

A new species of the genus *Trimma* (Percomorpha; Gobiidae) from Helen Reef, South-West Islands of Palau

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Abstract

A new species of the genus *Trimma* is described based on 41 specimens from the southern tip of Helen Reef, SW Islands of Palau. *Trimma hotsarihiensis* n. sp. is characterized by the absence of scales in the predorsal midline, no cheek or opercular scales, a broad U-shaped interorbital trough and a slit-like postorbital trench, a fleshy ridge, the dermal crest, in the dorsal midline extending from the first spine of the dorsal fin and decreasing in height anteriorly, reaching to a vertical above the vertical limb of the preopercle, no elongate dorsal spines, usually 9 dorsal-fin rays, 17 pectoral-fin rays with 6-12 of the inner rays branched, and an unbranched fifth pelvic-fin ray.

When freshly collected, *T. hotsarihiensis* is yellow with small yellow spots on the caudal fin, a black basal stripe in the dorsal and anal fins bordered distally by an approximately equal-width yellow stripe in the dorsal fins and rest of anal fin yellow, a short, diffuse, irregular dark stripe extending posteriorly from immediately above the opercle, and a dark, pupil-width, internal band extending along the midline from the occipital region, tapering out at the end of the caudal peduncle. Preserved specimens are straw-yellow, with the dark external stripes in the dorsal and anal fins and above the opercle, and, usually, the dark internal bar, still visible. *Trimma hotsarihiensis* is currently known only from Helen Reef just north of the equator in the western Pacific Ocean.

Zusammenfassung

Auf der Grundlage von 41 Exemplaren von der Südspitze des Helen-Riffs der SW-Inseln Palaus wird eine neue Art der Gattung *Trimma* beschrieben. *Trimma hotsarihiensis* n. sp. ist durch folgende Merkmale gekennzeichnet: fehlende Schuppen auf der prä dorsalen Mittellinie; keine Schuppen auf Wangen oder Kiemendeckel; eine breite U-förmige interorbitale Mulde und eine schlitzförmige postorbitale Furche; ein fleischiger Grat als Hautkambildung in der Mittellinie des Rückens vom ersten Strahl der Rückenflosse an nach vorne zu in der Höhe abnehmend bis hin zu einer gedachten senkrechten Linie vom senkrechten Glied des Präoperculums aus; keine verlängerten Rückenstacheln; normalerweise 9 Rückenflossenstrahlen; 17 Brustflossenstrahlen, von denen 6-12 im Mittelteil verzweigt sind; sowie ein unverzweigter

fünfter Bauchflossenstrahl. Wenn sie frisch gefangen sind, haben die Exemplare von *T. hotsarihiensis* eine gelbe Grundfarbe mit kleinen gelben Flecken auf der Schwanzflosse, einen schwarzen Streifen an der Basis der Rücken- und Afterflossen, der distal von einem etwa gleichbreiten gelben Streifen an den Rücken- und Afterflossen begrenzt wird, Gelb auf dem Rest der Afterflosse, einen kurzen, diffusen, unregelmäßigen dunklen Streifen, der unmittelbar oberhalb des Kiemendeckels beginnt und sich nach hinten zieht, sowie ein dunkles pupillen-breites inneres Band, das sich von der Mittellinie der Occipitalregion aus erstreckt und hinten am Ende des Schwanzstiels ausläuft. Konservierte Exemplare sind strohgelb, die dunklen äußeren Streifen an den Rücken- und Afterflossen und über dem Kiemendeckel bleiben sichtbar, meistens auch der dunkle innere Streifen. Bisher ist *Trimma hotsarihiensis* nur vom Helen-Riff etwas nördlich vom Äquator im westlichen Pazifik bekannt.

Résumé

Une nouvelle espèce du genre *Trimma* est décrite sur base de 41 spécimens de la pointe sud d'Helen Reef, au sud-ouest des îles Palau. *Trimma hotsarihiensis* n. sp. se caractérise par l'absence d'écaillés sur la partie prédorsale de la ligne médiane et sur la joue ou l'opercule, une large dépression interorbitale en forme de U et un sillon postorbital en forme de fente, un renflement charnu, la crête dermale, sur la ligne médiane dorsale s'étendant du premier rayon dur de la dorsale et diminuant de hauteur antérieurement, se terminant au-dessus du limbe vertical du préopercule, l'absence de rayons dorsaux prolongés, généralement 9 rayons dorsaux, 17 rayons pectoraux avec les rayons internes 6-12 ramifiés et le cinquième rayon de la pelvienne non ramifié.

Fraîchement collecté, *T. hotsarihiensis* est jaune avec de petites taches jaunes sur la caudale, une ligne noire basale sur la dorsale et l'anale bordée distalement par une ligne jaune environ de même largeur sur la dorsale et l'anale jaunes, une courte ligne sombre, diffuse, irrégulière, s'étendant postérieurement immédiatement au-dessus de l'opercule, se terminant en pointe au bout du pédoncule caudal. Les spécimens conservés sont jaune paille, et les lignes sombres externes de la dorsale et de l'anale et au-dessus de l'opercule, et, généralement, la barre sombre interne, restent visibles.

Trimma hotsarihiensis n'est connu qu'en provenance de Helen Reef, juste au nord de l'équateur, dans le Pacifique occidental.

Sommario

Una nuova specie del genere *Trimma* è descritta sulla base di 41 esemplari provenienti dall'estremità meridionale di Helen Reef, arcipelago di Palau sudoccidentale. *Trimma hotsarihiensis* n. sp. è caratterizzata da: assenza di scaglie sulla linea predorsale mediana, sulle guance e sull'opercolo, presenza di un ampio canale interorbitale a forma di U e di una fossa postorbitale a fessura, una cresta carnosa sulla linea dorsale mediana che si estende dalla prima spina dorsale e che discende in altezza anteriormente fino alla verticale sopra il ramo verticale del preopercolo, assenza di spine dorsali allungate, di norma 9 raggi dorsali, 17 raggi pettorali con 6-12 raggi centrali ramificati e il quinto raggio pelvico non ramificato.

Appena raccolta, *T. hotsarihiensis* appare di colorazione gialla con piccole macchie gialle sulla caudale e una striatura nera alla base della dorsale e dell'anale fiancheggiata distalmente da una stria gialla approssimativamente dello stesso spessore nella pinna dorsale mentre il resto della pinna anale è giallo. Presenta, inoltre, una breve, diffusa e irregolare stria scura che corre posteriormente da un punto immediatamente sopra l'opercolo e una banda scura, larga quanto il diametro della pupilla, che si estende lungo la linea mediana dalla regione occipitale e si assottiglia verso la parte terminale del peduncolo caudale. Gli esemplari conservati sono di colore giallo paglierino, con le striature scure sulla dorsale e sull'anale e sopra l'opercolo ben evidenti, come appare anche, di solito, la banda mediana scura. *Trimma hotsarihiensis* è attualmente nota solo da Helen Reef appena sopra l'equatore nel Pacifico occidentale.

INTRODUCTION

Trimma Jordan & Seale, 1906 (type species: *T. caesiurum*) contains about 90 species of small (<30 mm SL), often colourful gobiids, primarily associated with Indo-Pacific coral reefs. Members of the genus may be recognized by the lack of cephalic sensory canal pores, much reduced 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, fewer 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 currently 61 valid species of *Trimma*, with approximately 30 additional known undescribed species (Winterbottom & Hoese, unpublished).

A collecting trip to the six islands making up the South West Islands of Palau in September 2008 resulted in the collection of a previously unknown species of this genus from the most southeastern

island of the group, Helen Reef, which lies about 370 km due north of the Vogelkop of Irian Jaya and about 580 km SSE of the main Palauan Islands.

METHODS

Methods and the format of the descriptions follow Winterbottom (2002), except that pectoral and pelvic-fin ray branching is described from preserved material stained with a cyanine blue solution as outlined in Akihito et al. (1993, in Japanese).

The description of the method was subsequently published in English, with attribution, by Saruwatari et al. (1997), and the English translation of the original methodology appeared five years later (Akihito et al. 2002: 1270).

The description is based primarily on the holotype (ROM 83365) and 22 specimens from ROM 83268, ROM 83300 and ROM 1800CS. Lengths given are Standard Length (SL) given in millimetres; SD = Standard Deviation; values for the holotype are given in bold where appropriate. Abbreviations for repositories of material examined follow Leviton et al. (1985), except for Kanagawa Prefectural Museum of Natural History (KPM). Non-type material includes the two samples taken for subsequent genomic analysis. Figures 3 to 6 were produced from multiple digital images taken with a Nikon D100 camera attached to a Zeiss SV8 dissecting microscope at slightly incremental focal planes, then collated into a single image using Archimed™ (GT Vision).

Trimma hotsarihiensis n. sp.

Helen reef pygmy goby (Figs 1-6A)

Material Examined: A total of two lots, 41 type specimens, plus two additional non-type specimens (tissue voucher specimens), all from the southern tip of Helen Reef, Palau, collected by R. Winterbottom, W. Holleman, B. Hubley, M. Winterbottom, M. Westneat, J. Williams, C. McCord, J. Grabek and P. Collins.

Holotype: ROM 83365, 15.2 mm SL female, Palau, South West Islands, Hatohobei State, Helen Reef, slight embayment in southern margin of reef near eastern side, base of vertical drop-off, 02°47'57"N 131°45'18"E, vertical wall covered with sponges, small hard corals, ascidians, huge sandy-floored cave (approximately 20 m wide and 5 m high, floor at 27 m) with sea-fans and hydroids at entrance, with sand/rock/patch reef

below cave, 22-34 m, 1415-1530, rotenone, 22 September 2008. RW 08-30.

Paratypes: ROM 83268, 19, 9.7-15.5, collected with the holotype. ROM 1800CS, 3, 17.7-21.5, collected with the holotype. ROM 83300, 15, 11.5-14.8, just East of ROM 83365, 02°47'56"N 131°45'20"E, cave (approximately 15 m wide and 4 m high, floor at 27 m) and surrounding area at base of first drop-off, hydroids, some hard coral, sea-fans, sponges and ascidians, 24-32 m, 0910-1030, rotenone, 23 September 2008. RW 08-33. AMS I.44760-001, 2, 13.2-14.7, FMNH 118178, 2, 12.8-13.7, and USNM 395046, 2, 12.1-12.6, all collected with ROM 83300.

Non-type Material: Tissue samples for genetic analysis: ROM T04039 and ROM T04040, collected with ROM 83268.

Diagnosis: *Trimma hotsarihiensis* is characterized

by the lack of scales in the predorsal midline, a low dermal crest extending in the anterior midline from the base of the first dorsal spine and tapering out in the area above the vertical limb of the preopercle, 23-24 lateral scale rows, no scales on cheeks or opercles, fifth pelvic-fin ray usually (16 of 20 specimens) unbranched.

When freshly collected, the new species has a yellow head and body with scale pockets broadly outlined with darker yellow or orange yellow, a dark, diffuse, broken stripe above the opercle, thin black basal stripes in the dorsal and anal fins, and yellow spots in the caudal fin. The basal stripes in the dorsal and anal fins and the bar over the opercle persist in preserved specimens.

Description: The following description is based on the holotype and 22 paratypes (12.4-15.5 mm SL, mean = 14.3, SD = 0.71). Dorsal fins VI + I 9



Fig. 1. *Trimma hotsarihiensis*, 14.0 mm SL male paratype, Helen Reef, Palau, ROM 83268. Photo by R. Winterbottom.



Fig. 2. *Trimma hotsarihiensis*, 14.8 mm SL female paratype, Helen Reef, Palau, ROM 83300. Photo by R. Winterbottom.

(once 10, $n = 23$, $SD = 0.20$), second and third spines longest but not elongate, reaching only as far as spine of second dorsal fin when adpressed, rays all branched except, usually, posterior element of last ray; anal fin I 8-9 (mean = 8.3, $n = 23$, $SD = 0.41$), usually all but first and posterior element of posteriormost ray branched (first ray branched in holotype and two other specimens); posteriormost ray of both fins reaching between half and two-thirds of length of peduncle; pectoral fin 17 (once 18, $n = 23$, $SD = 0.20$), 2-3-6 (mean = 3.1, $SD = 0.87$) and 3-7 (mean = 4.1, $SD = 1.22$) unbranched dorsal and ventral rays respectively, middle rays branched, fin reaching posteriorly to a vertical line between middle of urogenital papilla and anal spine, most often to posterior margin of papilla; pelvic fin I 5, no frenum, basal membrane absent or vestigial (< 5% length of fourth ray – Fig. 3), first 4 rays with one sequential branch, fifth ray usually unbranched (branched once dichotomously in 4 female specimens, including holotype, $SD = 0.38$) and 50-58-62% length of fourth (mean = 55.9, $n = 20$, $SD = 3.65$), fourth ray reaching posteriorly to between origin of first to fourth anal-fin ray. Lateral scales 23-24 (mean = 23.2, $n = 20$, $SD = 0.40$), anterior transverse scales 8-9 (once 8, $n = 20$, $SD = 0.22$), posterior transverse scales 7-8, (once 7, $n = 20$, $SD = 0.32$), no scales in midline of predorsal, cheek or on opercle; usually 5 cycloid scales in posterior vertical row on

pectoral base, with a vertical row of 4 scales anterior to this; 6 (once 5, $n = 16$, $SD = 0.24$) prepelvic cycloid scales (in midline anterior to pelvic-fin base – Fig. 3); 12 circumpeduncular scales; body scales ctenoid except for cycloid scales on anterior belly midline, beneath and posterior to pectoral-fin base, anterior scales on sides of nape, and along base of first dorsal fin; generally, body scales extend anteriorly to line between upper pectoral base and first to fourth dorsal spine, but often with one to a few isolated scales anterior to this on sides of nape (in one case, a 15.5 mm SL female, as far as above vertical limb of preopercle). Gill opening extending anteroventrally to a vertical below between posterior and middle of pupil; upper jaw with outer row of curved, enlarged, spaced canines along anterior four-fifths of maxilla, gradually decreasing in size posteriorly; 1 or 2 irregular inner rows of similar but smaller (half height of outer row) teeth almost reaching proximal tip of maxilla. Lower jaw with outer row of 4-5 curved, enlarged, spaced canines reaching to bend of dentary, 1-2 irregular rows of slightly curved caniform teeth half size of outer, becoming reduced in size and less curved posteriorly to form single row of straight conical teeth along anterodorsal face of coronoid process.

Cephalic sensory papillae as in Fig. 4, rows *b* and *c* (of Sanzo 1911) moderately developed and consist of 5-6 small papillae each, row *cp* of a single papilla. Tongue truncate with rounded edges; gill rakers on first arch 3-4 + 13-14 = 16-18 (mean = 17.0, $n = 20$). Anterior nasal opening a short tube extending out over upper lip, posterior nasal opening a pore with a raised rim, both protruding from slightly raised oval sac confined to anterior half of snout. Bony interorbital 34-36-46% pupil width, with broadly U-shaped interorbital furrow and distinct, but very narrow, slit-like postorbital trench (Fig. 4A). Ridge of tissue (the dermal crest) extending from proximal one-tenth of first dorsal spine anteriorly, becoming reduced in height anteriorly and fading out above opercle/preopercle, crest and immediately adjacent area somewhat more densely pigmented than surroundings. Epaxialis extending anteriorly to above a vertical with posterior margin of pupil. Last two abdominal vertebrae each with a bridge of bone between haemal arches forming a 'haemal canal', and first caudal vertebra has two canals, a small proximal one at base of haemal arches, which fuse in midline briefly before diverging again to form a posteriorly directed funnel-like second arch. Haemal arches then fuse again in

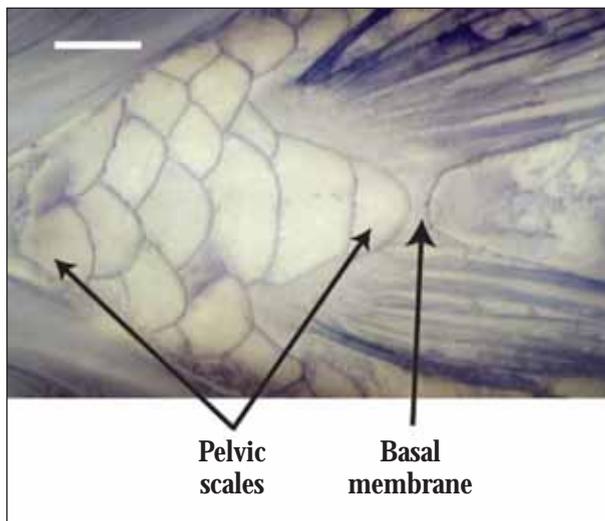


Fig. 3. *Trimma hotsarihiensis*, 15.2 mm SL female holotype, Helen Reef, Palau, ROM 83365, specimen stained with cyanine blue. Ventral view of prepelvic region, anterior part of pelvic fins and basal membrane. Scale bar = 0.5 mm. Photo and image enhancement by R. Winterbottom.

midline to form haemal spine (Type B, Fig. 5; see also Winterbottom 2003, Fig. 14, inset, and Winterbottom & Zur 2007, Fig. 3B).

Colour pattern (from slides of two freshly collected specimens, Figs 1 and 2): the background of the male is pale yellow with scale pockets broadly but diffusely outlined with orange-yellow pigment, especially along the dorsum.

The opercular region, pectoral-fin base and trunk below the vertebral column are suffused with red. A diffuse dark internal stripe, about pupil-width at its origin beneath the upper part of the pectoral-fin base tapers posteriorly along the vertebral column and fades out just anterior to the hypural plate, and a dark internal diffuse stripe connects the last anal fin ray with the anteriormost of the ventral procurrent fin rays. A diffuse stripe made up large scattered brown chromatophores passes posteriorly from just posterior to the middle of the eye above the dorsal margin of the opercle, fading out above the anterior bases of the pectoral-fin rays. The cheek and occiput have some widely scattered brown chromatophores.

The lower jaw and posterior tip of the upper jaw are reddish, concentrated into a diffuse bar between the eye and the upper jaw anteriorly. The nasal capsule and area immediately posterior to it

are reddish brown. The background of the iris is light yellow with a heavy suffusion of very dark chromatophores with a diffuse reddish purple dark stripe between the area adjacent to the nasal sac and the posterodorsal margin of the eye and a similar looking patch beneath the lens. A dark stripe of melanophores begins from the base of the fourth spine of the first dorsal fin and widens somewhat posteriorly in the second dorsal fin to about half-pupil diameter in height. The stripe is margined dorsally by a yellow stripe of similar width which begins at the origin of the first dorsal fin. The rest of the dorsal fin membranes are hyaline, except for melanophores outlining the distal margin. The anal fin has a similar dark basal stripe, the rest of the fin is yellow with an increasingly scattering of melanophores distally. The fin rays of the caudal fin have numerous ovoid yellow spots about half-pupil diameter in length along the longest axis, the fin membrane being hyaline dorsally but with a scattering of melanophores ventrally. The third and fourth rays of the pelvic are light yellow with a few melanophores, and the pectoral-fin rays are light reddish with hyaline membranes between them. The female is basically very similar, but the scale pocket outlines are dark yellow (rather than orange-yellow), there is only a hint of the dark stripe at the base of the first dorsal fin, there are only a few brown melanophores confined to the posterior part of the cheek, the upper and lower jaws are yellow rather than red, although a thin diffuse reddish bar passes from the anteroventral margin of the eye to the upper jaw in the same position as the bar in the male, and the nasal capsule is dark brown rather than reddish-brown.

Colour pattern in alcohol: The body is opaque whitish, with no yellow or orange-yellow pigment remaining. The dark stripe behind the eye is made up of large, densely but irregularly scattered chromatophores, which may extend to just posterior to the pectoral-fin origin. The dark basal stripes in the dorsal and anal fin remain obvious (although the stripe may be absent from the anterior portion of the first dorsal fin), and are made up of dark chromatophores. The proximal margins of the dorsal and anal fins have a dusting of melanophores. Below the first dorsal spine, a stripe made up of a line of spaced, single dark chromatophores situated subdermally along the midlateral septum is present in some specimens, and may continue posteriorly onto the anterior region of the peduncle (Fig. 6A). The dorsum below the first

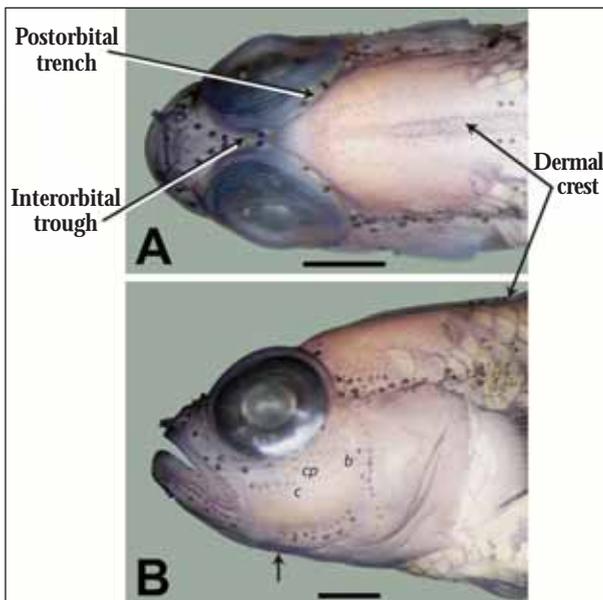


Fig. 4a-b. *Trimma hotsarihiensis*, 15.2 mm SL female holotype, Helen Reef, Palau, ROM 83365, specimen stained with cyanine blue. A: dorsal view of head; B: lateral view of head. Scale bar = 1 mm. Unlabeled arrow = anteroventral extent of gill opening. Photos and image enhancement by R. Winterbottom.

dorsal fin and the nape have widely scattered melanophores, which are more concentrated along and adjacent to the dermal crest, and a few specimens have some of the scale pockets in this region outlined with a single broken line of melanophores. The cheek, opercle and dorsal half of the pectoral-fin base have a light dusting of melanophores and small dark chromatophores. A few melanophores may be present in the region of the bar between the eye and upper jaw. There is a denser scattering of melanophores on the snout between the nasal capsules, with a few at the posterior end of the interorbital trough. The surface of the brain medial to this is covered with brown chromatophores. The large internal body stripe may or may not be visible, but dark pigmentation is usually visible through the body on the dorsal portion of the abdominal cavity. Sparse dark brown chromatophores may be present on the flanks and subdermally along the base of the anal fin, and a line of subdermal melanophores lies between the last anal fin ray and the anterior ventral procurrent fin rays. A few scattered melanophores and small dark chromatophores may be present in the caudal fin membranes, especially in the ventral half. The pectoral and pelvic fins are hyaline.

Affinities: There are eight other species of

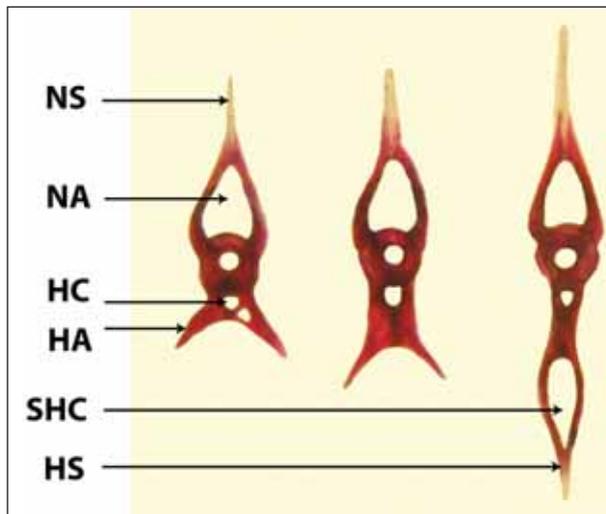


Fig. 5. *Trimma hotsarihiensis*, 14.5 mm SL male, paratype, ROM 1800CS. Anterior view of (from left to right): ninth abdominal vertebra (note lacuna at base of left haemal arch); tenth abdominal vertebra; first caudal vertebra. Abbreviations: HA = haemal arch; HC = haemal canal; HS = haemal spine; NA = neural arch; NS = neural spine; SHC = secondary haemal canal. Photos and image enhancement by R. Winterbottom.

Trimma that lack scales in the predorsal midline and have a dark marking or markings above the opercle. Four of these, *T. agrena* Winterbottom & Chen, 2004, *T. fangi* Winterbottom & Chen, 2004, *T. stobbsi* Winterbottom, 2001 and *T. winterbottomi* Randall & Downing, 1994, have a single, well-consolidate spot confined to the region above the posterodorsal margin of the opercle. In addition, the first two species have numerous orange-red spots on the head, and all four species have a branched fifth pelvic-fin ray and lack a dark basal stripe in the dorsal and anal fins. *Trimma winterbottomi* has very steeply sided and well developed interorbital and postorbital trenches (*vs.* a broadly U-shaped interorbital furrow and a narrow postorbital trench), the posterior margin of the nasal capsule is adnate to the eye (*vs.* nasal capsule confined to the anterior half of the snout), usually two dichotomous branches in the fifth pelvic-fin ray (*vs.* usually unbranched), and red bars on the nape (*vs.* none). *Trimma stobbsi* also has a dermal crest, but, in addition to the differences outlined

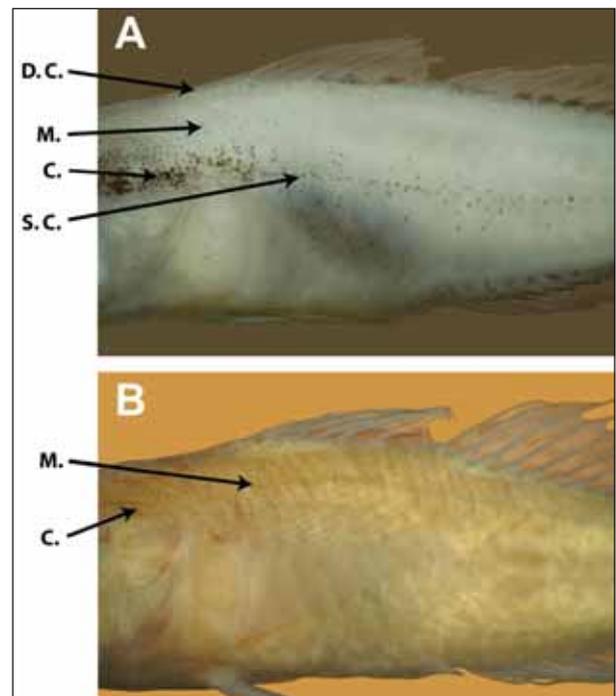


Fig. 6a.b. Left lateral view of body to show pigmentation. **A:** *Trimma hotsarihiensis*, 14.8 mm SL female paratype, preserved, Helen Reef, Palau, ROM 83300 (same specimen as in Fig. 2). **B:** *Trimma kudoii*, 19.0 mm SL male holotype, Izu Islands, Japan, KPM-NI 4255. Abbreviations: C. = chromatophores; D. C. = dermal crest; M = melanophores; S. C. = subcutaneous chromatophores. Photo and image enhancement by R. Winterbottom.

above, has a brownish body when alive and when freshly collected (*vs.* yellow), and has more strongly outlined scale pockets which persist in preservative (*vs.* not or very faintly outlined when preserved).

The remaining four species, two of which are undescribed, all have a dermal crest and more extensive dark pigmentation above the opercle. *Trimma shepardi* Winterbottom, 1984 has two adjacent dark spots above the opercle (*vs.* a continuous if disjointed stripe from behind the eye), and an elongate second dorsal spine (*vs.* not elongated), three yellow bars on the cheek (*vs.* absent) and broad diffuse yellow bars on the body when alive/freshly collected (*vs.* no yellow bars). *Trimma yanoi* Suzuki & Senou, 2008, described from two specimens from Japan, appears to be widely distributed in the western Pacific. It differs from *T. hotsarihiensis* in having more gill rakers (20 *vs.* 16-18), pectoral-fin rays (19 *vs.* 17-18) and smaller scales (lateral scales 32-33, anterior and posterior transverse scales 11 *vs.* 23-24, 8-9 and 7-8 respectively) and in having one or two dichotomous branches in the fifth pelvic-fin ray which is 60-64% the length of the fourth row (*vs.* 0-1 branches and 50-62%) and a much better developed basal membrane between the fifth rays (> 30% of pelvic-fin length *vs.* ≤5 %). When freshly collected, and when preserved, individuals of *Trimma hotsarihiensis* closely resemble the syntopic juveniles of *T. yanoi*. However, where *T. yanoi* has dark internal blotches along the vertebral column, *T. hotsarihiensis* has a broad stripe anteriorly that tapers out at the end of the peduncular region, and has strong black stripes at the bases of the dorsal and anal fins that are lacking in *T. yanoi*. The new species differs from the two undescribed species in possessing the dark basal stripes in the dorsal and anal fins, and the dark lateral internal band (*vs.* no dark stripes, and internal pigmentation in oblong blotches rather than continuous).

The most similar species morphologically is *T. kudoii*, described by Suzuki & Senou (2008) from seven specimens from Japan. It differs from *T. hotsarihiensis* in lacking the dark stripe behind the eye above the opercle (*vs.* present – see Fig. 6 B *vs.* A), usually 10 rays in the second dorsal fin (*vs.* usually 9), pectoral-fin rays unbranched in 5 of 7 specimens (*vs.* always at least six branched rays), a narrower bony interorbital width (19-24% pupil width *vs.* 34-46%), and 6-7 ventral branched caudal fin rays (*vs.* 5 in 19, once 6). Interestingly, the smallest of Suzuki & Senou's (op.cit.) specimens, the 19.0 mm SL male holotype, has an almost identical colour pattern to *T. hotsarihiensis* except for the lack of the dark stripe

behind the eye, but the images provided by those authors of a 25.1 mm SL freshly collected male paratype (op.cit. Fig. 3), their fig. 4 of a live specimen, and the images of four other live specimens identified by these authors as *T. kudoii* available on the Kanagawa Prefectural Museum of Natural History website (<http://fishpix.kahaku.go.jp>) are all of fish with considerably darker margins to the body scales that are red to brownish in colour, and, in three live specimens and the freshly collected paratype, diffuse red-brown bars across the dorsum and down onto the cheek. All these specimens exhibit the three oblique purple lines through the orbit described by Suzuki & Senou (2008: 100). The iris of *T. hotsarihiensis* is black, heavily mottled with yellow, with a pupil-width purple bar below the pupil, a similar but vaguer bar extending posterodorsally from the pupil, and a reddish tinge around the inner margin of the iris. *Trimma kudoii* also lacks the diffuse reddish bar between the eye and the maxilla that is present in both photographed specimens of *T. hotsarihiensis*. Finally, the presence of a 15.3 mm SL gravid female *T. hotsarihiensis* suggests that there is also a size difference between the two species (maximum recorded length for *T. hotsarihiensis* is 15.5 mm SL, *vs.* 25.1 mm SL for *T. kudoii*). These differences, when taken together, form a sufficient justification for the description of the new species.

Remarks: A cleared and stained 15.3 mm SL female (ROM CS1800) contained well developed ovaries with eggs. Sex ratios of the two lots (ROM 83268 and ROM 83300) containing 41 individuals were almost equal at 1 male to 1.2 females (18 males, 22 females, 1 immature – the smallest specimen, 9.7 mm SL).

This suggests that *T. hotsarihiensis* probably has a different mating system to that of its polygynous, serially sex-changing congener *T. okinawae*, which forms social units of one male and a mean of 2.8-3.0 females (Sunobe & Nakazono, 1990). It may be more similar to the system employed by *T. nasa* (sex ratio of 1 male to 1.6 females – Winterbottom & Southcott, 2008), but that system is currently unknown.

Distribution: *Trimma hotsarihiensis* has only been found at the southern tip of Helen Reef in depths ranging from 22 to 34 m, and appears to be associated with large caves in the drop-off (no live specimens were observed).

Etymology: The species name is derived from the Tobian word 'Hotsarihie', the local name for Helen Reef (old spelling), which translates into English

as the “reef of the giant clams”, in appreciation of the support of the Helen Reef Resource Management Project (HRRMP) and the friendliness and helpfulness of the people of Tobi and of Palau in general. The pronunciation of Hotsarihie is “ho-cha-ree-hee”, with the letter ‘h’ pronounced as a soft ‘g’. The suggested common name is ‘Helen Reef pygmy goby’. *Trimma hotsarihiensis* has been referred to informally (in litt.) as *Trimma* RW sp. 92.

Other Material: Type material of *Trimma kudoii* examined:

Holotype: KPM-NI 4255, 19.0 mm SL, Japan, Izu Islands, Izu-oshima Island, Akinohama, 36 m, H. Senou, T. Kudo and K. Imai, 24 Nov., 1997.

Paratype: NSMT-P 73056, 22.5 mm SL cleared and stained male, Japan, Kyushu, Kagoshima Pref., Kinkou Bay, 27 m, S. Dewa & M. Matsuoka, 8 Jul., 2005.

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