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First Japanese Record of the Rare Goby *Trimma panemorfum* Winterbottom and Pyle, 2022 from Okinawa Island, Ryukyu Islands, Southern Japan (Teleostei, Gobiidae)

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Abstract A single specimen (14.9 mm in standard length) of *Trimma panemorfum* Winterbottom and Pyle, 2022, a species recently described on the basis of three specimens from deep coral reefs off Palau, was collected from Okinawa Island, Ryukyu Islands, southern Japan. A description of the Japanese specimen, the first Japanese record of *T. panemorfum*, is provided, and the new standard Japanese name "Kosumosu-benihaze" proposed for the species.
Key words: Taxonomy, distribution, mesophotic coral ecosystem, cryptobenthic fish, Hamahiga Island.

Introduction

The pygmygoby genus *Trimma* Jordan and Seale, 1906 (Gobiidae, Gobiinae), one of the most speciose genera of coral-reef fishes, currently contains 109 valid species (Winterbottom, 2019; Winterbottom and Pyle, 2022a, b), 28 of which have been recorded from Japanese waters and given standard Japanese names (Motomura, 2022).

A single specimen of an initially unidentified species of *Trimma* was collected by basket trap from 190 m depth off Okinawa Island, Japan. Although in poor condition due to abrasion and the consequences of freezing, it was subsequently identified as the deep reef dwelling species *Trimma panemorfum* Winterbottom and Pyle, 2022, known from only three type specimens, and underwater photographs from Palau and Indonesia, the latter captioned as *Trimma* cf *panemorfum*. In this study, the Japanese example (and first record) of the species is described in detail, being a further contribution to understanding the distributional range of this small cryptobenthic inhabitant of mesophotic coral ecosystems.

Materials and Methods

Counts and measurements followed Winterbottom and Pyle (2022a). Measurements were made to the nearest 0.01 mm, except for standard length (nearest 0.1 mm), with needle-point calipers under a dissecting microscope. Standard length and head length are abbreviated as SL and HL, respectively. Terminology of the cephalic

sensory papillae rows (observed using versatile staining with Cyanine Blue; Saruwatari *et al.*, 1997) follows Winterbottom (2011), as modified by Winterbottom *et al.* (2015). The specimen examined in this study is deposited at OMNH: Osaka Museum of Natural History, Osaka, Japan.

Trimma panemorfum
Winterbottom and Pyle, 2022
(English name: Exquisite Pygmygoby;
new standard Japanese name:
Kosumosu-benihaze)

(Fig. 1)

Trimma panemorfum Winterbottom and Pyle, 2022a: 596, figs. 1–4 (original description; type locality: Uchelbeluu Reef, Palau)

Specimen examined. OMNH-P 43986, 14.9 mm SL, Hamahiga Island, off Okinawa Island, Ryukyu Islands, Japan, 190 m depth, 19 Sept. 2018, basket trap, K. Abe.

Description. General appearance as in Fig. 1. Head large, its length 34.8% of SL. Snout short and straight, its length 8.9% of SL and 25.4% of HL. Mouth oblique with posteriormost tips of upper and lower jaws reaching to below anterior margin of pupil and vertical level between anterior margins of eye and pupil, respectively. Both jaws with several irregular rows of spaced, curved canine-like teeth; outermost teeth enlarged (anterolateral teeth largest, about twice size of posteriormost teeth reaching to posterior tip of premaxilla), much larger than inner rows; inner row teeth minute, number of rows decreasing posteriorly. Anterior naris with short membranous tube just behind anterior margin of snout; posterior naris circular, without membranous tube, slightly larger than anterior naris, located slightly before anterior margin of eye. Eye large, its horizontal diameter 16.0% of SL and 45.9% of HL; interorbital region narrow, not extending laterally beyond 5th papilla of row *p*, its width 44.7% of pupil diameter; posterior interorbital trench absent. Cheek not expanded, its depth 9.9% of SL and 28.4% of HL. Gill opening large, anteroventrally reaching to below anterior one-third of pupil. Caudal peduncle long, slender, its length and depth 27.7% and 12.5% of SL, respectively (depth 45.1% of length).

Number of papillae in each row as follows: *a* = 6; *b* = 6; *c* = 6; *cp* = 1; *d* = 6; *d′* = 7; *e-anterior* = 16; *e-posterior* = 6 (damaged); *i-anterior* = 7; *i-posterior* = broken; *p* = 6; *r* = 2; *f* = 3; *cs″* = 3; *g* = absent or damaged; *n* = 1; *x*, *u*, *z*, *ot*, *os*, and *oi* = damaged.

Body scales, including scale pockets, mostly missing due to abrasion, ctenoid scales retained only on basal part of anal fin and left side of caudal peduncle. Pre-dorsal and pre-pelvic regions also abraded, but a few cycloid scales present on dorsal midline; cheek and opercle (surface apparently undamaged) naked. Available counts of scales as follows: posterior transverse scales 7; scale rows in midline between base of last anal ray and first ventral procurrent caudal-fin ray 8.

Dorsal-fin rays VI + I, 8; dorsal-fin spines without filamentous tips, 2nd spine of first dorsal fin not reaching second dorsal-fin origin, 3rd spine of first dorsal fin reaching base of 1st soft ray of second dorsal fin; all dorsal-fin soft rays branched, except for posterior element of last ray; posteriormost tip of fin reaching 55.9% distance between base of last ray and first exposed dorsal procurrent caudal-fin ray. Anal-fin rays I, 8; all anal-fin soft rays branched, except for posterior element of last ray; posteriormost tip of fin reaching 46.7% distance between base of last ray and first exposed ventral procurrent caudal-fin ray. Pectoral-fin rays 19; posterior part of fin broken. Pelvic-fin rays I, 5; 5th soft ray with 2 dichotomous branching points (total 4 branch tips), its length 83.0% of 4th soft-ray length; appressed pelvic fins reaching below base of 6th spine of first dorsal fin; basal membrane not confirmed (probably broken); no frenum. Caudal fin with 3 dorsal and 3 ventral segmented unbranched rays, and 6 dorsal and 5 ventral segmented branched rays.

Coloration. Based on Fig. 1B, C (taken immediately after thawing: coloration somewhat

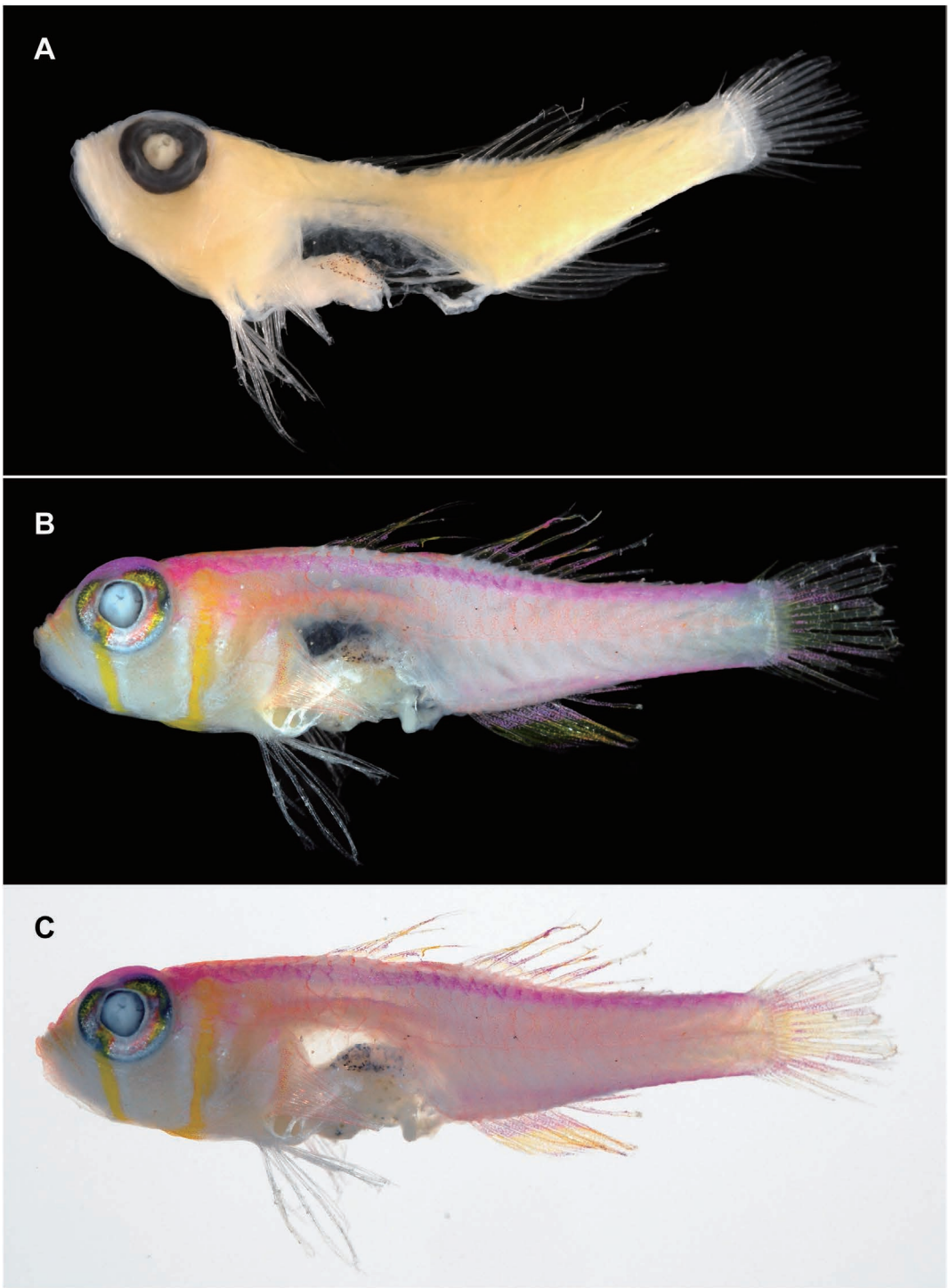

Fig. 1. *Trimma panemorfum* collected from Hamahiga Island, off Okinawa Island, Ryukyu Islands, Japan (OMNH-P 43986, 14.9 mm SL). A, preserved specimen, photographed by K. Fujiwara; B and C, fresh specimen, photographed by T. Suzuki.

faded due to freezing, although stripe and bar patterns, and some pigmentation retained). Snout brownish-yellow, faint reddish-pink stripe present along mid-line. Eye generally brownish-yellow with melanophores, dorsal and posteroventral parts reddish-pink and reddish-white, respectively; indistinct bright white oblique bar extending downward anteriorly from anterior margin of pupil. Head with two relatively broad yellow bars, both interposed between indistinct bright white bars (ca. 1/3 pupil width), tapering dorsally and ventrally; anterior yellow bar of similar width to bright white bars, extending from anteroventral margin of eye to ventral margin below mid-pupil, upper part of bar continuous with brownish-yellow pigmentation on eye; posterior bar about half width of pupil, extending from mid-part of postorbital region to isthmus, angled slightly downward anteriorly. Body ground color mostly faded, but faint reddish-orange pigmentation confirmed on middle portion; two narrow (ca. 1/4 to 1/3 pupil width) reddish-pink stripes, upper and lower stripes extending along dorsal and ventral profiles of body to dorsal- and ventral-most points of caudal-fin base, respectively; anterior part of upper stripe continuous with reddish-pink pigmentation on upper part of eye and posterior brownish-yellow and bright white bars on head; anterior tip of lower stripe faded, but at least extending from just above anal-fin origin; posterior part of lower stripe tapering. Membrane of dorsal fins mostly damaged, but with remnants of barred pattern formed by brownish-yellow and reddish-pink pigmentation; ca. 1/3 ray length of basal portion of anal fin reddish-pink, remaining fin brownish-yellow with narrow, faint reddish-pink margin; pectoral fin generally hyaline, except for faint orangish-red rays, basal region with indistinct bright white and orangish-red bars anteriorly to posteriorly, each bar laterally connected; pelvic fins completely hyaline; upper and lower parts of caudal fin hyaline, middle region with two narrow reddish-pink stripes enclosing a faint brownish-yellow area.

Distribution. *Trimma panemorfum* is distributed in the western Pacific Ocean and has been recorded to date from deep coral reefs off Japan, Palau, and Indonesia (Bali: possible record, based on an underwater photograph) (Winterbottom and Pyle, 2022a; this study).

Remarks. The present specimen agreed closely with the diagnosis of *Trimma panemorfum* given by Winterbottom and Pyle (2022a), as follows: midline of pre-dorsal region with scales; 5th soft ray of pelvic fin with 2 dichotomous branching points (total 4 branch tips); interorbital region narrow, not extending laterally beyond 5th papilla of row *p*; posterior interorbital trench absent; opercle and cheek lacking scales; reddish-orange body with two stripes along with dorsal and ventral profiles, anterior part of upper stripe connected with uppermost part of bars on head. Winterbottom and Pyle (2022a) also included branched pectoral-fin rays (middle 12–13 rays) and a ventral extension bar of ventral stripe in the diagnosis of the species although these characters could not be confirmed in the present specimen because of its poor condition (see description).

The most obvious difference between the present specimen and the original description of *T. panemorfum* is the coloration of the upper eye and body stripes, being reddish-pink in the present specimen (Fig. 1B, C) compared with light blue in the original description (Winterbottom and Pyle, 2022a, fig. 1). A similar coloration discrepancy of the caudal peduncle was recently confirmed in a single individual of an undescribed species of *Trimma* (viz., white in life, but pinkish when freshly dead; H. Wada, pers. comm.). The difference in *T. panemorfum* is due to the color descriptions provided in the original description and herein having been based on live (underwater photograph) and freshly thawed specimens, respectively. In addition to the above diagnostic characters, other morphological and color characters closely matched the original description of *T. panemorfum*. Accordingly, the Japanese specimen described herein was identified as *T. panemorfum*, previously known only from Palau (type locality) and Indonesia (possi-

ble record), and represents the first record from Japan, and northern most record for the species. The new standard Japanese "Kosumosu-beni-haze" is proposed here for *T. panemorfum*, in reference to the pink stripes and yellow bars on the body and head, reminiscent of cosmos (*Cosmos bipinnatus*) flowers.

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