkaido 041-8611, Japan

⁴National Museum of Marine Biology and Aquarium, no. 2, Houwan, Checheng, Pingtung 944, Taiwan

⁵Okinawa Churashima Research Center, Okinawa Churashima Foundation, 888 Motobu, Okinawa 905-0206, Japan

⁶National Research Institute of Far Seas Fisheries, Japan Fisheries Resedrch and Education Agency, 5-7-1 Orido, Shimizu ward, Shizuoka 424-8633, Japan

⁷Department of Zoology, National Museum of Nature and Science, 4-1-1 Amakubo, Tsukuba, Ibaraki 305-0005, Japan

⁸The Hokkaido University Museum, Kita 10-jo, Nishi 8-chome, Kita-ku, Sapporo, Hokkaido 060-0810, Japan

*Corresponding author. E-mail: Katsuya.Kimura@me7.sings.jp

Abstract

In November 2013, a single specimen of the platycephalid *Rogadius pristiger* (Cuvier in Cuvier and Valenciennes, 1829) was collected from the Nanfang-ao Fishing Port, Yilan, Taiwan. Although *R. pristiger* has been widely reported from the Indo-West Pacific, it has not been known from Taiwan. The specimen represents the first record for *R. pristiger* from Taiwanese water. Morphological characters for this specimen are reported in detail.

Key words: distribution, range extension, Taiwanese waters, taxonomy, western North Pacific

Introduction

On 2 and 4 November, 2013, The Hokkaido University Museum (HoUM), National Museum of Nature and Science, Tsukuba (NSMT) of Japan, and National Museum of Marine Biology and Aquarium (NMMB) of Taiwan conducted a joint survey of ichthyofauna at the Nanfang-ao Fishing Port, Yilan, northeastern Taiwan (Fig. 1). Among the specimens we found a single

specimen of platycephalid *Rogadius pristiger* (Cuvier 1829). Shao and Chen (1987) reported 17 platycephalid species in 9 genera from Taiwan and recently Shen and Wu (2011) reported 20 species in 12 genera, but *R. pristiger* was not included in these works. Therefore, this species represents the first record from Taiwanese waters. This report provides a detailed description of this specimen.



Fig. 1. Map showing sampling locality.

Materials and methods

Methods for counts and measurements follow Hubbs and Lagler (1958), except for the counts of dorsal-fin spines and the lengths of the first dorsal-fin base that follow Imamura and Gomon (2010). Standard and head lengths are abbreviated as SL and HL, respectively. Vertebrae were counted on a radiograph. Body scales were examined in detail from Scanning Electron Microscope (SEM) images, and numbers of ctenii on ctenoid scales were counted on the same images. Institutional abbreviations follow Fricke and Eschmeyer (2017).

Results

Rogadius pristiger (Cuvier in Cuvier and Valenciennes, 1829)

Figs. 2–3

Material examined. 1 specimen: HUMZ 222085, 112 mm SL, Nanfang-ao Fishing Port, Yilan, Taiwan, 4 Nov. 2013.

Description. Counts and measurements are shown in Table 1. Body depressed. Body deepest at first dorsal-fin origin. Head strongly depressed. Snout long; mouth superior. Posterior end of upper jaw reaching beyond anterior margin of eye. Teeth on



Fig. 2. Dorsal (upper) and lateral (lower) views of *Rogadius pristiger*, HUMZ 222085, 112 mm SL, Nanfang-ao Fishing Port, Yilan, Taiwan.

upper and lower jaws granular; upper jaw tooth plate with a small notch anteromedially. Two separated tooth plates on vomer; teeth villiform anteriorly, small and conical posteriorly, becoming larger posteriorly. Palatine with two tooth rows. Nasal with one small spine. Anterior and posterior nostrils slightly tubular; former with one flap on its posteromedial margin. Upper iris lappet bilobed; lower iris lappet simple. Ocular flaps absent. Interorbital space narrow and concave. One preocular spine present, without small spines on its base. First infraorbital (= lachrymal) finely serrated ventrally. Supraorbital ridge finely serrated. Distinct postocular and preorbital spines absent. Dorsal surface of head with tubercles. Suborbital ridge finely serrated. Fleshy sensory tubes on cheek region well developed. Five spines on preopercle; uppermost spine with a supplemental spine on its base; lowermost spine antrorse and strong. Two spines on opercle posteriorly; ridge for lower spine without serration and tubercles. Cleithral spine short. Interopercular flap absent. Scales on body ctenoid dorsally, with ca. 24–33 ctenii posteriorly, cycloid ventrally. Small ctenoid scales on postorbital area and opercle. Lateral-line scales with two external openings. Two dorsal fins narrowly separated. First dorsal-fin spine short and isolated. Pectoral fin slightly concaved posteriorly. Posterior

tip of pelvic fin attaining third anal-fin ray. Caudal fin truncated.

Color in alcohol. Dorsal side of body and head brown, ventral side pale. First dorsal fin pale basally, with single black, broad marginal band. Second dorsal fin pale with many small dark spots. Anal fin white. Pectoral fin pale with many small dark spots. Pelvic fin dark, except for pale base and outer margin. Caudal fin with white basal band, broad dusky submarginal band and narrow white edge.

Distribution. Widespread in the Indo-West Pacific, including Mozambique, Madagascar, Red Sea, Gulf of Oman, Andaman Sea, Indonesia, Gulf of Thailand, Philippines, northwestern Australia, Papua New Guinea, New Caledonia, Tonga (Randall, 1995, 2005; Knapp, 1999; Imamura, 2009; Fricke et al., 2011) and Taiwan (this study).

Remarks. This specimen is identifiable as a species of the genus *Rogadius* Jordan and Richardson, 1908 in having 54 lateral-line scales, a bilobed upper iris lappet, no ocular and interopercular flaps, tubercles on the dorsal surface of the head, the suborbital ridge finely serrated, well developed fleshy sensory tubes on the cheek, and lateral-line scales with two external openings (Imamura, 1996). Of the 12 valid species of *Rogadius*, the present specimen agrees well with *R. pristiger*, *Rogadius asper* (Cuvier in Cuvier and Valenciennes, 1829) known

Table 1. Counts and proportional measurements of examined specimens of *Rogadius pristiger*.

	Present specimen HUMZ 222085	Syntypes n = 5	Non-types n = 8
SL (mm)	112	94.5 – 119	63.8 – 130
Counts:			
First dorsal-fin rays	I + VIII	I + VIII	I + VII – VIII (VIII)
Second dorsal-fin rays	11	11	11
Anal-fin rays	11	11	11
Pectoral-fin rays*	2 + 13 + 8 = 23	2 + 9 – 12 + 8 – 9 = 20–23	2 + 9 – 12 + 8 – 9 = 20–23(12)
Branched caudal-fin rays	6 + 5 = 11	6 + 5 – 6 = 11–12 (12)	6 + 5 – 6 = 11–12 (12)
Lateral-line scales (LLS)	54	52–53	51–54
Anterior LLS with a spine	10	6–9	4–10
Oblique scale rows**	57	58–64	53–61
Gill rakers	1 + 6 = 7	1 + 6 – 7 = 7–8	1 + 6 – 7 = 7–8 (8)
Vertebrae	27	–	–
Proportional measurements (% SL):			
Head length	39.9	37.8 – 38.8	37.1 – 40.3
Predorsal length	37.7	36.9 – 38.3	36.3 – 38.7
Length of first dorsal-fin base	20.1	22.0 – 23.0	20.3 – 24.0
Length of second dorsal-fin base	25.5	24.6 – 26.0	24.4 – 28.3
Length of anal-fin base	28.8	25.3 – 26.3	25.3 – 27.9
Length of caudal peduncle	11.0	10.2 – 11.3	9.7 – 11.2
Depth of caudal peduncle	6.8	4.9 – 5.7	5.2 – 5.9
Length of first dorsal-fin spine	4.9	5.6 – 6.3 ***	5.1 – 7.5
Length of second dorsal-fin spine	16.4	13.6 – 15.0 ****	14.0 – 15.0
Pectoral-fin length	20.8	18.1 – 20.2 ****	17.9 – 20.6
Pelvic-fin length	28.0	26.6 – 29.5 ****	22.1 – 29.3
Caudal-fin length	22.8	19.6 – 21.9 ***	19.7 – 22.4
Proportional measurements (% HL):			
Snout length	29.6	28.6 – 29.7	27.1 – 30.7
Orbital diameter	26.7	28.0 – 30.3	26.1 – 30.5
Upper-jaw length	42.4	37.5 – 39.0	36.8 – 39.7
Lower-jaw length	55.5	57.2 – 59.5	55.3 – 57.1
Interorbital width	5.0	3.4 – 5.1	4.0 – 5.8

Mode values indicated in parentheses.

* Upper unbranched + middle branched + lower unbranched rays.

** Slanting downward and forward above lateral line.

*** Based on 3 syntypes.

**** Based on 4 syntypes.

from the western Pacific and *Rogadius fehmanni* Knapp, 2012 known from Somalia, in having a single strong antrorse preopercular spine (vs. absent or weak in the others) (e.g., Imamura, 1996, 2007, 2009; Knapp, 1999, 2012; Imamura et al., 2006). It was identified as *R. pristiger* by its possession of the following three diagnostic characters for this species: 57 oblique scale rows slanting downward and forward above the lateral line (51–61 in *R. pristiger* vs. 66–76 in *R. asper*), first dorsal fin with a single black, broad marginal band (vs. with 3–5 irregular blackish bands or randomly arranged blackish spots in *R. asper*, and with a submarginal dark band and a series of small dark spots on spines in *R. fehmanni*), and caudal fin with a white basal band, a broad dusky submarginal band and a narrow white edge (vs. with 3–5 irregular blackish bands or a basal blackish band and randomly arranged blackish spots posteriorly in *R. asper*, and with a broad basal dark blotch followed by a pale area and 3 or 4 narrow vertical dark bands posteriorly) (see also Imamura et al., 2006; Knapp, 2012). In addition, the present specimen has no remarkable differences in counts and proportional measurements with syntypes and non-types of *R. pristiger* (Table 1).

We compared ctenoid scales between our 112 mm SL specimen of *R. pristiger* with a 118 mm SL specimen of *R.*

asper (Fig. 3), and found a difference in the number of ctenii (ca. 24–33 in *R. pristiger* vs. ca. 21–23 in *R. asper*). Hughes (1981) stated that “the number of cteni increases with the age of the fish” in the Platycephalidae and “the number of cteni is of limited taxonomic value and must be correlated to scale and specimen size.” The validity of the number of ctenii separating the two species should be evaluated as a taxonomic character in the future.

In the Pacific Ocean, this species has been reported from Indonesia, Gulf of Thailand, the Philippines, Papua New Guinea, New Caledonia and Tonga (Randall, 1995, 2005; Knapp, 1999; Imamura, 2009; Fricke et al., 2011).

Comparative material. *Rogadius asper* (1 specimen): NSMT-P 119548, 118 mm SL, Mimase, Kochi, Japan. *Rogadius pristiger* (13 specimens): CAS 52338, 63.8 mm SL, MNHN 4529, 101 mm SL, Selebes; CAS 52343, 74.8 mm SL, Luzon Island; CSIRO CA1860, 130 mm SL, H3306-12, 94.6 mm SL, H3316-01, 125 mm SL, H3361-06, 120 mm SL, Australia; MNHN 4165, syntype, 106 mm SL, 6855, syntype, 119 mm SL, HUMZ 131413, 123 mm SL, Papua New Guinea; MNHN 6849, syntype, 94.5 mm SL, 6856, syntype, 108 mm SL, Sulawesi; MNHN 6850, syntype, 116 mm SL, New Caledonia.

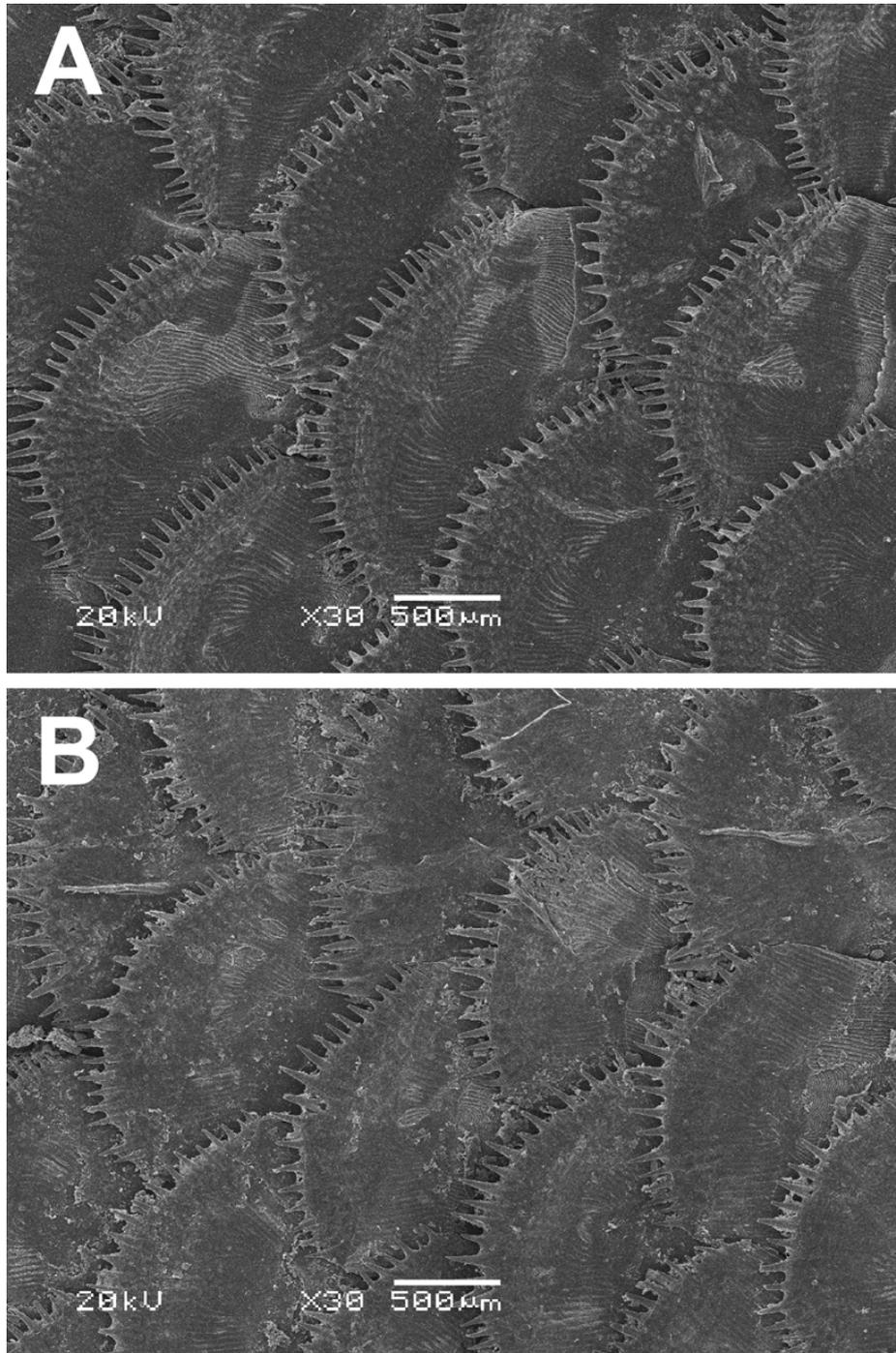


Fig. 3. SEM images of scales on right lateral side of body. A, *Rogadius pristiger*, HUMZ 222085, 112 mm SL, Taiwan; B, *R. asper*, NSMT-P 119548, 118 mm SL, Japan.

Acknowledgments

We are especially grateful to Mamoru Yabe (Faculty of Fisheries Sciences, Hokkaido University / HoUM) for his valuable advice. We also express our sincere thanks to Martin F. Gomon (Museums Victoria) for his English corrections and critical comments. This study is partially conducted under the MoU between HoUM and NMMB signed on 29 July 2014. This study was partly supported by JSPS (Japan Society for the Promotion of Science) KAKENHI Grant Number JP 24120001 in Scientific Research on Innovative Areas “Innovative Materials Engineering Based on Biological Diversity” to the last author (GS) and JSPS KAKENH Grant Number 16K07472 and JSPS Core-to-Core Program—Research and education network on Southeast Asian coastal ecosystems to the fourth author (HI).

References

- Fricke, R. & W.N. Eschmeyer. 2017. A guide to fish collections in the Catalogue of Fishes. Online version, updated 03 January 2017.
<http://researcharchive.calacademy.org/research/ichthyology/catalog/collections.asp>, (2017-1-18)
- Fricke, R., M. Kulbicki & L. Wantiez. 2011. Checklist of the fishes of New Caledonia, and their distribution in the Southwest Pacific Ocean (Pisces). Stuttgarter Beiträge zur Naturkunde A, Neue Serie, 4: 341-463.
- Hubbs, C.L. & K.F. Lagler. 1958. Fishes of the Great Lakes region. Bulletin of Cranbrook Institution of Science, 26: xi + 213 + 44.
- Hughes, D.R. 1981. Development and organization of the posterior field of ctenoid scales in the Platycephalidae. Copeia, 1981: 596-606.
- Imamura, H. 1996. Phylogeny of the family Platycephalidae and related taxa (Pisces: Scorpaeniformes). Species Diversity, 1: 123-233.
- Imamura, H. 2007. *Rogadius mcgrouteri*, a new species of flathead (Teleostei: Platycephalidae) collected from eastern Australia and New Caledonia. Ichthyological Research, 54: 303-307.
- Imamura, H. 2009. Platycephalidae. pp. 74-77. In: Kimura, S., U. Satapoomin and K. Matsuura (eds). Fishes of Andaman Sea, west coast of southern Thailand. National Museum of Nature and Science, Tokyo.
- Imamura, H. & M.F. Gomon. 2010. Taxonomic revision of the genus *Ratabulus* (Teleostei: Platycephalidae), with descriptions of two new species from Australia. Memoirs of the Museum of Victoria, 67: 19-33.
- Imamura, H., M. Komada & T. Yoshino. 2006. Record of the flathead fishes (Perciformes: Platycephalidae) collected from Nha Trang, Vietnam. Coastal Marine Science, 30: 293-300.
- Knapp, L.W. 1999. Platycephalidae. pp. 2385-2421. In: Carpenter, K.E. & V.E. Niem (eds). FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Volume 4. Bony fishes part 2 (Mugilidae to Carangidae). FAO, Rome.
- Knapp, L.W. 2012. *Rogadius fehlmanni*, a new flathead fish (Scorpaeniformes: Platycephalidae) from Somalia. Proceedings of Biological Society of Washington, 125: 61-65.
- Randall, J.E. 1995. Coastal fishes of Oman. Crawford House Publishing Pty Ltd, Bathurst. xvi + 439 pp.
- Randall, J.E. 2005. Reef and shore fishes of the South Pacific. New Caledonia to Tahiti and the Pitcairn Islands. University of Hawai'i Press., Honolulu. xii + 707 pp.

Shao, K.-T. and J.-P. Chen. 1987. Fishes of the family Platycephalidae (Teleostei: Platycephaloidei) of Taiwan with descriptions of two new species of Bulletin of the Institute of Zoology, Academia Sinica, 26: 77-94.

Shen, S. C. and K. Y. Wu (eds). 2011. Fishes of Taiwan. National Museum of Marine Biology and Aquarium, Pintong. 896 pp.