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Southward range extension of the Marukawa's sculpin, *Marukawichthys ambulator* (Actinopterygii, Perciformes, Rhamphocottidae), from Taiwan

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Abstract

The fish family Rhamphocottidae is a small group of fishes that primarily inhabits cold temperate waters of the North Pacific Ocean. With 3 genera and 5 species recognized as valid, only one species, *Ereunias grallator* Jordan et Snyder, 1901, has been reported from southern Taiwan. Here, we report three specimens of *Marukawichthys ambulator* Sakamoto, 1931 collected off northeastern Taiwan. Detailed description of the specimens is provided and compared to other specimens collected from Japan, with variations noted. It is suggested that *M. ambulator* has a rather wide range of distribution in the western North Pacific.

Keywords

Biodiversity, deep-sea fish, ichthyology, new record, taxonomy

Introduction

The fish family Rhamphocottidae is a small group of fishes, with 3 genera and 5 species currently recognized as valid (Yabe 1983; Nakabo and Kai 2013; Smith and Busby 2014; Munehara et al. 2023). Among the three genera, the genus *Marukawichthys* Sakamoto, 1931 is characterized by having: pelvic-fin rays I, 4; spiny scales on body forming 6 rows; preopercular spines 5; and a single spine on posterodorsal face of cleithrum (Yabe 1983; Nakabo and Kai 2013). *Marukawichthys* comprises two species: *Marukawichthys ambulator* Sakamoto, 1931 from Japanese waters and *Marukawichthys pacificus* Yabe, 1983 from the Emperor Seamount Chain, central North Pacific (Yabe 1983; Smith and Busby 2014).

The majority of rhamphocottid species inhabit cold temperate waters in the North Pacific Ocean (Nakabo and Kai 2013; Nelson et al. 2016; Munehara et al. 2023), with only one species, *Ereunias grallator* Jordan et Snyder, 1901, recorded from southern Taiwan based on a single specimen (Shao et al. 2008).

A recent visit to the Biodiversity Research Museum, Academia Sinica revealed three specimens of *M. ambulator* collected from off northeastern Taiwan, which represent the southernmost records of the species. A detailed description of the specimens is provided, with a comparison of data of Japanese specimens.

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Materials and methods

Terminology and methodology of taking counts and measurements follow Hubbs and Lagler (1958), with slight modifications following Yabe (1983). Counts of paired fins and scale rows are presented as left/right whenever available. Suborbital depth was measured at the least depth between lower margin of orbit and ventral margin of the lachrymal bone (i.e., the pit where the maxilla fits). Measurements were made using digital calipers, rounded to the nearest 0.1 mm, and expressed as % and/or ratios of standard length (SL) or head length (HL), unless otherwise indicated. Specimens examined in this study are deposited in the Biodiversity Research Museum, Academia Sinica, Taipei, Taiwan (ASIZP). The distribution map was generated from the software Ocean Data View (Schlitzer 2026).

Results

Family Rhamphocottidae

New Chinese name: 喙吻杜父魚科

Genus *Marukawichthys* Sakamoto, 1931

New Chinese name: 丸川杜父魚屬

Marukawichthys ambulator Sakamoto, 1931

English name: Marukawa's sculpin

New Chinese name: 遊走丸川杜父魚

Fig. 1. Tables 1, 2

Marukawichthys ambulator Sakamoto, 1931.—Sakamoto (1931): 54, fig. 1 (Type locality: off Humi-gun, Toyama Bay, Japan, depth 70–300 m; holotype presumably lost).—Yabe (1983) (comparative material, compared to the new species described).—Yabe (1984) in Masuda et al.: 308, pl. 290-B (description, Japan).—Shinohara et al. (1996): 175 (listed, Japan).—Shinohara et al. (2001): 319 (listed, Japan).—Furuhashi et al. (2010): 19, fig. 5 (off southern Nagasaki Prefecture, Japan).—Shinohara et al. (2011): 43 (listed, Japan).—Nakabo and Kai (2013): 1157 (in key, Japan).—Shinohara et al. (2014): 248 (listed, Japan).—Motomura et al. (2016): 19 (Uji Islands, Japan, East China Sea).—Wada et al. (2019): 151 (southwestern Satsuma Peninsula, Japan).—Honda et al. (2024): 156 (Sagami Bay, Japan).—Koreeda and Motomura (2025): 41 (Koshiki Islands, Kagoshima Prefecture, Japan).—Hatanaka et al. (2025): 25 (listed, Uji Islands, Japan, East China Sea).

Specimens examined. ASIZP 64602, 2 specimens, 113.0–124.4 mm SL, ASIZP 64582, 1 specimen, 120.4 mm SL, off Nan-fang-ao fishing port (ca. 24°34′55″N 121°52′01″E), Yilan, northeastern Taiwan, 7 Jul. 2004, coll. H.-C. Ho.

Description. Meristic and morphometric characters are provided in Tables 1–2. Dorsal-fin rays IX–X, 13–14, anterior 3–4 soft rays unbranched, others branched; pectoral-fin rays 15/15, with lower 4 rays free, and uppermost and lower 4 rays unbranched, others branched; pelvic-fin rays I, 4/I, 4; anal-fin rays 11–12, with anterior 8 rays unbranched, others branched; principal caudal-fin rays 6 + 6. Gill rakers on outer face of first gill arch 1 + 1 + 10–11 = 12–13, all short; pseudobranchial filaments 13–15. Scales in dorsal row 33–36/33–35; scales in supralateral row 28–29/26–28; scales in lateral line 30–33/29–32; scales in infralateral row 13–14/14–15; scales in supraventral row 27–31/27–28; scales in ventral row 13–14/11–13. Branchiostegal rays 6. Body slightly compressed and elongated, depth between dorsal- and pelvic-fin origins 4.8–5.1 in SL. Head moderate, length 2.7–2.8 in SL. Eye large, width 2.6–2.7 in HL. Snout blunt, slightly rounded and distinctly protruding before premaxilla, length 2.8–3.1 in HL. Interorbital space extremely narrow, width 14.7 in HL. Postorbital length 2.8–2.9 in HL. Mouth moderate, upper-jaw length 2.8–2.9 in HL; posterior end of maxilla straight, its end reaching slightly posterior to vertical through anterior margin of eye. Lower-jaw length 2.4–2.5 in HL; its anterior tip slightly posterior to tip of upper jaw. Two nostrils, with anterior one forming short tube and posterior one forming pore; anterior nostril situated slightly posteroventral to nasal spine and posterior one anterior to eye. Premaxilla and dentary with small, needle-like villiform teeth. Prevomerine and palatine teeth present and similar to those on both jaws. Prevomerine tooth patch oval. Spines present on nasal, frontal, parietal, lachrymal, preopercle, and cleithrum. Nasal spine single and single tipped. Frontal with six spines along upper margin of eye; all spines slightly recurved and directed posterodorsally; spines with single tip, rarely double tipped. Parietal spine single, similar to frontal spine and double tipped. Lachrymal with two spines, both directed anteriorly. Preopercle with five spines: uppermost two spines directed posterodorsally and lowermost three spines directed ventrally or posteroventrally; second (counted from above) spine longest. Cleithrum with single spine, single tipped and directed posterodorsally. Gill rakers mostly short, some forming bumps on both inner and outer rows of three arches, and outer row of fourth arch; rakers on first arch near middle rather developed, larger and longer than rest. No slit behind fourth arch. Gill membranes broadly connected to each other and connected to anterior tip of isthmus; anteriormost extent of gill opening at vertical through middle of eye. Small, prickle-like scales present on body, dorsal portion of eye, and head, including operculum, snout, both jaws, and gular region. Six rows of enlarged scales on lateral side of body; each scale with distinct and recurved central spine. Two dorsal fins; length of first and second dorsal-fin base 4.7–5.3 and 3.4–3.6 in SL, respectively; its origin slightly posterior to upper end of gill opening; outer margin of spinous dorsal fin rounded, with third spine longest. Upper pectoral-fin origin slightly above horizontal through ventral margin of eye; its length 1.6–1.7 in HL, its tip pointed and reaching beyond vertical through anal-fin origin; lower 4 rays free, with uppermost free ray longest, length 1.1–1.3 in HL and becoming progressively shorter ventrally. Pelvic-fin origin anterior to that of pectoral fin, below preopercle; its length long, 3.1–3.2 in HL;

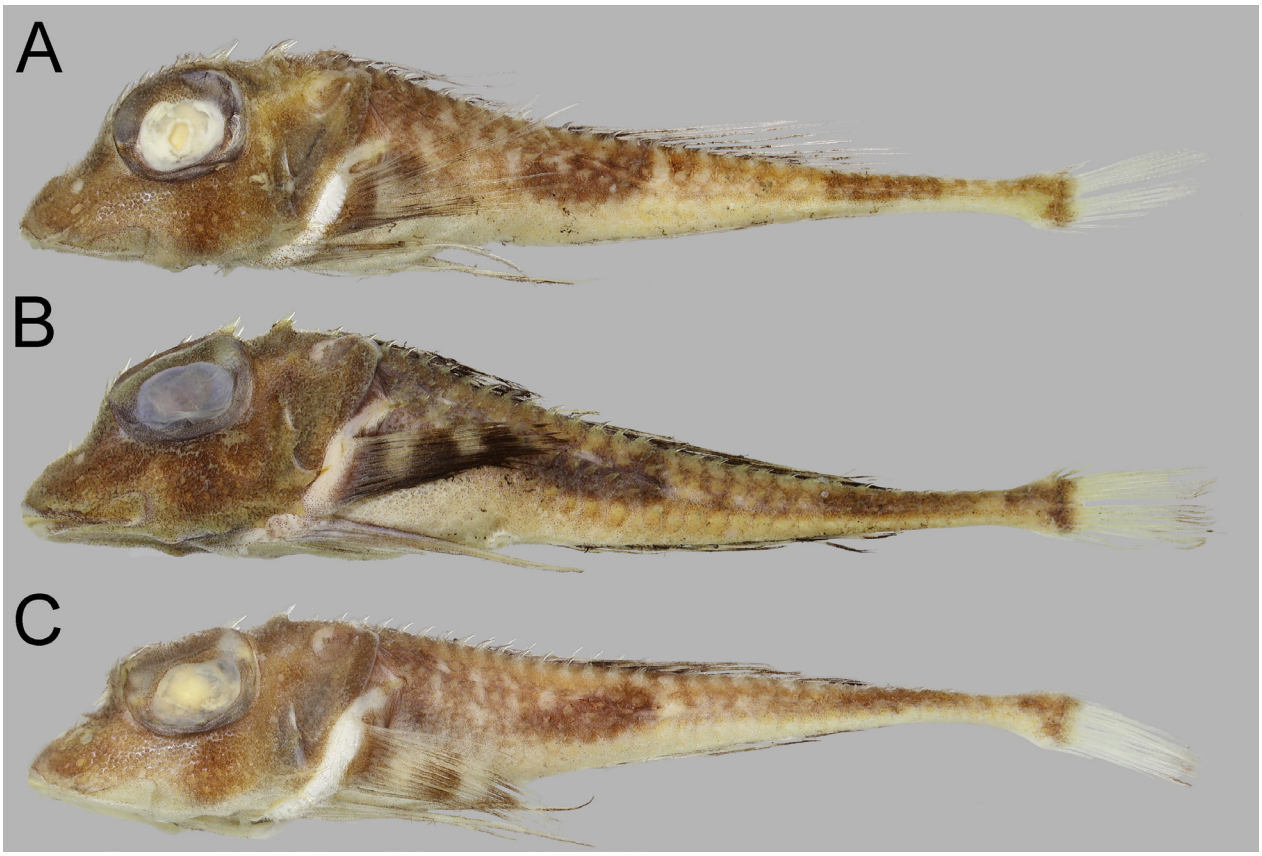

Figure 1. Preserved specimens of *Marukawichthys ambulator*. (**A**) ASIZP 64602, 1 of 2 specimens, 113.0 mm SL; (**B**) ASIZP 64582, 120.4 mm SL; (**C**) ASIZP 64602, 1 of 2 specimens, 124.4 mm SL. Photo by Y.-C. Hsu.

Table 1. Meristic data of *Marukawichthys ambulator*. Paired characters are presented as left/right whenever available. Data of Japanese specimens were retrieved from Yabe (1983) and Wada et al. (2019).

Character	This study			Yabe 1983	Wada et al. 2019
	ASIZP 64582	ASIZP 64602		*n* = 26	*n* = 3
Dorsal-fin rays	IX, 14	X, 14	X, 13	IX–XI, 13–15	X–XI, 12–13
Pectoral-fin rays	15/15	15/15	15/15	—	15/15
Pelvic-fin rays	I, 4/I, 4	I, 4/I, 4	I, 4/I, 4	—	—
Anal-fin rays	12	12	11	11–14	11–12
Gill rakers	1 + 1 + 11 = 13	1 + 1 + 11 = 13	1 + 1 + 10 = 12	10–12	11–12
Pseudobranchial filaments	15	13	13	—	—
Scale rows					
Dorsal row	35/34	33/33	36/35	—	34–36
Supralateral row	28/28	28/26	29/28	—	31–34
Lateral-line scales	31/29	30/32	33/32	—	32–34
Infralateral row	13/15	13/14	14/14	—	17
Supraventral row	31/28	27/27	27/27	—	29–30
Ventral row	13/11	13/13	14/11	—	12–13

its tip not reaching anus when adpressed. Anal-fin origin at vertical through origin of second dorsal fin; length of base 3.7–4.4 in SL. Caudal fin slightly truncated (tips damaged in all specimens). Caudal peduncle long and thin, its length and depth 1.4–1.5 and 10.7–11.2 in HL, respectively. Anus anterior to anal-fin origin, anterior to vertical through second dorsal-fin origin.

Coloration. When preserved, body and head slightly brownish with ventral side of body and tip of lower jaw paler; lateral side of body with four dark blotches. Dorsal fin black, with pale bands on spinous dorsal fin. Pectoral fin pale, with four dark vertical bands; lower free pectoral-fin rays dusky. Pelvic fin pale, scattered with melanophores. Anal fin dusky, with outer margin rather black. Caudal fin pale. Oral cavity, including underside of tongue, gill arches and rakers pale. Inner side of operculum and gill membrane with dense dark melanophores.

Table 2. Morphometric data of *Marukawichthys ambulator*. Data of Japanese specimens were retrieved from Yabe (1983) and Wada et al. (2019).

Character	This study			Yabe 1983	Wada et al. 2019
	ASIZP 64602-1	ASIZP 64582	ASIZP 64602-2	*n* = 26	*n* = 3
Absolute values [mm]					
Standard length (SL)	113.0	120.4	124.4	82.2–181.8	115.4–128.6
Head length (HL)	41.7	44.4	43.7	—	—
Relative values [%SL]					
HL	36.9	36.9	35.1	32.3–37.0	35.5–36.6
Head depth	19.3	20.3	18.9	—	—
Head width	14.1	15.7	15.9	—	—
Orbit diameter	13.4	13.8	13.4	—	—
Snout length	12.8	13.3	11.2	—	—
Interorbital width	2.5	2.5	N/A	—	—
Suborbital depth	4.6	5.2	4.4	—	—
Postorbital length	12.6	13.2	12.1	—	—
Upper-jaw length	13.1	12.7	12.1	—	—
Maxillary depth	4.1	3.7	3.7	—	—
Lower-jaw length	15.5	14.7	14.5	—	—
Body depth	19.4	21.0	19.7	17.5–21.7	20.4–21.8
Predorsal length	32.5	33.8	31.6	27.0–33.3	31.9–32.9
Prepectoral length	32.6	33.1	31.1	—	—
Prepelvic length	24.6	25.5	22.9	—	—
Preanal length	52.4	51.2	51.6	50.0–52.6	50.4–52.5
Pelvic-fin–Anal-fin length	28.2	27.3	31.3	—	—
1st dorsal-fin base	19.8	21.1	19.0	19.6–24.4	22.2–23.2
2nd dorsal-fin base	27.5	28.3	29.1	25.6–32.3	29.4–32.2
1st dorsal-fin spine	N/A	13.4	11.5	—	—
2nd dorsal-fin spine	17.7	15.5	13.1	—	—
Longest dorsal-fin spine	N/A	14.8	14.6	—	—
Last dorsal-fin spine	3.0	5.1	2.4	—	—
Dorsal-fin height	22.5	25.8	N/A	—	—
Anal-fin base	22.9	26.9	25.1	21.3–27.8	26.6–27.2
Anal-fin height	16.6	18.1	13.4	—	—
Pectoral-fin length	22.3	22.0	21.7	—	—
Longest free pectoral-fin ray	32.1[R]	28.3	29.6	—	—
Shortest free pectoral-fin ray	17.5	15.0	15.9	—	—
Pelvic-fin length	11.9	11.4	N/A	—	—
Caudal-peduncle length	24.0	26.6	25.6	22.2–28.6	23.5–26.8
Caudal-peduncle depth	3.3	3.4	3.2	—	—
Relative values [%HL]					
Head depth	52.4	55.1	53.8	52.6–58.8	55.0–56.2
Head width	38.2	42.5	45.2	47.6–62.5	49.7–57.3
Snout length	34.7	36.1	31.8	34.5–40.0	34.7–37.4
Orbit diameter	36.4	37.3	38.1	31.3–38.5	34.2–37.9
Interorbital width	6.8	6.8	N/A	6.3–11.1	6.3–9.4
Postorbital length	34.1	35.7	34.3	34.5–37.0	35.0–36.8
Upper-jaw length	35.6	34.5	34.4	33.3–37.0	34.8–36.4
Maxillary depth	11.1	9.9	10.6	—	7.4–7.9
Suborbital depth	12.5	14.0	12.5	—	12.9–14.3
Caudal-peduncle depth	8.9	9.3	9.0	7.9–10.6	8.0–9.1
Pelvic-fin length	32.2	30.9	N/A	23.8–32.3	25.4–27.3

[R] indicates data taken from right side.

Distribution. Previously known from Japanese waters, with the southernmost record from off southwestern Satsuma Peninsula, Kagoshima Prefecture (31°10′42.0″N, 129°52′46.0″E; Wada et al. 2019; Fig. 2). Our specimens, collected from Taiwan, represent the southernmost record and extend ca. 1080 km southward from Japan to Taiwan.

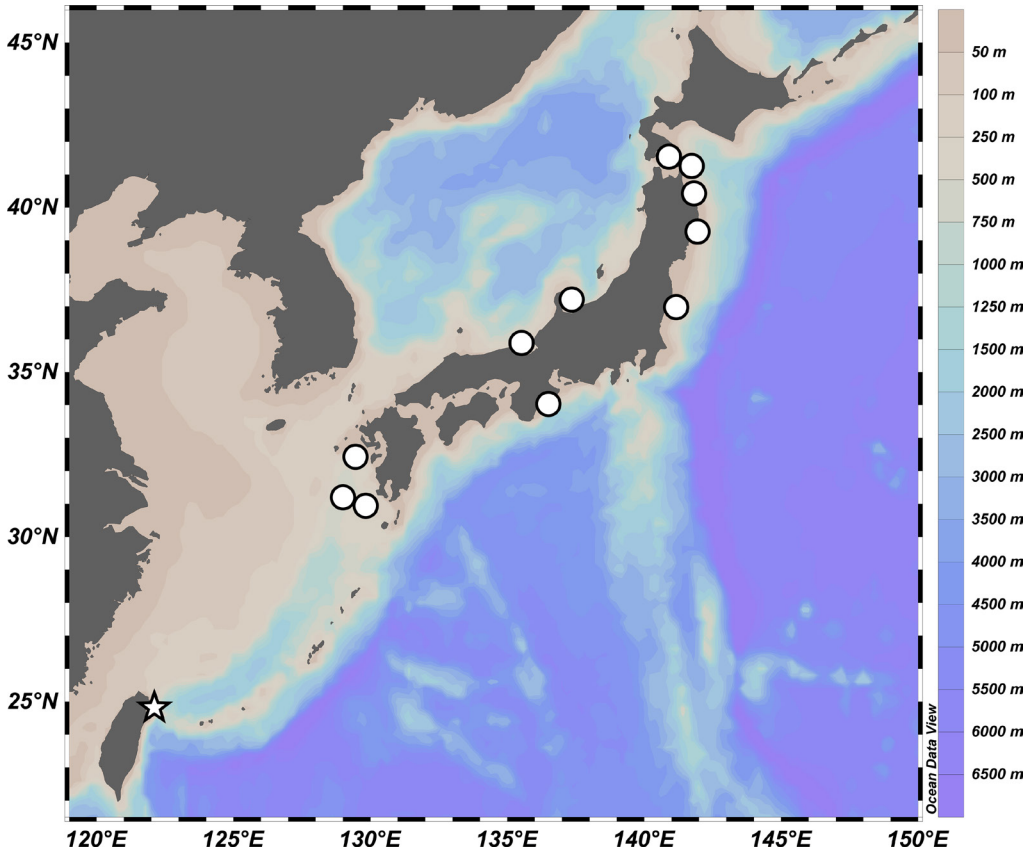

Figure 2. Distribution map of *Marukawichthys ambulator*. Star = presently-reported study; circle = previous studies. One point may represent more than one specimen. Only records with precise localities are included.

Discussion

The presently reported specimens are identified as *Marukawichthys ambulator* based on having gular region covered with small prickle-like scales, total gill rakers 12–13, interorbital 14.7 in HL, upper-jaw length 2.8–2.9 in HL, and body light brown (Yabe 1983). Compared to data of other specimens, our specimens generally agree with those collected from Japan, with the exception that our specimens possess slightly more total gill rakers (12–13 vs. 10–12; Table 1), fewer scales in supralateral row (26–29 vs. 31–34), fewer scales in infralateral row (13–15 vs. 17), narrower head (38.2%–45.2% HL vs. 47.6%–62.5% HL; Table 2), and deeper maxillary depth (9.9%–11.1% HL vs. 7.4%–7.9% HL). These differences are likely attributed to different geographic populations. Nevertheless, another possible explanation for the differences in the scale counts is the presence of smaller scales in both anterior and posterior portions of each row, making them somewhat difficult to distinguish from body scales.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

Artificial Intelligence (AI) use

The authors accept full responsibility for the content of the manuscript, including the disclosure of any use of AI.
No AI tools were used in the preparation of this manuscript.

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Author contributions

Conceptualization: YS. Data curation: YS. Formal analysis: YS. Funding acquisition: YCL, HCH. Investigation: HCH, YS. Writing - original draft: YS. Writing - review and editing: YCL, HCH.

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Data availability

All of the data that support the findings of this study are available in the main text.