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A new record of *Trimma fasciatum* Suzuki, Sakaue & Senou, 2012 (Perciformes: Gobiidae) from Christmas Island, Indian Ocean, Australia

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Abstract. A distinctively patterned dwarf reef goby of the genus *Trimma* was obtained from submarine cave habitat in Christmas Island from expeditions conducted in 2010 to 2012. A comparison with valid *Trimma* species revealed this species to be conspecific with *T. fasciatum*, a recently described species from Palau, Saipan and Ryukyu islands. This current record extends the distribution range of *T. fasciatum* southwards into the Indian Ocean, mirroring similar disjunct records of other marine taxa.

Key words. *Trimma*, Indian Ocean, Christmas Island, biogeography, biodiversity

INTRODUCTION

Dwarf reef gobies of the genus *Trimma* Jordan & Seale, 1906, are found throughout shallow tropical seas amongst coral reef communities in the Indo-Pacific region. *Trimma* is a diverse group of about 100 species (Winterbottom, 2011) of small (40 mm SL or less), usually colourful fishes which can be recognised by the lack of cephalic sensory canal pores, reduced cephalic sensory papillae, wide gill opening, and fewer than 12 dorsal or anal fin-rays (Suzuki et al., 2012). Only approximately 70 species are described (Winterbottom, 2011; Suzuki et al., 2012); while the remaining recognised species are still unnamed or known only from photographs. *Trimma* are associated with healthy coral reef habitats, occurring in pairs or small schools, usually swimming upside down or vertically head-up in crevices, under overhangs and caves.

The marine fishes of Christmas Island have been well documented by Allen et al. (2007), which listed four *Trimma* species, viz. *T. emeryi* Winterbottom, 1985, *T. macrophthalma* (Tomiyama, 1936), *T. taylori* Lobel, 1979, and *Trimma* sp.; however more of these tiny and rare cryptic species are to be discovered. The present new record of *Trimma fasciatum* is such an example. From three expeditions conducted by the Raffles Museum of Biodiversity Research (now known as Lee Kong Chian Natural History Museum, National University of Singapore) in conjunction with Queensland Museum and Parks Australia (Christmas Island) in 2010, 2011 and 2012 (for more details of the expeditions, please refer to earlier chapter in this supplement), only three specimens were obtained, though more were observed in-situ.

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MATERIAL AND METHODS

Specimens listed are deposited in the Osaka Natural History Museum (ONHM-P), Osaka; Zoological Reference Collection (ZRC) in the Lee Kong Chian Natural History Museum, National University of Singapore; and voucher specimen will be deposited in the Western Australian Museum (WAM), Perth, Australia.

Specimens were initially anaesthesized in-situ using a clove oil-ethanol emulsion, and collected in jars before transfer to shore for observations. These specimens were then euthanised using an overdose of MS-222 in solution, fixed in 10 % formalin and subsequently placed in 75 % ethanol for long term storage. In-situ photographs were taken with a digital SLR camera in an underwater housing.

Trimma fasciatum Suzuki, Sakaue & Senou, 2012
(Figs. 1–3)

Trimma fasciatum Suzuki et al., 2012: 68, figs. 1–2
Trimma sp. 13 – Senou et al., 2004: 116 (top half)

Material examined. ZRC 54425, 2 ex., 19.7–22.7 mm SL; Australia, Indian Ocean Territory: Christmas Island, Thunderdome Cave dive site, 3.3–16.6 m depth, 10°27.906'S, 105°36.465'E [field code CI-D04-2011]; Tan HH 25 March 2011. — WAM, 1 ex., 13.7 mm SL; Australia, Indian Ocean Territory: Christmas Island, Thunderdome Cave dive site [field code CI3-D03]; Tan HH 15 February 2012.

Diagnosis. *Trimma fasciatum* differs from its congeners in the following combination of characters: 8 predorsal scales; no elongate and filamentous spine of first dorsal fin; all pectoral-fin rays unbranched; height of basal membrane between innermost pelvic-fin rays about 23% of length of fifth pelvic-fin ray; nape with 1, and body with 4, broad (3 to 4 scales wide) bright yellow-orange bands when fresh or

Fig. 1. *Trimma fasciatum* in-situ, ca. 20 mm SL, dorso-lateral view, Thunderdome Cave, not collected (January 2010).

Fig. 2. *Trimma fasciatum* in-situ, ca. 20 mm SL, dorsal view, Thunderdome Cave, not collected (January 2010).

alive (when preserved no colour was retained, only black eye orbits remain).

Comparative notes. The Christmas Island population's biometric counts fall within the type series' range (Suzuki et al., 2014), but exhibits some variation for the colouration pattern. The size range is comparable, but the present series increases the maximum size from 21.9 mm (OMNH-P 35167, holotype from Palau) to 22.7 mm SL. The variations of the Christmas Island population are as follows: slightly broader white borders on both dorsal fins and caudal fin than the Palau population (holotype), the orange stripe on the anal fin is more distinct than in the Palau population, iris colour is more orange with a bluish dorsal rim (vs. Kumejima population which has an almost all blue iris (Suzuki et al., 2012: fig. 2C).

Distribution. From Suzuki et al.'s (2012) account, *Trimma fasciatum* is located from the Pacific Ocean region in Ngis Island, Palau; Kume-jima Island (Ryukyu Islands, Japan); and Saipan Island. From the present account, the range of *T. fasciatum* is extended further southwards to Christmas Island in the Indian Ocean.

Field notes. Senou et al. (2004: 116) stated that *Trimma fasciatum* (identified as *Trimma* sp. 13) was solitary, occurring around drop-offs at the coral reef, near side walls in recesses of caves from 15 to 40 m depth. This was probably based on the observations at Kumejima Island.

Trimma fasciatum was only obtained from a single locality, Thunderdome Cave, along the northwestern coast of Christmas Island. The fish was obtained from near the base of a rocky outcrop about 30 m from within the cave opening. The cave environs were craggy limestone walls and ceiling, with white sand bottom (Fig. 4). Further within the cave, a thermocline was present where anchialine waters meet the sea water. The fish was normally found singly or in pairs, swimming vertically or upside down in small crevices. This species was uncommon in Thunderdome Cave, and when alarmed by attempts to catch them, darted quickly into crevices in the limestone walls of the cave. Some of these

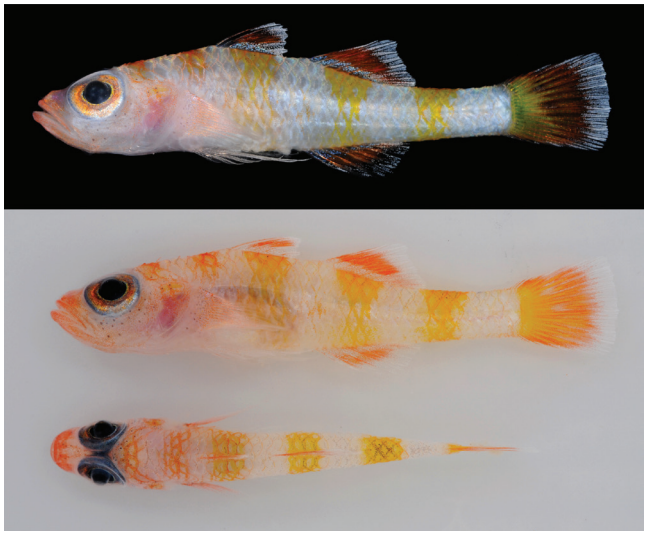

Fig. 3. *Trimma fasciatum*, top and centre, lateral views– ZRC 45525, 22.7 mm SL; bottom, dorsal view – ZRC 45525, 19.7 mm SL.

crevices were very narrow and deep, thus making capture extremely difficult. Moreover the cave environs were full of narrow corners and inaccessible areas, where this goby could reside and not be located easily. No other goby fish was sighted within the submarine cave systems.

DISCUSSION

The disjunct distribution of *T. fasciatum* mirrors that of several marine decapod crustaceans. These species of crustaceans are also located in the Pacific Ocean region, in Guam Island and the Ryukyu Islands; and in the Indian Ocean, in Christmas Island. These crustacean examples are *Neoliomera cerasinus* Ng, 2002 (Xanthidae), *Atoportunus gustavi* Ng & Takeda, 2003 (Portunidae), and *Parhippolyte* sp. (Hippolytidae).

This disjunct distribution pattern could represent inadequate sampling, insufficient survey in island habitats between the Pacific Ocean and Indian Ocean, or could represent a truly patchy distribution.

Fig. 4. Habitat within Thunderdome Cave (January 2010).

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