

A northward range extension of *Thysanophrys papillaris* (Actinopterygii: Scorpaeniformes: Platycephalidae) to Taiwan

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Abstract

The smallknob flathead, *Thysanophrys papillaris* Imamura et Knapp, 1999, is redescribed based on six specimens collected from southern Taiwan, which constitutes a northward range extension of the species [previously recorded from the Andaman, Timor, and Arafura seas (eastern Indian Ocean), and Nha Trang, Vietnam (western Pacific Ocean)]. *Thysanophrys papillaris* is distinguished from all congeneric species in having a combination of 11 second dorsal-fin rays, 12 anal-fin rays, 58–75 scale rows below the lateral line (slanting downward and forward), a longer snout (snout length / orbital diameter ratio 1.1–1.3), 1 or 2 small papillae on the eye, the upper iris lappet with short branches, a single preorbital spine and 3–5 suborbital spines. Previously suggested intraspecific variation in the number of eye papillae is confirmed.

Keywords

intraspecific variation, northernmost record, smallknob flathead

Introduction

The smallknob flathead, *Thysanophrys papillaris* Imamura et Knapp, 1999, was originally described, based on six specimens collected from the Andaman, Timor, and Arafura seas, (eastern Indian Ocean) (Imamura and Knapp 1999), and listed as an Australian and Northern Territory, Australia species, respectively, by Hoese et al. (2006) and Larson et al. (2013). Imamura et al. (2019) later reported a single specimen from Nha Trang, Vietnam (western Pacific

Ocean). Recently, the first author (HI) had an opportunity to examine platycephalids collected from southern Taiwan and identified six specimens as *T. papillaris*, such having been previously reported as *Sunagocia arenicola* (Schultz, 1966) by Ho and Chong (2020). The presently reported specimens, which are described herein, represent the first record of the species from Taiwan and the northernmost distributional record of the species. In addition, intraspecific variation in the number of eye papillae, previously suggested by Imamura et al. (2019), is confirmed.

Materials and methods

Methods for counts and measurements generally followed Imamura (2008), being routinely taken from the left side, although gill rakers, defined as depressible bony elements and not including tooth plates, were counted on the right side. Terminology of head spines follows Knapp et al. (2000). Pectoral fin rays are expressed as “upper unbranched rays + middle branched rays + lower unbranched rays = total rays”. All measurements were made to the nearest 0.1 mm with calipers. Standard and head lengths are abbreviated as SL and HL, respectively. Institutional acronyms follow Fricke and Eschmeyer (2022), showing AMS (Australian Museum, Sydney), BMNH (Natural History Museum, London), CSIRO (Commonwealth Scientific and Industrial Research Organisation, Hobart), HUMZ (Hokkaido University Museum, Hakodate), NMMP-P (National Museum of Marine Biology & Aquarium, Pingtung), NMV (Museum Victoria, Melbourne), NSMT (National Museum of Nature and Science, Tsukuba), NTM (Museum and Art Gallery of Northern Territory, Darwin), QM (Queensland Museum, Brisbane), USNM (Smithsonian Institution National Museum of Natural History, Washington D.C.) and WAM (Western Australian Museum, Perth). A tissue sample of NMMP-P28534 is preserved in NMMPA with accession tissue number 4164.

Results

Family Platycephalidae Swainson, 1839

Genus *Thysanophrys* Ogilby, 1898

Thysanophrys papillaris Imamura et Knapp, 1999

English common name: smallknob flathead

New Chinese common name: 皮瓣多棘牛尾魚

Fig. 1; Tables 1 and 2

Sunagocia arenicola (not Schultz, 1966): Ho and Chong 2020: 589, unnumbered fig. (description, Ke-tzu-liao, Kaohsiung, southern Taiwan) (in part).

Thysanophrys papillaris Imamura et Knapp, 1999: 180, figs. 1–4, 5A (original description, type locality: southwest of Flat Top Bank, Timor Sea, Western Australia; Hoese et al. (2006: 947) (list, northern Australia); Larson et al. (2013: 93) (list, northern Australia); Imamura et al. (2019: 17, figs. 1, 2) (description, Nha Trang, Vietnam, western Pacific Ocean).

Material examined. Six specimens: NMMP-P26824 (5 specimens, 99.3–148.2 mm SL), off Dong-gang, Pingtung, southern Taiwan (ca. 22°28'N, 120°20'E), 11 March 2017, bottom trawl; NMMP-P28534 (137.3 mm SL), off Ke-tzu-liao, Kaohsiung, southern Taiwan (ca. 22°43'N, 120°15'E), 18 February 2018, bottom trawl.

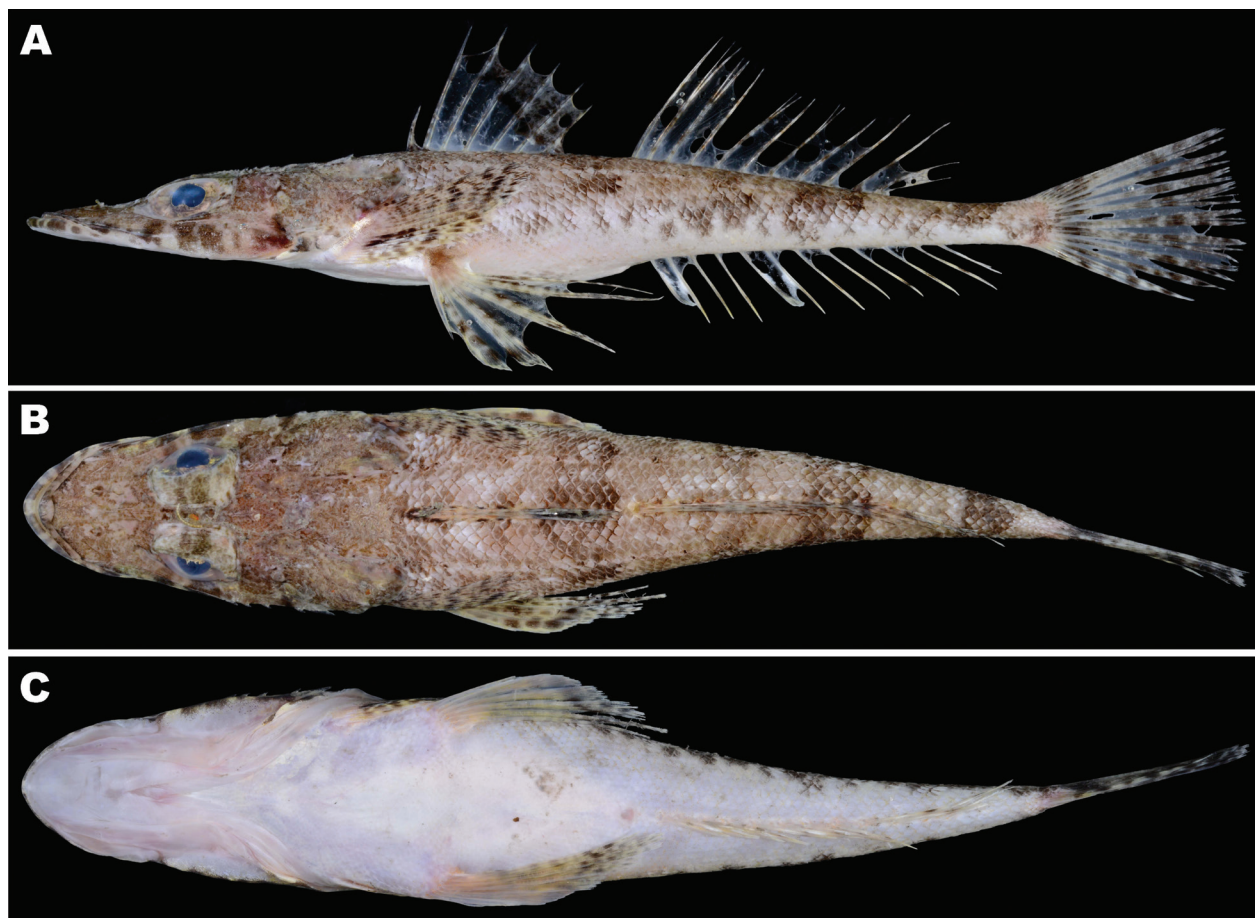


Figure 1. Lateral (A), dorsal (B), and ventral (C) views of *Thysanophrys papillaris* (fresh condition), NMMP-P28534, 137.3 mm SL, Ke-tzu-liao, Kaohsiung, southern Taiwan.

Table 1. Meristic characters of *Thysanophrys papillaris*.

Character	Present specimens (n = 6)	Holotype NTM S. 13325-001	Paratypes (n = 5)	Additional non-types (n = 5)
First dorsal-fin rays	I + VII–VIII	I + VIII	I + VI–VII	I + VII–VIII
Second dorsal-fin rays	11	11	11	11
Anal-fin rays	12	12	12	12
Pectoral-fin rays	2 + 12–14 + 4–6 = 19–20	2 + 12 + 6 = 20	1–2 + 10–13 + 5–8 = 19–20 (4)	2 + 12–15 + 3–6 = 20
Branched caudal-fin rays	10	10	10 (2)	10 (4)
Pored lateral-line scales (LLS)	52–54	51	52–54	52–53
Anterior LLS with spine	2–3	2	2–3	2–3
SADB	52–54	51	54 (1)	52–53
SADF	52–55	51	52 (1)	52–54 (4)
SBDF	59–74 (5)	69	58–71 (4)	58–75 (3)
Gill rakers	1 + 5–6 = 6–7	1 + 4 = 5	1 + 5–6 = 6–7	1 + 5 = 6

Pectoral fin rays are expressed as “upper unbranched rays + middle branched rays + lower unbranched rays = total rays”; SADB = Scale rows above lateral line slanting downward and backward; SADF = Scale rows above lateral line slanting downward and forward; SBDF = Scale rows below lateral line slanting downward and forward. Numbers in parentheses indicate the number of specimens examined.

Comparative material. Holotype: NTM S. 13325-001 (121.7 mm SL), southwest of Flat Top Bank, Timor Sea, Western Australia (12°28'S, 128°37'E), 98 m depth, 8 December 1990. Paratypes (5 specimens): NTM S. 12912-008 (101.3 mm SL), Arafura Sea, Northern Territory, Australia (10°15'S, 134°42'E), 64 m depth, 10 Nov. 1990; USNM 344833 (2 specimens, 77.8–99.4 mm SL), Andaman Sea, Indian Ocean (13°28'N, 97°19'E), 73–81 m depth, 30 March 1963; USNM 344834 (2 specimens, 99.3–113.3 mm SL), Andaman Sea, Indian Ocean (14°07'N, 97°05'E), 69–73 m depth, 30 March 1963. All USNM paratypes were trawled by R/V *Anton Bruun*. Additional non-types (5 specimens): CSIRO H1037-1 (2 specimens, 124.4–149.7 mm SL), north-northwest of Port Hedland, Western Australia (19°03'S, 117°59'E–19°04'S, 118°01'E), 90–97 m depth, FRV *Soela*, demersal trawl, 27 September 1987; CSIRO H1500-01 (124.7 mm SL), north-northwest of Port Hedland, Western Australia (19°06'S, 118°12'E–19°05'S, 118°10'E), 84–87 m depth, FRV *Soela*, demersal trawl, 3 October 1988; HUMZ 229721, 170.3 mm SL, fish landing port, Cua Be, Nha Trang, Vietnam (12°11'N, 109°12'E), 25 July 2018, coll. by N. V. Quan and party; WAM P.34804-005 (112 mm SL), Lynher Bank, Western Australia (15°32.69'S, 122°12.43'E–15°32.65'S, 122°12.45'E), 63.2–64.3 m depth, 30 October 2016, coll. by M.G. Allen.

Description. Counts and proportional measurements are given in Tables 1 and 2, respectively. The following description was based on the six Taiwanese specimens. Body moderately depressed; caudal peduncle somewhat cylindrical. Head strongly depressed. Snout longer than orbit diameter; ratio of snout length / orbit diameter 1.1–1.2. Posterior end of upper jaw nearly or just reaching below anterior margin of pupil. Villiform teeth in bands on jaws and palatine, in 2 separate patches on vomer, except for anteromedial portion of upper jaw with short slender conical teeth. Notch absent on posterior margin of upper jaw tooth band. Anterior and posterior nostrils tubular; former with single flap on posterior margin. Single papilla on upper surface of eye; additional papilla present

posteriorly and posteromedially to former on right side eye in 99.3 mm SL specimen of NMMB-P26824 and right side eye in NMMB-P28534, respectively. Upper iris lappet with short branches; lower iris lappet simple in 5 specimens, bilobed in left eye in 99.3 mm SL specimen of NMMB-P26824. Interorbital space narrow, concave. Dorsal surface of head with many spines but lacking tubercles. Two antrorse lachrymal spines present. Nasal with 1 small spine. Ethmoid spines absent in 5 specimens, 1 spine present on left side in 147.4 mm SL specimen of NMMB-P26824. Single preorbital spine present. Single preocular spine present, lacking small spines on base. Supraorbital ridge finely serrated. Single postocular spine, followed by 2 or 3 pterotic spines. One or two stout parietal spines present. Two to six frontal spines present between posteriormost supraorbital spine and parietal spine. One or two nuchal spines present posterior to parietal spine. Suborbital ridge with single preorbital spine anteriorly, followed by 4–6 stout suborbital spines. Three preopercular spines present; uppermost longest, not reaching posterior margin of opercle, with supplemental spine on base. Two stout spines on opercle, each with short supporting ridge and without serrations or tubercles. Supratemporal, posttemporal and supracleithrum each with single stout spine. Well-developed fleshy sensory tubes completely covering cheek region. Interopercular flap absent. Small ctenoid scales on postorbital area and opercle. Scales on body ctenoid dorsally and laterally, cycloid ventrally. Lateral-line scales each with 2 sensory ducts directed upward and downward, respectively; each duct terminating with single external opening. First dorsal fin originating nearly level with opercular margin, narrowly separated from second dorsal fin. Posterior margin of pectoral fin rounded. Tip of pelvic fin reaching anus in 147.4 mm SL specimen of NMMB-P26824, to base of second ray of anal fin in remaining specimens. Caudal fin slightly rounded posteriorly.

Color when fresh [based on color photographs of NMMB-P28534 (Fig. 1)]. Dorsal surface of body and head pale brown, ventral surface white. Two brownish

Table 2. Absolute and relative morphometric characters of *Thysanophrys papillaris*.

Character	Present specimens (n = 6)	Holotype NTM S. 13325-001	Paratypes (n = 5)	Additional non-types (n = 5)
Absolute values [mm]				
Standard length (SL)	99.3–148.2	120.7	77.8–113.3	111.9–170.3
Relative values [%SL]				
Head length (HL)	36.3–37.5	38.4	36.0–39.4	36.2–38.5
Predorsal length	36.6–37.4	38.4	36.0–39.3	36.5–39.5
Length of first dorsal-fin base	16.5–19.8	17.7	13.6–16.6	16.2–18.6
Length of second dorsal-fin base	25.1–26.0	24.3	24.4–26.7	25.3–28.0
Length of anal-fin base	29.7–31.5	28.7	30.0–32.8	29.5–31.9
Snout length	10.9–11.7	11.4	11.3–12.2	10.5–12.2
Orbital diameter	9.4–9.9	9.9	8.6–10.5	9.4–10.1
Upper jaw	13.1–14.0	14.0	12.9–15.1	13.5–13.7 (3)
Lower jaw	20.4–20.9	20.9	20.9–22.0 (4)	20.1–20.6
Interorbital width	1.3–1.7	1.7	1.4–1.5	1.4–1.9
Pectoral-fin length	14.8–16.1	15.6	14.1–16.8	14.9–16.4
Pelvic-fin length	21.3–24.6	24.0	22.9–24.6	22.2–26.0
Caudal-fin length	20.4–22.3	21.5	22.1–22.6 (3)	20.6–22.7 (4)
Relative values [%HL]				
Snout length	29.8–31.8	29.5	29.4–31.5	28.7–31.8
Orbital diameter	25.6–26.8	25.6	23.8–27.7	25.1–26.8
Upper jaw	35.9–37.8	36.4	35.9–38.4	36.2–36.8 (3)
Lower jaw	55.3–56.5	54.3	53.1–57.2 (4)	52.3–55.5
Interorbital width	3.5–4.7	4.5	3.7–4.0	3.8–5.1
Ratio of snout length / orbital diameter	1.1–1.2	1.2	1.1–1.3	1.1–1.3

Numbers in parentheses indicate the number of specimens examined.

bands crossing interorbit and both eyes; several small brown or dark brown blotches laterally on head, including single dark brown blotch posteriorly on preopercle. Dorsal surface of body with four irregular dark brown bands, level with posterior portion of first dorsal fin, middle and posterior portions of second dorsal fin, and caudal peduncle, respectively. First dorsal fin with broad blackish band distally; spines with several brown spots. Second dorsal fin with brown spots along rays. Anal fin pale (coloration details unclear). Pectoral and pelvic fins pale brown with small brown spots tending to form irregular narrow bands. Anteroventral portion of pectoral fin with elongate dark brown spot. Basal portion of caudal fin dark brown; remaining area of caudal fin with four irregular dark brown bands.

Color in alcohol. Dorsal surface of body and head pale brown, ventral surface pale yellow. One or two brownish bands crossing interorbit and both eyes; several small brown or dark brown blotches laterally on head, including a single dark brown blotch posteriorly on preopercle. Dorsal surface of body with four irregular brown or dark brown bands, level with posterior portion of first dorsal fin, middle and posterior portions of second dorsal fin, and caudal peduncle, respectively. First dorsal fin with broad blackish band distally; spines with several brown spots. Second dorsal fin with brown or dark brown spots along rays. Anal fin pale; posterior 2–10 rays with a brown spot distally. Pectoral and pelvic fins pale brown with small brown spots tending to form irregular narrow bands. Anteroventral portion of pectoral fin with elongate dark brown spot. Basal portion of caudal fin dark brown; remaining area of caudal fin with several irregular brown to dark brown bands.

Distribution. Recorded from the Andaman, Timor, and Arafura seas (eastern Indian Ocean) (Imamura and Knapp 1999), and Nha Trang, Vietnam (Imamura et al. 2019) and southern Taiwan (western Pacific Ocean) (this study).

Remarks. The presently reported six specimens, collected from southern Taiwan, conformed to the genus *Thysanophrys* Ogilby, 1898 in having the upper iris lappet with short branches, many spines on the dorsal surface of the head (but lacking tubercles), the suborbital ridge with 5 or 6 spines (including 1 preorbital spine), the lateral-line scales each with 2 sensory ducts (directed upward and downward, respectively, and terminating in a single external opening), and well-developed fleshy sensory tubes completely covering the cheek region, and lacking an interopercular flap (Imamura 1996; Imamura et al. 2019). To date, the genus includes the following 10 valid species: *Thysanophrys armata* (Fowler, 1938); *Thysanophrys celebi-ca* (Bleeker, 1855); *Thysanophrys chiltonae* Schultz, 1966; *Thysanophrys cirronasa* (Richardson, 1848); *Thysanophrys longirostris* Shao et Chen, 1987; *T. papillaris*; *Thysanophrys randalli* Knapp, 2013; *Thysanophrys rarita* Knapp, 2013; *Thysanophrys springeri* Knapp, 2013; and *Thysanophrys tricaudata* Knapp, 2013 (see Imamura 1996; Imamura and Knapp 1999; Knapp 2013; Imamura et al. 2019). *Thysanophrys haploblepharis* Prokofiev, 2017 was regarded as a junior synonym of *Insidiator cooperi* (Regan, 1908) by Imamura et al. (2019). The presently reported specimens from southern Taiwan conformed to *T. papillaris*, differing from all congeners in having the following combination of characters: 11 second dorsal-fin rays,

12 anal-fin rays, 59–74 scale rows below the lateral line slanting downward and forward, a longer snout (snout length / orbit diameter ratio 1.1–1.2), 1 or 2 small papillae on the eye, the upper iris lappet with short branches, a single preorbital spine and 3–5 suborbital spines (see Imamura et al. 2019 for a detailed comparison of all 10 species of *Thysanophrys*, and materials of six of the nine species deposited in the collections of AMS, BMNH, CSIRO, NMV, NSMT, NTM, QM, USNM, and WAM). Accordingly, this study identified the six Taiwanese specimens as *T. papillaris*. Imamura and Knapp (1999) originally described *T. papillaris* as having a single small papilla on the eye (based on six specimens). Recently, however, Imamura et al. (2019) recorded a single specimen with an additional papilla on the right eye from Nha Trang, Vietnam, and noted the potential for intraspecific variation in the number of eye papillae. Recognition herein of two specimens of *T. papillaris* with an additional papilla on the eye confirms such intraspecific variation. The presently

reported specimens represent the first record of *T. papillaris* from Taiwan and the northernmost distributional record of the species.

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