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TWO NEW SPECIES OF *TRIMMA* (TELEOSTEI: GOBIIDAE) FROM THE WESTERN PACIFIC OCEAN

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***ABSTRACT.* –** Two new species of the small marine gobiid, *Trimma*, are described and illustrated. *Trimma agrena*, new species, from eastern Sabah, the Sulu Sea, and the Moluccas is diagnosed by many small bright orange to yellow orange spots and blotches on the head, dark brown, strongly outlined scale pockets, the absence of predorsal scales, and scales extending anteriorly at least to the midpoint between the rear margin of the eye and the anterior margin of the shoulder spot. The other new, apparently related, species, *Trimma fangi*, new species, was obtained during the Anambas expedition during March 2002 in the South China Sea. It is very similar to *T. agrena*, and may be distinguished by the larger bright orange spots and blotches on the head, a smaller rounded spot on the shoulder, larger orange spots in pectoral fin base, the absence of distinct dark outlines of scale pockets and in having the anterior limit of the body squamation ending at the dark shoulder spot.

***KEY WORDS.* –** Gobiidae, *Trimma*, coral reef fishes, fish taxonomy, South China Sea.

INTRODUCTION

The gobiid fishes form the largest family of marine teleosts, and comprise over 2000 nominal species (Miller, 1993). In marine habitats, there are still many undescribed species of small gobies in need of description or revision of their taxonomic status (Chen et al., 1998; Chen & Fang, 2003).

Trimma are small (to 30 mm SL), usually colourful, coral reef gobies which can be recognized by the lack of cephalic sensory canal pores, much reduced longitudinal cephalic sensory papillae pattern, wide gill opening extending to below the vertical limb of the preopercle or anterior to this, lack of spicules on the outer gill rakers of the first gill arch, less than 12 dorsal and anal fin rays, and a fifth pelvic fin ray that is equal to or more than 40% the length of the fourth pelvic fin ray. There are 39 valid species of *Trimma* and approximately 40 additional species that have yet to be described in addition to the species described here.

The purpose of this paper is to describe two new species of *Trimma*, the first from eastern Sabah, the Philippines and eastern Indonesia, the second recently collected by the second author during the 2002 expedition to the Anambas island group, Indonesia, which lies at the south-western margin of the South China Sea between Kalimantan and Malaysia.

MATERIALS AND METHODS

All specimens were collected with anaesthetic using handnets or plastic bags while SCUBA diving. Morphometric and meristic methods followed Winterbottom (2002). The terms 'spines' and 'rays' used for the dorsal and anal fins are mutually exclusive. All lengths are standard length (SL). The type specimens and comparative materials are deposited in the Australian Museum, Sydney (AMS); the Bernice P. Bishop Museum, Hawaii (BPBM), Museum Zoologicum Bogoriense (MZB); the Pisces collection of National Museum of Marine Biology & Aquarium, Pingtung (NMMBP); the Royal Ontario Museum (ROM); and the Raffles Museum of Biodiversity Research, National University of Singapore (ZRC).

SYSTEMATICS

Trimma agrena, new species

(Fig. 1)

***Material examined.* –** Holotype – ROM 53126, 20.8 mm SL female, Philippines, Cebu, Bohol Strait, Sumilon I., S. side of island about 0.75 km NE of sand spit, (09°26'10"N; 123°23'06"E), 3-10.7 m, Johnson, Downar, Catada and Coro, 20 May.1987.

Paratypes – ROM 74054, 6 (12.6-23.8), collected with the holotype; ROM 49216, 6 (16.9-29.3), Philippines, Cebu, Bohol Strait, Sumilon I., NW coast, (09°25' N; 123°20'E), 12-18 m, Winterbottom, Murdy, Catada and Cabanban, 11 Aug.1985; ROM 1153CS, Siquijor I., Tonga Point, W side about 1 km from tip of point, coral head, (09°12' 16"N; 123°27'16"E) , 0.91-3.7 m, Johnson, Mooi, Benjamin and Downar, 09 May.1987; ROM 1157CS, Bohol Strait, just inshore of RW87-36, (09°26'12"N; 123°23'06"E), 3.7-7.6 m, Johnson, Downar, Catada and Deran, 21 May.1987. USNM 210234, 23 (11.5-23.3), Indonesia, Moluccas, NE side of Ambon Island, about 2 km E of Sawa Telu (which is E of Morela), 0-7.6 m, Springer and Gomon, 08 Jan.1973.

Others – Malaysia: ROM 56560, 1(15.9), Sabah, Celebes Sea, Pulau Sipidan, (04°07'N; 118°37'E), 8 m, Swan, 08 Sep.1980; **Indonesia, Moluccas:** USNM 246762, 1(11.2), Kampung Pasir Putih, Jailolo District, Halmahera Island, (00°53'N; 127°41'E), H. Singou, 28-31 May.1979; BPBM unreg., 5(15.2-21.4), Ambon Island, NW side of Ambon Bay at Hative-Besar, base of fringing reef, 15 m, J.E. Randall and D. Pelasula, 01 Oct.1987; USNM 210142, 3(7.7-11.5), Saparua off Kampungmahu, 13.7-16.8 m, V.G. Springer and M.F. Gomon, 17 Jan.1973; USNM 313297, 1(11.9), Saparua, off Kampungmahu, S of VGS73-12, 3.6-9.1 m, V.G. Springer and M.F. Gomon, 18 Jan.1973; USNM 264581, 1(22.7), Banda Islands, S shore of Goenoeng Api Island(also Gunung), (04°32'10"S; 129°53'00"E), 0-3 m, V.G. Springer and M.F. Gomon, 07 Mar.1974; **Philippines:** Batangas: AMS 1.21922016, 1(20.4), Caban Island, (13°46'N; 121°01'E), 18-21 m, D. Hoese, E. Murdy and C. Ferraris, 26 Apr.1980; Mindoro: AMS 1.21939003, 2(12.6-17.3), S side of Apo Island, (12°30'N; 120°50'E), 27 m, C. Ferraris, 01 May.1980; Masbate: USNM 099586, 1(24.8), Cataingan Bay, Albatross Expedition, 17 Apr.1908; USNM 099607, 1(18.6), Burias Island, Alimango Bat, Albatross. Expedition, 05 Mar.1909; Cebu Island: USNM 261662, 3(15.4-22.9), S tip of island at Liloan Point(Whirlpool Point), (09°24'48"N; 123°18'E), 13.4-19.2 m, J. Libbey et al., 29 Apr.1979; Sumilon Island: ROM 49216, 6(16.9-29.3), Bohol Strait, NW coast, off RW85-10, (09°25'N; 123°20'E), 12-18 m, Winterbottom, Murdy, Catada and Cabanban, 11 Aug 1985; ROM 53126, 7(12.0-23.2), Bohol Strait, S side of island, about 0.75 km NE of sand spit, (09°26'10"N; 123°23'06"E), 3-10.7 m, Johnson, Downar, Catada and Coro, 20 May.1987; ROM 64667, 3(18.6-22.7), Bohol Strait, W side of island, 50 m S of RW87-30, (09°26'11"N; 123°23'06"E), 9.1-22.9 m, Johnson, Downar, Catada, Deran, 21 May.1987; Negros Oriental: Diutav Island: USNM 244055, 1(21.3), about 3 km E of the island, (09°36'58"N; 123°10'05"E), 0-21.3 m, Smithsonian Crew, 15 May.1978; Negros Island; USNM 243944, 1(18.9), Ajong, (09°23'00"N; 123°15'30"E), 0-2.4 m, V.G. Springer et al., 18 Jun.1978; Siquijor Island; ROM 53066, 2(19.6- 19.6), Tonga Point, W side about 1 km from tip of point, (09°12'16"N; 123°27'16"E), 4.6-12.2 m, Johnson, Mooi, Downar and Benjamin, 09 May.1987; ROM 53067, 1(21.3), Tonga Point, (09°12'16"N; 123°27'16"E), 0-4.6 m, Mooi, Burridge-Smith, Downar and Benjamin, 14 May.1987; USNM 243905, 1(18.6), W side of island about 1.6 km S of San Juan town, (09°08'28"N; 123°29'40"'E) , 0-10.7 m, Smithsonian Team, Silliman fishermen, 10 May.1978.

Fig. 1. *Trimma agrena*, 20.8 SL female holotype, Sumilon I., Philippines, ROM 53126. Photo: R. Winterbottom.

***Diagnosis.* –** The new species can be distinguished by the combination of the following features: no predorsal scales; anterior extension of body scales along the side of the nape from half-way between the eye and the shoulder spot in juveniles to just behind the eye in adults; and in coloration: a light brown body with orange spots or stripes on the head, a dark greyish orange shoulder spot above pectoral fin base, and scale pockets strongly outlined with dark brown chromatophores with an orange spot at the junction between adjacent pockets in the same longitudinal row.

***Description.* –** The description is based on the holotype and up to 19 paratypes (values for the holotype in bold where appropriate). Dorsal fins VI + I 8-**10** (n=20, mean = 9.1), second and/or third spine longest, reaching to the base of the first spine of D2 or as far posteriorly as the base of the second ray; rays of second dorsal fin, except first, branched; anal fin I **8**-9 (n=20, mean = 8.2), all rays branched; pectoral fin 17-**18**-19 (n = 20, mean = 18.0) with 5 - 12 branched rays in the approximate centre of the fin, reaching posteriorly to a vertical line with the first few elements of the anal fin; pelvic fin I 5, no fraenum, full basal membrane, but fragile and usually torn, first three rays with one sequential branch, fourth ray usually with two such branches, fifth ray branched two or three times dichotomously (n=20, mean = 2.4) and 70-82% the length of the fourth (n=15, mean = 77.9), fourth ray reaching posteriorly to a vertical line with the first few elements of the anal fin. Lateral scales 23-**24** (n=20, mean = 23.9), anterior transverse scales 8-**9** (n=20, mean = 8.9), posterior transverse scales 8; no predorsal scales, body scales on the side of the head extending anteriorly above the pectoral-fin base beyond dark shoulder blotch half way to orbit (small specimens) but almost to the posterior margin of the eye (large specimens); 4-5 (usually 4) rows of cycloid scales on the pectoral base; cheek and opercle scaleless; scales on breast cycloid (may be ctenoid in larger specimens), one or two small anterior scales followed by a median row of 4-5 larger scales, the last always cycloid and between the bases of the pelvic fin. Gill opening extending anteroventrally to below the posterior margin of the pupil. Upper and lower jaws with an enlarged outer row of curved, spaced canines, and 3-4 inner rows of smaller, conical teeth. Tongue round, truncate or parenthesis shaped. Gill rakers on first arch **3**-4 + **13**-14 = 16-18, (n=12, mean = 16.9). Anterior naris a short tube extending anteriorly over the upper lip, posterior naris with a raised rim, entire nasal sac confined to the anterior half of the snout (when viewed from above). Bony interorbital width 1/3 pupil width, concave with steep (but not vertical) sides, no postorbital trough or trench.

***Coloration when collected.* –** Body translucent light brown, scale pockets strongly outlined with dark brown chromatophores, the junction between the pockets of adjacent scales in a given row with an orange elongated oval spot, especially on the anterior half of the body. A dark, pupil-sized spot on the shoulder immediately above the upper

margin of the gill opening, which is smaller, fainter and suffused with orange in smaller specimens. Three small (< half pupil width) spots on the pectoral-fin base arranged at the corner of a triangle with the apex pointing posteriorly and situated at the middle of the height of the base over the fin-ray bases; a few other similar spots may be present. Head light brown with scattered, irregularly-shaped red to orange spots which vary from one-fifth to pupil diameter in greatest diameter, larger in smaller specimens, spots extend ventrally onto the branchiostegal membrane. Iris grey to brown, usually suffused with orange-brown ventrally. Base of first dorsal fin liberally sprinkled with chromatophores and with a row of spots which may form a stripe, other scattered spots posteriorly in the fin; second dorsal fin with chromatophores and up to five oblique rows of orange spots (sometimes parallel to the base of the fin) about one-third pupil diameter in size. Caudal fin dusky with numerous scattered orange spots similar to those in second dorsal fin; anal fin essentially similar to second dorsal fin. Pectoral fin rays strongly suffused with orange, pelvic fin less so.

Colour pattern of preserved material essentially similar, but background colour straw-yellow, the orange spots persist of light spots, especially evident on the cheek.

***Etymology.* –** The new species is named from the Greek "agrenon" meaning a net, in allusion to the mesh-like pattern on the body formed by the strongly outlined scale pockets. To be treated as a noun in appposition. Suggested common name: Fishnet pygmy goby.

***Distribution.* –** *Trimma agrena* has so far been collected at the eastern tip of Sabah, Malaysia, the Philippine Sulu Sea, and the Indonesian islands of Halmahera and the Moluccas.

***Remarks.* –** *Trimma agrena* is most easily confused with *Trimma fangi*, new species. However, the scales on the sides of the nape extend anterior to the dark shoulder blotch (vs. only as far as the blotch); the orange spots on both the cheek and the base of the pectoral fin are more numerous and not as large as in *T. fangi*, and the scale pockets on the body are heavily margined with brown chromatophores and have orange spots where adjacent scale pockets in a longitudinal row meet (vs. faintly outlined with no orange spots). *Trimma stobbsi* Winterbottom, 2001 could also be confused with *T. agrena*. Both species have light brown bodies with the scale pockets outlined with darker brown, a dark pupil to half-pupil sized spot above the upper attachment of the opercular membrane, and no predorsal scales. However, *T. stobbsi* lacks the red to orange spots on the head and pectoral base, has a single dichotomous branch in the fifth pelvic fin ray (vs. two or three such branches); and the body scales do not extend anteriorly beyond the shoulder.

Trimma fangi, new species
(Figs. 2, 3)

***Material examined.* –** Holotype – MZB 12621, 20.5 mm SL, coll. I-S. Chen, 19 Mar.2002, (03º06'17''N; 106º 17'54'' E), Pulau Bajau, Anambas, South China Sea.

Paratypes – MZB 12622, 16.0 mm SL, NMMBP 7053, 15.7 mm SL, ROM 74055, 2 specimens, 9.5-15.7 mm SL, and ZRC 49158, 1 specimen, 14.6 mm SL, data same as holotype.

***Diagnosis.* –** The new species can be distinguished by the combination of following features: no predorsal scales; anterior extension of body scales up to the shoulder spot; a light brown body with large orange spots or stripes on the head; a dark greyish-orange shoulder spot above pectoral fin base; and a grey iris with several orange spots. Orange spots on head grading to red on the branchiostegal membrane.

***Description.* –** The description is based on the holotype and 5 paratypes. Dorsal fin VI + I 9, second spine usually longest (once third spine) reaching to the base of the second branched ray of second dorsal fin or as far posteriorly as the base of fourth ray; anal fin I 8, all rays branched; pectoral fin modally 18 (17 in two) with 6-8 branched rays in the approximate centre of the fin, which reaches posteriorly to vertical line with the first few elements of the anal fin; pelvic fin I 5, no fraenum, full basal membrane, but fragile and usually torn, first three rays with one sequential branch, fourth ray usually with two such branches, fifth ray branched two times dichotomously and 60-80% the length of fourth, fourth ray longest, reaching posteriorly to the bases of the first to third branched rays of the anal fin. Lateral scales 23-25 (modally

Fig. 2. *Trimma fangi*, 20.5 mm SL holotype, Pulau Bajau, Anambas, South China Sea, MZB 12621. Photo: I-S. Chen.

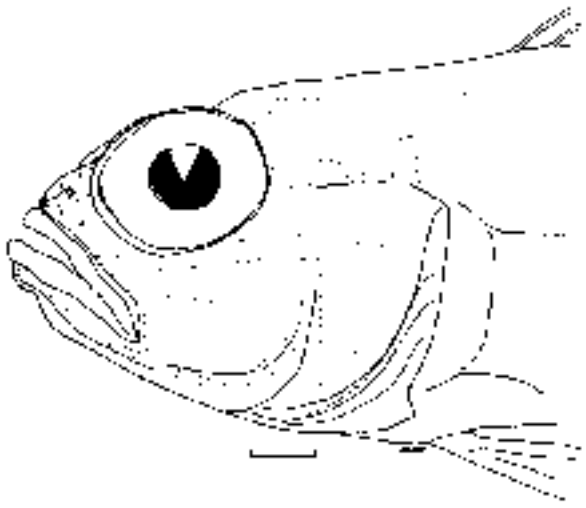

Fig. 3. *Trimma fangi*, left lateral view of head papillae, MZB 12621. Bar = 1 mm. Drawn by I-S. Chen.

24); anterior transverse scales 8; posterior transverse scales 8-9 (modally 8); no predorsal scales; body scales on the side of head extending anteriorly above the anterior margin of shoulder spot; 4-5 rows of cycloid scales on the pectoral fin base; cheek and opercle scaleless; scales on breast ctenoid. Gill opening extending anteroventrally to below the posterior margin of the pupil. Upper and lower jaws with enlarged outer row of curved, spaced canines, and 3-4 inner rows of smaller, conical teeth. Tongue rounded, truncate. Anterior naris a short tube extending anteriorly over the upper lip, posterior naris with a raised rim. Bony interorbital width 2/5 pupil width, concave with steep sides, no posterior trough or trench. Head papillae as in Fig. 3.

***Coloration when collected.* –** Body translucent light brown, with scale pockets indistinctly outlined. Sides of body with three somewhat longitudinal yellowish-orange stripes. A greyish-orange spot, a little smaller than the pupil, on the shoulder above the upper margin of the gill opening. Two large, rounded, pupil-sized orange spots on pectoral-fin base. A large, round, orange spot below gill opening in branchiosteal membrane in front of pelvic fin base. Head light brown with somewhat rounded orange spots which vary from 0.5-1 pupil diameter in size. The spots grade to red in on the branchiostegal membrane. Snout with an orange stripe from margin of eye to anterior region of both lips. Another orange bar passing below orbit to lower region of both lips. Iris grey with few orange mark and ventrally marking larger. First dorsal fin translucent with a row of orange spots basally. Second dorsal fin with two longitudinal rows of orange spots. Caudal fin dusky with three rows of orange spots. Pectoral fin rays unmarked, pelvic fin with basal orange mark.
Colour pattern of preserved material essentially similar, but background colour straw-yellow, the orange spots persist as light spots, especially evident on the cheek.

***Etymology.* –** The new species is named after Prof. Lee-Shing Fang, head of the Museum of Marine Biology & Aquarium, for his enthusiastic support of fish systematics aspects of the second author's current research program. Suggested common name: Fang's pygmy goby.

***Distribution.* –** This species is so far known only from the Anambas Islands, South China Sea.

***Remarks.* –** See under *Trimma agrena*. In addition, some specimens of *Trimma fangi* may also be confused with *T. macrophthalma* Tomiyama, 1936. However, the latter does not have the dark blotch on the shoulder, has smaller spots on the head, and possesses two vertically aligned red spots on the pectoral fin bases that have dark centres - especially so in preserved material.

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