APPENDIX I

NEW SPECIES DESCRIPTIONS

Descriptions of twenty-five new species of reef fishes from the East Indian region

INTRODUCTION

The following section includes descriptions of new taxa, collected during recent investigations in the East Indian region. Fourteen of these were taken at the Bird's Head Peninsula of West Papua, Indonesia in connection with Conservation International-sponsored faunal surveys. The various new taxa are presented in phylogenetic order by family and in alphabetical order within families.

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MATERIALS AND METHODS

Reference to specialised papers dealing with methodology for some species is provided in the individual descriptions. General terminology and methodology applicable to most of the new species follows below.

Lengths of specimens are given as standard length (SL) measured from the anterior end of the upper lip to the base of the caudal fin (posterior edge of the hypural plate); head length (HL) is measured from the same anterior point to the posterior edge of the opercle flap; body depth is the maximum depth taken vertically between the belly and base of the dorsal spines, except gobies where it is taken at the pelvic fin origin and anal fin origin; body width is the maximum width just posterior to the gill opening; snout length is measured from the anterior end of the upper lip to the anterior edge of the eye; eye diameter is the horizontal fleshy diameter, and interorbital width the least fleshy width unless stated otherwise; upper jaw length is taken from the front of the upper lip to the posterior end of the maxilla; caudal peduncle depth is the least depth, and caudal peduncle length is the horizontal distance between verticals at the rear base of the anal fin and the caudal fin base; lengths of fin spines and rays are measured to their extreme bases (i.e., not from the point where the ray or spine emerges from a basal scaly sheath if present); caudal fin length is the horizontal length from the posterior edge of the hypural plate to a vertical at the tip of the longest ray; caudal concavity is the horizontal distance between verticals at the tips of the shortest and longest rays; pectoral fin length is the length of the longest ray; pelvic fin length is measured from the base of the pelvic spine to the filamentous tip of the longest soft ray; pectoral ray counts include the small splint-like uppermost rudimentary ray; for some non-gobioid fishes only the tube-bearing anterior lateral-line scales are counted; a separate count is given for the deeply pitted scales occurring in a continuous series midlaterally on the caudal peduncle; the decimal figure ".5" appearing in the scale row count above and below the lateral line refers to a small truncated scale at the respective bases of the dorsal and anal fins; gill raker counts include all rudiments unless stated otherwise and are presented as separate counts for the upper and lower limbs as well as a combined count; the last fin ray element of the dorsal and anal fins is often branched near the base and is counted as a single ray.

Counts and proportions appearing in parentheses apply to the range for the paratypes if different from the holotype unless stated otherwise (e.g. gobiesocids). Type specimens are deposited at the following institutions: Bernice P. Bishop Museum, Honolulu, (BPBM), Museum Zoologicum Bogoriense, Cibinong, Java, Indonesia (MZB); National Museum of Natural History, Washington, D.C. (USNM); and Western Australian Museum, Perth (WAM).

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FAMILY SCORPAENIDAE

Terminology and methods follow Eschmeyer (1969) with slight modification.

Scorpaenodes bathycolus n. sp.

Allen & Erdmann
(Figs. 1-2; Table 1)

Holotype: MZB 20605, male, 62.5 mm SL, Pulau Panjang, 02°58.560'S, 132°17.732'E, southern Fakfak Peninsula, West Papua, Indonesia, 60 m, rotenone, M. Erdmann & G. Allen, 21 March 2009.
Paratype (collected with holotype): WAM P.33090-007, 46.7 mm SL.

Diagnosis: A species of *Scorpaenodes* with elongate middle pectoral rays and lack of nasal spines; dorsal spines relatively long, longest spine 3.2-3.3 in head length; body relatively deep, greatest depth 3.1-3.2 in SL; vertical scale rows 32; pectoral rays 14-15; Dorsal rays XIII,8; colour generally blotchy reddish with scattered brown spots and streaks and median fins translucent with red stripes or bars.

Description: Counts and proportions of holotype, followed by data for paratype in parentheses if different. Dorsal rays XIII,8; anal rays III,5; pectoral rays 15 except 14 on left side of holotype; gill rakers on first branchial arch 6 + 8 (including 4 rudiments on upper arch); vertical scale rows 32; longitudinal scale rows above lateral line 5, below lateral line 12; vertebrae 25.

Preorbital (lacrimal) bone with two broad lumps over maxillary; suborbital ridge with three spinous points, first two under eye and third at posterior end of suborbital ridge; no secondary row of spines below suborbital ridge; preopercular margin with five spines, two lowermost spines very small and bearing cirrus, third spine moderate-sized, and fourth spine large with smaller fifth spine immediately anterior, arising at base; nasal spine absent; following spines present: preocular, supraocular, postocular, anterior and posterior parietal, lower posttemporal, tympanic, pterotic, sphenotic, opercular, and cleithral.

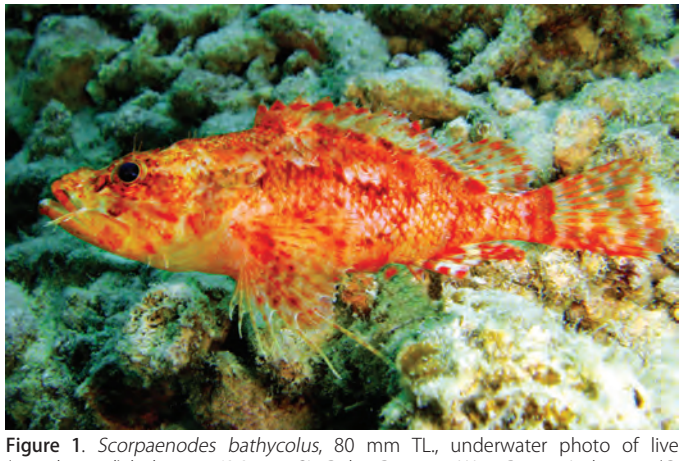

Figure 1. *Scorpaenodes bathycolus*, 80 mm TL., underwater photo of live (anesthetised) holotype, 63.3 mm SL, Pulau Panjang, West Papua, Indonesia (G. Allen photo)

Table 1. Proportional measurements (as percentage of SL) for type specimens of *Scorpaenodes bathycolus*.

	Holotype MZB 20605	Paratype WAM P. 33090
Standard length	67.9	66.7
Body depth	31.2	33.8
Body width	18.9	19.7
Head length	44.0	46.5
Snout length	11.0	10.4
Orbit diameter	11.4	12.1
Interorbital width	5.6	5.4
Caudal-peduncle depth	9.6	9.7
Caudal-peduncle length	15.7	14.7
Upper-jaw length	23.0	22.5
Predorsal length	42.4	44.6
Preanal length	75.8	74.7
Prepelvic length	38.4	37.2
First dorsal-spine length	6.4	7.4
Second dorsal-spine length	8.6	10.4
Longest dorsal-spine length	13.6	14.1
Twelfth dorsal-spine length	8.0	7.1
Thirteenth dorsal-spine length	12.5	11.0
Longest soft-dorsal ray	17.1	17.1
First anal-spine length	9.0	10.0
Second anal-spine length	18.1	19.3
Third dorsal-spine length	14.1	16.0
Longest soft-anal ray	21.3	21.0
Caudal-fin length	26.4	29.0
Pectoral-fin length	34.2	36.8
Pelvic-spine length	16.3	16.9
Pelvic-fin length	25.1	26.6

Following measurements expressed as times in SL: body depth 3.2 (3.0); head length 2.3 (2.1); predorsal length 2.4 (2.2); preanal length 1.3; prepelvic length 2.6 (2.7). Following measurements expressed as times in head length: body width 2.3 (2.4); snout length 4.0 (4.5); orbit diameter 3.9 (3.8); interorbital width 7.9 (8.6); upper jaw length 1.9 (2.1).

Finely ctenoid scales covering most of head and body, except cycloid scales present on breast, abdomen, and cheek. Cirri and skin flaps generally inconspicuous except for long (about equal to eye diameter), simple cirrus at lower rear margin of preorbital (lacrimal); other small cirri associated with preopercular spines and other head spines; also short, scattered cirri on scales of upper back.

Band of fine villiform teeth in upper and lower jaw, with scattered enlarged (more than twice height of other teeth) teeth in both jaws, those of lower jaw mainly along outer row; prominent enlarged symphyseal knob on lower jaw; V-shaped patch of villiform teeth on vomer; palatine teeth absent; tongue slender and free.

Dorsal fin deeply notched, spines gradually increasing in length to seventh spine, first spine 6.9 (6.3), second dorsal spine 5.1 (4.5), and seventh dorsal spine 3.2 (3.3), all in head length; remaining dorsal spines gradually decreasing in length to penultimate spine, its length 5.5 (6.5) in head length; last dorsal spine abruptly taller, its length 3.5 (4.2) in head length; longest soft dorsal ray (fourth) 2.6 (2.7) in head length; first anal spine 4.9 (4.7), second anal spine 2.4, third anal spine 3.1 (2.9), and longest soft anal ray 2.1 (2.2), all in head length; pectoral fins with middle two rays (generally tenth and eleventh, but easily damaged) greatly prolonged compared to other rays; lowermost four rays (and two prolonged rays immediately above) unbranched with free, filamentous distal tips; pectoral-fin length 2.9 (2.7) in SL; length of pelvic fin 4.0 (3.8) and caudal fin 3.8 (3.4), both in SL; pelvic-spine length 2.7 (2.8) in head length.

Colour in life (Fig. 1): blotchy reddish with scattered brown spots and streaks; dorsal fin with large reddish vertically elongate patches along base and red distal tips on spinous portion, continuous with red stripe across middle of soft portion; also row of reddish spots along outer margin of soft dorsal fin; caudal fin with red base, and about four irregular red bars; anal fin with scattered large red spots; pectoral fin mainly clear with faint reddish spots and a few scattered small brown spots; pelvic fins whitish.

Colour in alcohol (Fig. 2): generally pale yellowish with brown blotches and smaller spots, including five saddle-like markings on upper back, irregular brownish stripe along middle of side, and brown bar across caudal-fin base; fins mainly translucent except a few diffuse dark spots visible on median and pectoral fins.

Remarks: The new species is apparently related to *Scorpaenodes albaiensis* (Evermann & Seale, 1907) and *S. minor* (Smith, 1958), which have sometimes been placed in a separate genus *Hypomacrus*, based on their elongate middle pectoral rays and lack of nasal spines. Both of these features are also typical of *S. bathycolus*. It shares lower counts of soft dorsal rays (8), pectoral rays (usually 15) and vertical scale rows (less than 34) with *S. minor*, but differs noticeably from that species in having a slightly deeper body (depth 3.1-3.2 versus usually 3.3-3.4 in SL for *S. minor*), shorter dorsal spines (longest spine 3.2-3.3 in head length for *S. bathycolus* compared with about 4.6 for *S. minor*) and a different colour pattern, especially the predominately red colouration and absence of a prominent dark brown spot on the lower gill cover.

The new species is presently known only on the basis of the type specimens from the Fakfak Peninsula of West Papua, Indonesia. The habitat consisted of a relatively flat or gradually sloping sand-rubble bottom with scattered rock and coral outcrops in 60 m depth.

Etymology: The new species is named *bathycolus* (*bathy* from the Greek, meaning depth, and *colus* from the Latin, meaning dwelling in) with reference to the deep reef habitat of this species.

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Figure 2. *Scorpaenodes bathycolus*, 80 mm TL, preserved holotype, 63.3 mm SL (G. Allen photo)

FAMILY SERRANIDAE (Subfamily Anthiinae)

Pseudanthias mica n. sp.

Allen & Erdmann
(Figs. 1-3; Table 1)

Holotype: MZB 20600, male, 56.1 mm, Suangi, south-western Lembata Island, 08°34.111'S, 123°13.452'E, Indonesia, 52 m, clove oil, M.V. Erdmann, 31 March 2011. **Paratypes (collected with holotype)**: MZB 20601, 2 specimens, 39.8-47.7 mm SL; WAM P.33406-002, 3 specimens, 43.0-57.2 mm SL.

Diagnosis: Dorsal rays X,15-17; anal rays III,7; pectoral rays 17-19; lateral-line scales 36-38; gill rakers 9-11 + 20-24; body moderately elongate, depth 2.5-2.8 in SL; no papillae on posterior edge of orbit; male without a fleshy protuberance at front of upper lip; vomerine teeth in a small triangular patch; third dorsal spine of male slightly elongate, 2.2-2.5 in HL; caudal fin lunate, caudal concavity 1.9-2.7 in HL; male in life mainly orange-red to yellowish with brown scale margins posterodorsally; a broad yellow band behind eye, bordered on lower edge by pink stripe and above by moderately broad red band that continues above eye and across interorbital; median fins reddish with narrow bluish outer margin (upper and lower margins on caudal); pelvic fins reddish yellow with faint violet hue on inner part of fin; pectoral fins translucent to slightly yellowish; female yellowish red with narrow pink-edged yellow band extending from lower rear corner of eye to pectoral-fin base.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays X,16 (X,15-17, usually 16); anal rays III,7; all dorsal and anal soft rays branched, the last to base; pectoral rays 18 (17-19, usually 18 or 19), all branched except uppermost pair and lowermost ray; pelvic rays I,5; principal caudal rays 15, the median 13 branched; lateral-line scales 38 (36-38, usually 38); upper and lower procurrent caudal rays 8-9; scales above first lateral line scale to base of third dorsal spine 4; scales above lateral line to base of middle dorsal spines 3; scales below lateral line to origin of anal fin 15 (14-15, usually 15); circumpeduncular scales 23 (23-24); gill rakers 10 + 23 (9-11 + 20-25), total rakers 33 (29-36); branchiostegal rays 7; vertebrae 26.

Body moderately elongate for the genus, maximum depth 2.8 (2.5-2.8) in SL, and laterally compressed, width 1.9 (1.9-2.1) in body depth; head length 3.0 (2.9-3.0) in SL; snout shorter than orbit diameter, its length 4.7 (4.1-5.3) in HL; front of upper lip without pointed, fleshy protuberance; eye large, orbit diameter 3.2 (2.7-3.1) in HL; posterior edge of orbit without fleshy papillae; interorbital space convex, least fleshy width 3.8 (3.2-3.8) in HL; length of maxillary 2.0 (1.9-2.2) in HL; caudal-peduncle depth 2.4 (2.2-2.3) in HL; caudal-peduncle length 1.7 (1.6-1.8) in HL.

Mouth moderately large, maxilla reaching to below posterior edge of pupil or posterior to this point; mouth strongly oblique, lower jaw slightly projecting, gape forming an angle of about 42° to horizontal axis of head and body; posterior end of maxilla truncate with rounded corners; no supramaxilla; pair of widely separated, forward-projecting canine teeth at front

Figure 1. *Pseudanthias mica*, 56.1 mm SL, underwater photograph of male holotype, at type locality (G. Allen photo)

of upper jaw, tips usually exposed when mouth fully closed; canines followed by outer row of slender conical teeth and inner band of small conical teeth, this band ending anteriorly with large recumbent canine tooth; front of lower jaw with well-separated pair of stout canines projecting anterolaterally, these teeth just medial to upper canines and projecting outside gape when mouth fully closed; 1-2 large recurved canine teeth at side of lower jaw about one-third distance from lower jaw symphysis, preceded by band of villiform teeth in irregular rows extending medial to anterior canines; vomer with small triangular patch of villiform teeth; palatines with single irregular row of small teeth; tongue slender with pointed tip; gill rakers long and slender, longest rakers on lower limb near angle about twice as long as opposing gill filaments.

Anterior nostril a membranous tube with small, triangular posterior flap, at level slightly above centre of eye in front of orbit by distance of about one-third pupil diameter; posterior nostril a large subtriangular opening dorsoposterior to anterior nostril, internarial distance about equal to horizontal diameter of posterior nostril; cephalic sensory pores as follows: 3 pores in vicinity of nostrils, 4 suborbital pores, 11-13 pores on supraorbital-postorbital region, 4 dentary pores, 4 pores on lower limb of preopercle, 6 pores on posterior margin of preopercle, and 2 pores on side of nape above preopercle margin.

Upper part of opercle with blunt, rounded projection dorsally and two strong spines below, upper broadly triangular extending farther posteriorly; margin of preopercle with 23 (18-29) serrae, progressively larger ventrally; serrae absent on lower edge of subopercle and upper edge of interopercle.

Scales ctenoid on head and body; auxiliary scales absent; head scaled except lips, isthmus, area around nostrils, and tip of lower jaw; no scales basally on membranes of anterior half of spinous portion of dorsal fin, but low sheath of scales present basally on remaining part of spinous and soft portion of fin; similar scaly sheath present basally on anal fin; column of small scales covering about one-third to one-half of membranous portion of soft dorsal and anal fins; progressively smaller scales on membranous portion of caudal fin, extending nearly to posterior margin; progressively smaller scales on pectoral fins extending about one-half distance to posterior margin; a midventral cluster of small scales between bases of pelvic fins, extending posteriorly about one-half length of pelvic spine.

Origin of dorsal fin over upper end of gill opening, predorsal distance 3.1 (2.8-3.2) in SL; base of soft portion of dorsal fin slightly longer than base of spinous portion; first dorsal spine 6.7 (5.9-8.1) in HL; second dorsal spine 3.6 (2.3-3.6) in HL; third dorsal spine longest, 2.3 (2.2-2.5) in HL; tenth dorsal spine 3.3 (2.5-2.9) in HL; membranes of spinous portion of dorsal fin moderately incised; longest (seventh or eighth) dorsal soft ray, 2.2 (1.9-2.4) in HL; origin of anal fin below base of second or third dorsal soft ray, preanal distance 1.6 (1.5-1.6) in SL; first anal spine 4.3 (4.7-5.5) in HL; second anal spine 2.2 (2.1-2.6) in HL; third anal spine 2.5 (2.3-2.7) in HL; longest soft anal ray (third or fourth) 1.6 (1.5-1.9) in HL; pectoral fins more or less pointed, middle rays longest, 3.6 (3.2-3.6) in SL; origin of pelvic fins below lower base of pectoral fins, prepelvic distance 2.9 (2.6-3.0) in SL; pelvic spine 1.9 (1.6-1.9) in HL; second pelvic soft ray longest, 3.0 (2.7-3.5) in SL; caudal fin lunate with filamentous lobes, its length 3.2 (2.9-3.4) in SL, caudal concavity 2.4 (1.9-2.7) in HL.

Colour in life and when freshly collected (Figs. 1-2): male overall orange-red to yellowish with brown scale margins posterodorsally; a broad yellow band behind eye, bordered on lower edge by pink stripe and above by moderately broad red band that continues above eye and across interorbital; small horizontal red patch across middle of forehead; lower part of head and adjacent breast pinkish; reddish mid-dorsal stripe beginning just anterior of dorsal fin origin, extending along base of spinous dorsal fin, eventually blending with red of posterior body region; median fins reddish with narrow bluish outer margin (upper and lower margins on caudal); pelvic fins reddish yellow with faint violet hue on inner part of fin; pectoral fins translucent to slightly yellowish; female generally yellowish red with relatively narrow pink-edged yellow band extending from lower rear corner of eye to pectoral-fin base, region below this stripe (on lower head and breast) pale pink; fins generally reddish yellow, but caudal fin strongly yellow.

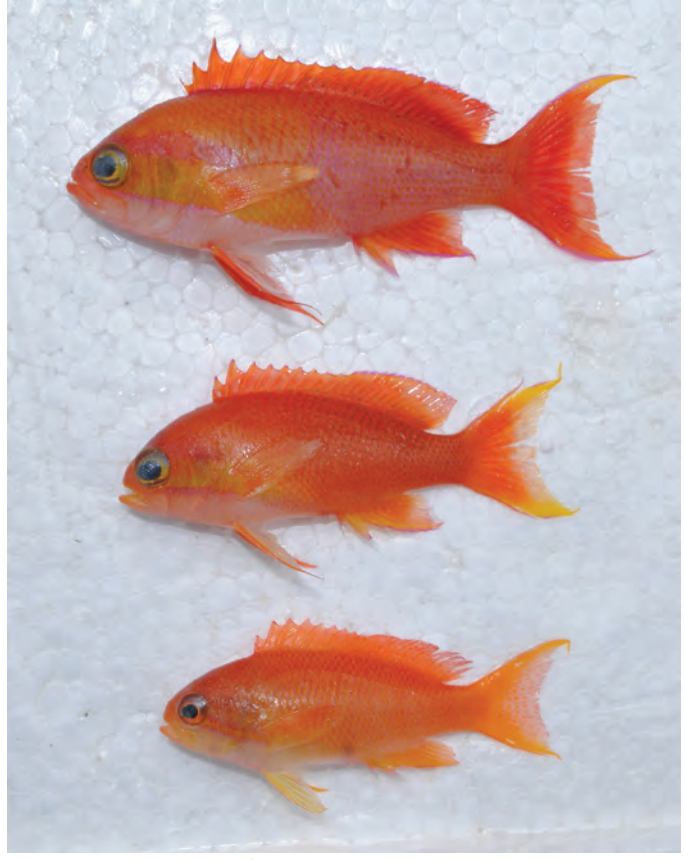

Figure 2. *Pseudanthias mica*, freshly collected specimens: 56.1 mm SL male holotype (upper), 43.0 mm SL male paratype (middle), and 39.8 mm SL female paratype (lower) (G. Allen photo)

Figure 3. *Pseudanthias mica*, preserved holotype (G. Allen photo)

Figure 4. *Pseudanthias pulcherrimus*, underwater photograph of male, approximately 55 mm SL, Andaman Islands (M. Erdmann photo)

Figure 5. *Pseudanthias randalli*, underwater photograph of male, approximately 50 mm SL, Cenderawasih Bay, West Papua, Indonesia (G. Allen photo)

Colour in alcohol (Fig. 3): after several months in alcohol generally yellowish tan with faint indication of small brown spots on posterodorsal part of body, and hyaline fins.

Remarks: The low lateral-line count (36-38, usually 38) separates the new species from nearly all other *Pseudanthias* from the East Indian region. Both *P. huchtii* (Bleeker, 1857) and *P. squamipinnis* (Peters, 1855) have similar low counts (36-40 and 37-43 respectively), but are easily distinguished by the very elongate, pennant-like third dorsal spine and male colour patterns. Moreover, both species are generally restricted to shallow water (usually above 20 m depth) compared to the relatively deep reef habitat of *P. mica*.

Preliminary genetic results indicate that *P. mica* is closely related to *P. pulcherrimus* (Heemstra & Randall, 1986) from the Indian Ocean and *P. randalli* (Lubbock & Allen, 1978) from the western Pacific. Both these species differ from *P. mica* in colour, as well as having a longer third dorsal spine in males (compare Figs. 1-2 with Figs. 4-5). Moreover, they also possess higher lateral-line scale counts (40-45 for *P. pulcherrimus* and 45-50 for *P. randalli* vs. 36-38 in *P. mica*).

Pseudanthias mica is currently known only from a small rocky islet lying 1.5 km off the south-western tip of Lembata Island, Indonesia. This location is about 42 km due east of Flores, one of the main islands of the Lesser Sunda Group. The habitat consisted of reef crevices and caves in 52 m depth.

Etymology: The new species is named *mica* in honour of the Mica Erdmann, the second author's daughter.

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Table 1. Morphometric proportions (as percentage of SL) for type specimens of *Pseudanthias mica*.

	Holotype MZB 20600	Paratype WAM P. 33406	Paratype WAM P. 33406	Paratype MZB 20601	Paratype WAM P. 33406	Paratype MZB 20601
Standard length (mm)	56.1	57.2	52.6	47.7	43.0	39.8
Body depth	35.1	35.7	37.5	37.9	39.5	38.7
Body width	18.4	16.6	19.0	20.3	19.8	18.6
Head length	33.5	33.9	33.5	34.2	34.2	33.4
Snout length	7.1	8.2	6.3	7.3	7.7	8.0
Orbit diameter	10.5	11.0	11.6	11.9	12.8	11.1
Interorbital width	8.9	9.1	8.7	9.2	9.5	10.6
Caudal-peduncle depth	14.1	15.4	15.0	15.7	15.8	14.8
Caudal-peduncle length	20.0	19.8	20.9	20.8	20.7	18.8
Upper jaw length	16.9	17.5	17.3	17.6	17.2	15.1
Predorsal length	32.1	32.7	31.4	33.1	36.0	34.7
Preanal length	63.8	65.6	66.2	66.9	60.9	65.3
Prepelvic length	34.4	33.6	37.8	35.4	33.3	33.9
Length dorsal-fin base	60.6	58.9	58.4	61.0	62.1	61.6
Length anal-fin base	16.8	17.1	16.7	17.8	20.2	18.3
Length pectoral fin	28.0	28.1	28.9	31.4	29.5	29.1
Length pelvic fin	33.0	33.9	32.5	37.7	33.5	28.9
Length pelvic-fin spine	17.3	17.7	18.8	21.0	20.5	17.3
Length 1st dorsal spine	5.0	4.2	5.5	5.0	5.8	5.0
Length 2nd dorsal spine	9.3	13.8	9.3	10.1	14.7	13.8
Length 3rd dorsal spine	14.4	13.8	14.8	14.3	15.6	15.1
Length last dorsal spine	10.2	11.9	12.5	13.4	13.7	13.6
Length longest dorsal ray	15.2	14.0	16.3	17.8	16.0	16.3
Length 1st anal spine	7.8	6.1	6.1	7.3	7.2	6.8
Length 2nd anal spine	15.0	14.9	15.2	13.2	16.3	15.6
Length 3rd anal spine	13.5	12.4	13.7	14.9	14.9	13.6
Length longest anal ray	20.3	18.2	20.0	22.0	22.1	19.6
Length caudal fin	31.4	29.4	36.5	39.8	38.1	34.4
Caudal concavity	13.7	13.1	16.0	17.8	14.4	12.6

FAMILY PSEUDOCHROMIDAE (Subfamily Pseudochrominae)

Methods of counting and measuring follow Gill, 2004.

Pseudochromis tigrinus n. sp.

Allen & Erdmann
(Figs.1-4; Table 1)

Holotype: WAM P. 33250-001, 50.8 mm SL, south-eastern tip of Narcondam Island, 13°25.227'N, 94°17.399'E, Andaman Islands, 42-50 m, clove oil, M.V. Erdmann, 28 March 2010.
Paratypes: USNM 404320, 5 specimens, 25.2-49.8 mm SL, collected with holotype; WAM P. 33249-001, 5 specimens, 16.5 mm-52.5 mm SL, same data as holotype except collected on 15 January 2010.

Diagnosis: *Pseudochromis tigrinus* differs from other pseudochromids in having the following combination of characters: pelvic-fin rays I,5; dorsal-fin rays III,25-27; anal-fin rays III,15; palatine tooth patches more or less contiguous with posterolateral arms of vomerine tooth patch; scales in lateral series 37-40; circumpeduncular scales 16; strong sexual dichromatism: female mainly light grey with yellow dorsal fin and male white with 10-11 narrow black bars on side, and bright yellow forehead, upper back, and dorsal fin.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal fin rays III,25 (25-27), all segmented rays branched; anal fin rays III,15, all segmented rays branched; pectoral fin rays 18; upper procurrent caudal fin rays 6; lower procurrent caudal fin rays 6 (one paratype with 5); total caudal-fin rays 29 (one paratype with 28)); scales in lateral series 40 (37-40); anterior lateral line scales 28 (26-29); anterior lateral line terminating beneath segmented dorsal fin ray 19 (18-20); posterior lateral line scales 7 + 1 (one paratype with 6 + 2 and another with 7 + 2); scales between lateral lines 3; horizontal scale rows above anal fin origin 12 + 1 + 1; circumpeduncular scales 16; predorsal scales 16 (18-20); scales behind eye 3; scales to preopercular angle 4; gill rakers 6 + 11 = 17 (6 + 10-11 = 16-17); pseudobranch filaments 12 (one paratype with 8 and one with 10); circumorbital pores 29 (19-24); preopercular pores 15 (11-15); dentary pores 4; single posterior interorbital pore.

Lower lip incomplete; dorsal and anal fins without scale sheaths; predorsal scales extending slightly anterior to mid AIO pores (nearly to anterior AIO pores in some paratypes); opercle margin smooth without serrations; teeth of outer ceratobranchial 1 gill rakers mainly confined to raker tips; anterior dorsal fin pterygiophore formula S/S/S + 3/1 + 1/1/1/1/1/1 + 1/1/1 + 1 (1 paratype counted); spines moderately stout and pungent; anal fin spines moderately stout and pungent, second spine shorter, but slightly stouter than third; pelvic fin spine moderately stout and pungent; second segmented pelvic fin ray longest; caudal fin rounded; vertebrae 10 + 16.

Upper jaw with 2-3 pairs of curved, enlarged caniniform teeth, and inner band of small conical teeth in about eight irregular rows at symphysis, narrowing to 2–3 rows posteriorly; lower jaw with two pairs of curved, caniniform teeth, and inner band of small conical teeth in about four rows at symphysis and single row on side of jaw, teeth on middle of jaw larger than others (except canines); vomer with 1-2 irregular rows of small conical teeth, forming chevron; palatine with band of small conical teeth arranged in elongate patch, more or less contiguous with posterolateral arm of vomerine patch; ectopterygoid edentate; tongue broad and edentate with blunt tip.

Figure 1. *Pseudochromis tigrinus*, underwater photograph of male, approximately 50 mm SL, Andaman Islands (M. Strickland photo)

Figure 2. *Pseudochromis tigrinus*, underwater photograph of female, approximately 50 mm SL, Andaman Islands (M. Strickland photo)

As percentage of SL: head length 31.1 (31.0-32.3); orbit diameter 10.4 (9.8-10.7); snout length 5.9 (6.3-7.0); fleshy interorbital width 5.7 (5.0-5.7); bony interorbital width 4.1 (3.4-4.5); body width 10.8 (10.6-13.3); snout tip to posterior tip of retroarticular bone 15.2 (15.6-16.3); predorsal length 33.7 (32.7-33.7); prepelvic length 32.7 (30.9-32.8); posterior tip of retroarticular bone to pelvic fin origin 18.5 (17.2-19.5); dorsal fin origin to pelvic fin origin 27.6 (28.8-30.9); dorsal fin origin to middle dorsal fin ray 30.9 (31.0-39.3); dorsal fin origin to anal fin origin 42.1 (42.0-43.7); pelvic fin origin to anal fin origin 26.8 (26.0-33.2); middle dorsal fin ray to dorsal fin termination 27.4 (26.1-29.7); middle dorsal fin ray to anal fin origin 27.8 (26.4-28.3); anal fin origin to dorsal fin termination 35.4 (36.3-39.1); anal fin base length 27.0 (28.0-31.0); dorsal fin termination to anal fin termination 15.2 (14.3-16.7); dorsal fin termination to caudal peduncle dorsal edge 10.8 (10.0-12.0); dorsal fin termination to caudal peduncle ventral edge 18.1 (18.1-19.2); anal fin termination to caudal peduncle dorsal edge 19.3 (18.1-20.6); anal fin termination to caudal peduncle ventral edge 12.0 (10.0-13.2); first dorsal fin spine 2.4 (2.1-2.8); second dorsal fin spine 4.7 (4.8-6.2); third dorsal fin spine 6.9 (5.7-7.2); first segmented dorsal fin ray 12.6 (11.2-13.0); fourth last segmented dorsal fin ray 17.9 (15.6-20.3); first anal fin spine 1.4 (1.6-2.4); second anal fin spine 4.7 (3.0-5.1); third anal fin spine 6.9 (5.7-7.2); first segmented anal fin ray 10.6 (11.2-13.0); fourth last segmented anal fin ray 16.9 (17.0-19.0); longest pectoral fin ray 22.0 (21.7-26.1); pelvic fin spine 10.6 (10.6-12.0); second segmented pelvic fin ray 27.8 (21.6-29.0); caudal fin length 29.5 (27.5-30.0).

Colour of male in life (Fig. 1): generally light grey to whitish; broad yellow zone on forehead, narrowing posteriorly and covering back above anterior lateral line and adjacent dorsal fin; 11 narrow black bars on side, first (incomplete) just behind and above pectoral-fin base and last at base of caudal fin; most black bars on side with 4-5 vertically elongate white sections; yellow rim with slightly broader light blue margin around ventral and posterior edge of eye; blue stripe on dorsal and ventral edge of pupil; diffuse brownish band from front of eye to upper lip; white mark near middle of upper lip; dorsal margin of upper lip yellowish; upper preopercle margin dull yellowish; 7-10 short grey "hash" marks on anterior portion of opercle; posteriormost extension of gill cover yellowish brown; caudal fin white with broad yellow margin, narrow blackish submarginal line, outer row of small black spots and inner, vertically elongate black patch; anal fin broadly white at base with scattered black spots, semi-translucent on outer half with yellow submarginal stripe; pelvic fins whitish; pectoral fins translucent.

Colour of female in life (Fig. 2): mainly light grey (except whitish to slightly yellowish on lower head, operculum, and anteroventral portion of side); head markings similar to those described above for male except yellow rim around eye becoming brown around posterior part of eye; dorsal fin and adjacent uppermost portion of back yellow, except about posterior 10 rays mainly translucent; caudal fin semi-translucent pale greyish; anal fin mainly semi-translucent with whitish base; pelvic fins semi-translucent whitish; pectoral fins translucent.

Colour of male in alcohol (Fig. 3): brown dorsally grading to yellowish tan on side; 11 narrow black bars on side, first (incomplete) just behind and above pectoral-fin base and last at base of caudal fin; most black bars on side with 4-5 vertically elongate pale sections (more pronounced ventrally); sometimes short black bar or saddle dorsally on caudal peduncle between last two dark bars of body; upper edge of gill cover highlighted by short black band on adjacent body; dark brown or blackish rim on posterior edge of eye brownish band from front of eye to upper lip; posteriormost extension of gill cover brown; dorsal fin semi-translucent whitish; caudal fin pale grey with blackish submarginal band across upper and lower lobe, scattered black spots, and horizontally elongate black central black patch on basal half; anal fin pale grey with scattered black spots on basal portion; pelvic fins whitish; pectoral fins semi-translucent.

Figure 3. *Pseudochromis tigrinus*, preserved male holotype, 50.8 mm SL (G. Allen photo)

Colour of female in alcohol (Fig. 4): mainly pale brown, lighter on anterior side and abdomen; grey band from front edge of eye to upper lip; posteriormost extension of gill cover brown; fins generally semi-translucent whitish. Juveniles are similar, except the smallest paratype, 16.5 mm SL, has about 10 widely scattered, small dark spots on the side, mainly on the posterior half.

Figure 4. *Pseudochromis tigrinus*, preserved female paratype, 49.8 mm SL (G. Allen photo)

Figure 5. *Pseudochromis fuscus*, underwater photograph, approximately 50 mm SL, Raja Ampat Islands, West Papua, Indonesia (G. Allen photo)

Remarks: Gill (2003) revised the subfamily Pseudochrominae, recognising 80 valid species in 10 genera. Several additional species (Allen & Erdmann, 2007; Allen *et al*., 2008a & b, Gill & Allen, 2004, 2011; Gill & Tanaka, 2004; Gill *et al*., 2009; Randall & Schultz, 2004) have been described since this comprehensive work boosting the current total to 88 species, not including several others that are in the process of being described (Gill, pers. comm.). The new species differs from all other *Pseudochromis* by the combination of features in the above diagnosis, particularly with regards to the highly unique, barred pattern of the male. The female pattern is reminiscent of that sometimes seen in *P. fuscus* from eastern Indonesia (Fig. 5). The latter species has a variety of bewildering colour forms that possibly represent a complex of several species.

The new species is currently known only from Narcondam, a small volcanic island, situated about 114 km east of the northern tip of the main Andaman Islands. It was observed only in a relatively narrow depth band from 42 to 50 m. The habitat was a steep coral-covered slope exposed to strong currents and frequent cold-water upwellings. Young individuals were associated with larger coral rubble pieces under which they would hide, but adults invariably were associated with a deep labyrinthine burrow under larger coral outcrops. Adults were almost always seen in pairs sharing the same burrow.

The second author observed an adult female that was apparently paired with a very large (approximately 100 mm TL), all black pseudochromid. Attempts to collect the mystery fish were unsuccessful, but possibly it represents another undescribed species or perhaps, another colour phase of *P. tigrinus*.

Etymology: The species is named *tigrinus* (Latin: tiger) with reference to the unusual and highly diagnostic, barred colour pattern of the male.

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Table 1. Proportional measurements (as percentage of SL) for selected type specimens of *Pseudochromis tigrinus*. Abbreviations as follows: RA = posterior tip of retroarticular bone; DFO = dorsal-fin origin; PvO = pelvic-fin origin; D = soft dorsal; AFO = anal-fin origin; Dt = dorsal-fin termination; At = anal-fin termination; CPde = caudal peduncle dorsal edge; CPve = caudal peduncle ventral edge; A = soft anal. See Gill (2004) for detailed explanation of all terms.

	Holotype WAM P. 33250	**Paratype WAM P. 33249**	**Paratype WAM P. 33249**	**Paratype USNM 404320**	**Paratype USNM 404320**	**Paratype WAM P. 33249**
Sex	male	female	male	male	female	female
Standard length	50.8	52.5	49.3	43.5	41.2	36.4
Head length	31.1	31.0	31.2	31.0	32.3	32.1
Snout length	5.9	7.0	6.7	6.9	6.3	6.3
Orbit diameter	10.4	9.9	10.3	10.1	10.7	9.9
Fleshy interorbital width	5.7	5.0	5.7	5.1	5.1	5.2
Bony interorbital width	4.1	3.6	4.5	3.7	3.9	3.8
Body width	10.8	12.8	11.6	13.3	12.4	12.9
Snout to RA	15.2	15.6	15.6	16.3	15.8	15.7
Upper-jaw length	11.2	11.4	12.0	11.7	11.7	11.3
Predorsal length	33.7	32.8	33.7	33.6	32.8	32.7
Prepelvic length	32.7	31.6	31.6	32.4	32.8	32.1
RA to pelvic-fin origin	18.5	18.9	17.2	19.1	19.4	19.5
DFO to PvO	27.6	29.7	29.6	29.2	29.4	28.8
DFO to middle D ray	30.9	35.0	37.1	32.4	39.3	31.0
DFO to AFO	42.1	42.1	44.2	43.0	42.0	43.7
PvO to AFO	26.8	27.2	29.4	28.5	26.0	33.2
Middle D ray to last D ray	27.4	28.0	28.0	29.7	27.7	26.1
Middle D ray to AFO	27.8	28.2	27.0	28.3	28.2	26.4
AFO to last D ray	35.4	38.5	38.1	39.1	39.1	36.3
Anal-fin base length	27.0	31.0	29.4	30.1	31.1	28.0
Dt to At	15.2	14.3	15.4	16.3	16.3	16.2
Dt to CPde	10.8	10.5	12.0	10.6	10.0	10.4
Dt to CPve	18.1	19.2	18.1	19.1	18.9	18.4
At to CPde	19.3	18.7	18.1	19.3	18.9	20.6
At to CPve	12.0	11.0	13.2	11.5	10.0	11.3
First dorsal spine	2.4	2.1	2.6	2.8	2.7	2.7
Second dorsal spine	4.7	4.8	6.1	6.2	5.8	4.9
Third dorsal spine	7.7	7.8	8.1	8.7	8.7	8.2
First dorsal soft ray	12.6	12.2	12.2	13.8	13.6	13.5
Fourth last D ray	17.9	15.6	20.3	19.5	17.7	18.4
First anal spine	1.4	1.7	2.4	2.1	1.7	1.6
Second anal spine	4.7	4.2	5.1	4.6	3.9	3.0
Third anal spine	6.9	5.7	6.7	7.1	7.0	5.8
First soft anal ray	10.6	12.4	13.0	11.5	11.2	12.4
Fourth last A ray	16.9	19.0	17.8	17.7	17.0	17.6
Pectoral-fin length	22.0	23.0	21.7	22.5	21.8	22.8
Pelvic-fin spine	10.6	11.2	11.6	12.0	11.7	10.7
Second soft pelvic ray	27.8	26.3	29.0	28.0	21.6	27.5
Caudal-fin length	29.5	28.2	30.0	29.2	28.4	27.5

FAMILY APOGONIDAE

Ostorhinchus tricinctus n. sp.

Allen & Erdmann
(Figs. 1-2; Table 1)

Holotype: WAM P.33008-009, male, 56.5 mm SL, south-western corner of Entalula Island, 11°07.822'N, 119°19.810'E, Bacuit Bay, Palawan, Philippines, 22 m, rotenone, G.R. Allen & M.V. Erdmann, 13 June, 2008.
Paratypes (collected with holotype): WAM P.33008-036, 2 specimens, 31.7-36.0 mm SL.

Diagnosis: Dorsal rays VI + I,9-10; anal rays I or II,8; pectoral rays 13; lateral-line scales 24; predorsal scales 8; developed gill rakers 5-7 + 18-19 plus 2-3 tiny rudiments at beginning of upper limb; preopercular margin serrate; preopercular ridge smooth; caudal fin moderately forked; body depth 2.8-3.0 in SL; overall colour red (including fins) with three slightly oblique greyish-brown bands on middle of side.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays VI + I,10 (9); anal rays II,8 (one paratype with I,8); all dorsal and anal soft rays branched, last to base; pectoral rays 14, lowermost and uppermost pairs unbranched; pelvic rays I,5, all rays branched; principal caudal rays 17, upper and lower rays unbranched; upper and lower procurrent caudal rays 5, most posterior (and occasionally one preceding it) segmented; lateral-line scales 24, plus 2 small pored scales posterior to hypural plate; scales above lateral line to origin of dorsal fin 2; scales below lateral line to origin of anal fin 7; median predorsal scales 8; circumpeduncular scales 12; developed gill rakers 5 + 18 (6-7 + 19), 2-3 tiny rudiments at beginning of upper limb; branchiostegal rays 7; supraneural (predorsal) bones 3; vertebrae 10 + 14.

Body depth 2.8 (2.8-3.0) in SL; body width 1.9 (2.2-2.4) in depth; head length 2.4 (2.4-2.5) in SL; dorsal profile of head more or less straight, slight concavity in snout profile; snout length 4.4 (4.8-5.4) in head; orbit diameter 3.9 (3.1-3.4) in head; bony interorbital width 6.6 (5.4-6.3) in head; caudal peduncle depth 2.9 (3.0-3.3) in head; caudal peduncle length 1.7 (1.4-1.5) in head.

Mouth large, the maxilla reaching a vertical through rear edge of eye, upper jaw length 1.9 (1.8-1.9) in head; mouth oblique, gape forming angle of about 35 degrees to horizontal axis of head and body; posterior edge of maxilla slightly concave; no supramaxilla present; lower jaw slightly subterminal; upper jaw with band of small villiform teeth in about 6-12 irregular rows with toothless gap at front of jaw; lower jaw with band of similar teeth in about 5-7 irregular rows, narrowing to 1-2 rows posteriorly; irregular band of small teeth forming 'V' on vomer and straight, narrow row on each palatine; tongue broad-based with rounded tip.

Anterior nostril a small, membranous tube with pointed flap, just above upper lip on side of snout; posterior nostril relatively large and ovate without raised rim, adjacent to anterior orbital

Figure 1. *Ostorhinchus tricinctus*, holotype, 56.5 mm SL, underwater photograph, Bacuit Bay, Palawan, Philippines (G. Allen photo)

rim at level of middle of eye. Cephalic lateralis papillae lines numerous, especially perpendicular lines on interorbital, around eye, and on ventral surface of lower jaw; 23 (19-21) fine serrae on rear margin of preopercle; preopercular ridge smooth.

Scales weakly ctenoid; lateral line conspicuous, nearly paralleling dorsal contour of body to end of dorsal fin, then abruptly descending to middle of caudal peduncle, continuing in straight line to caudal-fin base (two small, pored scales posterior to hypural); no scales on dorsal and anal fins except low sheath at base of second dorsal and anal fins; small scales on about basal one-fourth of caudal fin; no scales on paired fins except pair of large midventral scales at base of pelvic fins.

Origin of first dorsal fin above fourth lateral-line scale; predorsal length 2.0 (2.0-2.1) in SL; first dorsal spine slender and short, 5.3 (4.4-4.6) in head; second dorsal spine longest, 2.2 (1.7-1.8) in head; fourth or fifth soft dorsal rays longest, 2.0 (2.0-2.1) in head; origin of anal fin below base of about first dorsal soft ray; preanal length 1.5 (1.6) in SL; first anal spine 9.6 (8.1) in head; second anal spine 2.8 (2.7-3.0) in head; fourth or fifth anal soft rays longest, 2.1 (1.8-2.0) in head; caudal fin forked, 1.6 (1.2-1.4) in head; caudal concavity 5.1 (5.7-6.1) in head; middle pectoral rays longest, 1.5 (1.5-1.8) in head; origin of pelvic fins level with pectoral-fin base; prepelvic length 2.4 (2.5-2.6) in SL; first pelvic soft ray longest, just reaching anal-fin origin, 1.8 (1.6-1.7) in head.

Colour in life (Fig. 1): scales above lateral line mainly grey with narrow red margins; remainder of head and body mainly red, but many scales with broad grey margins, giving overall dusky red appearance; three slightly oblique, greyish-brown bands on middle of side, first two below middle of first and second dorsal fins respectively, and third across anterior part of caudal peduncle; fins semi-translucent reddish.

Colour in alcohol (Fig. 2): generally brown to yellowish tan with faint hint of three dark bands described above; fins semi-translucent whitish.

Remarks: The new species belongs to the genus *Ostorhinchus* Lacepède. Members of this group were formerly included in the subgenus *Nectamia* Jordan as defined by Fraser (1972). However, the latter name is a junior synonym of *Ostorhinchus*, which has recently been elevated to full generic status (Fraser, pers. comm. and Randall 2005).

The new species is very similar to *O. talboti* Smith, 1961, which is widely distributed in the Indo-west Pacific region. Both species are characterised by six spines in the first dorsal fin, 13 pectoral-fin rays, and a predominately red colouration, although *O. talboti* lacks the three dark bands on the middle section of the body (Fig. 3). They also occur in similar cave habitats, and although not seen or collected together at the same site, both occur in the El Nido vicinity of northern Palawan. Although our sample size for the new species is limited to three specimens, there is a difference in the extent of the thin skin flap at the posterior corner of the preopercle (Fig. 4) when compared to eight specimens of *O. talboti* lodged at WAM. The flap is relatively wider in *O. tricinctus*, nearly equal to the pupil width, compared to about 50-70 % of the pupil width in *O. talboti*. Moreover, there are two very large sensory pores in the middle of the flap, whereas in *O. talboti* the pores are inconspicuous and situated on the margin of the flap. The flap extends to the edge of the opercle margin in the two small paratypes of *O. tricinctus*. Moreover the middle of the flap is perforated by a large sensory pore

Figure 2. *Ostorhinchus tricinctus*, preserved holotype, 56.5 mm SL, Bacuit Bay, Palawan, Philippines (G. Allen photo)

Figure 3. *Ostorhinchus talboti*, about 85 mm SL, underwater photograph, Halmahera, Indonesia (G. Allen photo)

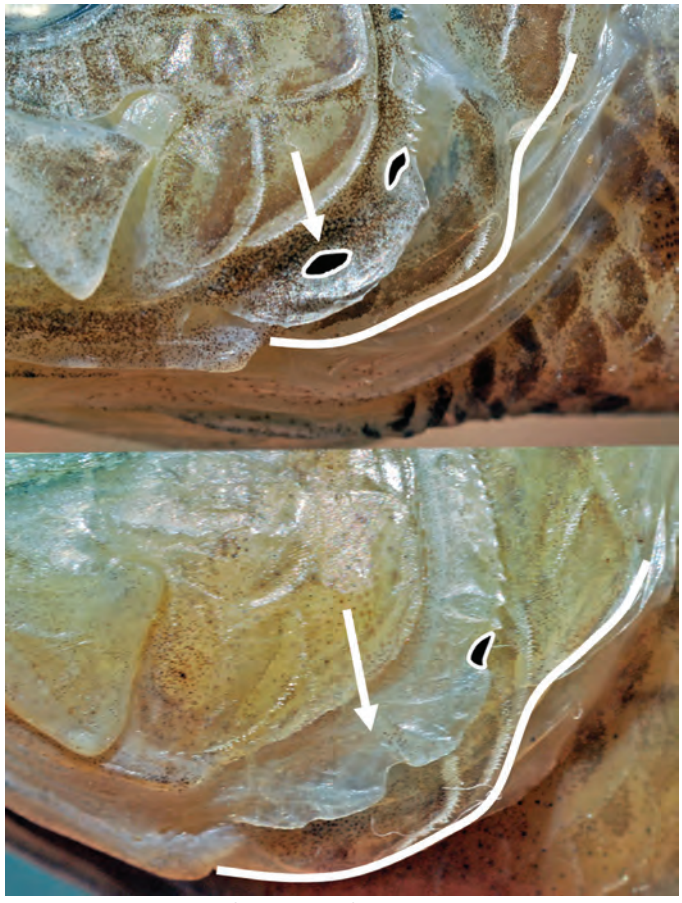

Figure 4. Preopercular skin flaps (arrow) of *Ostorhinchus tricinctus*, 56.5 mm SL (upper) and *O. talboti*, 59.5 mm SL (lower). The edge of the operculum is indicated by the solid white line. Preopercular flap sensory pores shown in black outlined in white (G. Allen photos)

(Fig. 4, upper), which is absent in *O. talboti*. The first-arch gill rakers are generally better developed in *O. trincinctus* with 5-7 rakers on the upper limb and 18 or 19 on the lower limb. In contrast, those of *O. talboti* are generally weaker, usually with 2-3 developed rakers on the upper limb and 10-12 on the lower, plus 5-6 rudimentary rakers. For the purposes of this comparison we have examined eight specimens of *O. talboti*, 43.7-59.1 mm SL at WAM from Christmas Island (Indian Ocean), Indonesia (Banggai Islands, Flores, and Halmahera), and northern Western Australia.

Ostorhinchus tricinctus is currently known only from the type locality at Bacuit Bay, in the El Nido district of northernmost Palawan Island, Philippines. The type specimens were collected in a large cave at the base of a steep slope, next to shore, in 22 m depth.

Etymology: The species is named *tricinctus* (Latin: "three-belts") with reference to the unique colour feature of three dark bands on the middle of the body.

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Table 1. Proportional measurements (as percentage of SL) for type specimens of *Ostorhinchus tricinctus*. Missing spine denoted by asterisk (*).

	Holotype WAM P. 33008-009	**Paratype WAM P. 33008-036**	**Paratype WAM P. 33008-036**
Standard length (mm)	56.5	36.0	31.7
Body depth	36.3	33.9	36.3
Body width	18.9	14.2	16.7
Head length	42.3	40.6	41.0
Snout length	9.6	7.5	8.5
Eye diameter	10.8	11.9	13.2
Bony interorbital width	6.4	6.4	7.6
Upper jaw	21.8	20.8	22.4
Depth of caudal peduncle	14.5	13.6	12.3
Length of caudal peduncle	25.0	26.9	28.7
Predorsal length	49.4	46.9	47.6
Preanal length	67.6	61.7	62.1
Prepelvic length	42.1	38.1	39.7
First dorsal-spine length	8.0	9.2	8.8
Second dorsal-spine length	19.6	23.3	22.4
Third dorsal-spine length	9.0	6.7	7.6
First spine of second dorsal fin	12.4	13.9	13.6
Longest soft dorsal ray	20.7	18.9	20.2
First anal-spine length	4.4	5.0	0.0*
Second anal-spine length	14.9	15.0	13.6
Longest soft anal ray	20.5	22.2	20.5
Caudal-fin length	26.2	33.9	30.0
Caudal concavity	8.3	6.7	7.3
Pectoral-fin length	28.7	31.7	30.3
Pelvic-spine length	16.6	18.9	18.6
Pelvic-fin length	23.2	25.6	23.7

FAMILY NEMIPTERIDAE

Methods following Allen & Erdmann, 2009 and Russell, 2001.

Pentapodus komodoensis n. sp.

Allen & Erdmann
(Figs. 1-3, Table 1)

Holotype: MZB 20598, 104.1 mm SL, Nusa Kode, 8°47.167'S, 119°39.601'E, Komodo Islands, Indonesia, 15-20 m, spear, M.V. Erdmann, 7 September 2010.
Paratypes (collected with holotype): MZB 20599, 111.4 mm SL; WAM P.33354-001, 3 specimens, 89.6-102.9.

Diagnosis: Caudal fin slightly emarginate, without filamentous extensions on either lobe; broad, tapering golden yellow stripe on side of body; predorsal scales reaching forward to about level of anterior edge of eye, well behind posterior nostril openings; suborbital naked; lower limb of preopercle with 1-2 rows of small scales; lateral-line scales 44 (plus tubed scale on caudal-fin base); pectoral-fin rays 16; eye diameter greater than snout diameter.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal-fin rays X,9; anal-fin rays III,7; pectoral-fin rays 16, all rays branched except two uppermost and two lowermost; pelvic-fin rays I,5; lateral-line scales 44; transverse scale rows above lateral line 2.5; transverse scale rows below lateral line 11 (10-11); circumpeduncular scales 18; transverse scale rows on preopercle 5-6 + 1-2; gill rakers on first branchial arch 4 + 9 (4-6 + 8-9), all low and rudimentary; pseudobranchs 26 (25-29); vertebrae 24.

Body depth at dorsal fin origin 3.8 (3.8-4.1) in SL; maximum body depth 3.8 (3.7-4.1) in SL; body width 5.5 (5.4-6.2) in SL; head length 3.2 (3.3-3.4) in SL; eye 2.7 (2.8-3.0) in head

Figure 1. *Pentapodus komodoensis*, adult, approximately 100 mm SL, underwater photograph, Nusa Kode, Komodo Islands, Indonesia (G. Allen photo)

Figure 2. *Pentapodus komodoensis*, juvenile, approximately 50 mm SL, underwater photograph, Nusa Kode, Komodo Islands, Indonesia (G. Allen photo)

length; snout 3.9 (3.1-3.6) in head length; bony interorbital width 4.1 (2.9-3.8) in head length; suborbital depth 10.5 (9.9-10.8) in head length; caudal peduncle depth 2.7 (2.3-2.5) in caudal peduncle length; caudal peduncle length 1.4 (1.4-1.5) in head length; predorsal length 3.0 (2.9-3.0) in SL; preanal length 1.5 (1.5-1.6) in SL; prepelvic length 2.9 (2.7-2.9) in SL; prepectoral length 3.1(3.1-3.3) in SL; dorsal-fin base length 2.1 (1.9-2.1) in SL; first dorsal spine 2.4 (1.5-2.6) in longest (fifth) dorsal spine; fifth dorsal spine 2.2 (2.1-2.9) in head length; sixth or seventh dorsal soft ray longest, 2.9 (2.5-2.9) in head length; anal-fin base length 7.3 (6.2-7.4) in SL; first anal spine 2.2 (1.9-2.1) in length of second anal spine; second anal spine 1.3 (1.1-1.4) in length of third anal spine; third anal spine 3.8 (3.3-3.8) in head length; pectoral-fin length 1.5 in head length; pelvic-fin length 1.5 (1.3-1.4) in head length; pelvic-spine length 1.4 (1.4-1.7) in pelvic-fin length; caudal fin length 1.8 (1.5-1.8) in head length; caudal concavity 6.0 (9.4-11.5) in head length.

Maxilla reaching level of anterior margin of eye, its length 3.3 (3.1-3.5) in head length; pelvic fins falling well short of anal opening; predorsal scales 25 (24-28), reaching forward to about level of anterior edge of eye, well short of posterior nostrils; suborbital naked; lower limb of preopercle with 1-2 rows of small scales; two pairs of moderately large canines at front of upper jaw and strong, laterally flaring canine at each corner of front of lower jaw.

Colour in life (Fig. 1): snout and forehead dull yellow; iridescent blue band below eye; iris bright yellow; brown on upper back, bluish along ventral head and body with broad, posteriorly tapering, golden yellow stripe (with brownish margins) on side between these two zones; narrow blue stripe from forehead continuing along base of dorsal fin to upper surface of caudal peduncle; fins semi-translucent often with bluish reflections.

The broad, midlateral golden stripe can be quickly "switched" on and off. When it is turned off the fish is brownish dorsally and bluish ventrally with a relatively narrow, midlateral white stripe. A diffuse remnant of the white stripe is usually evident towards the tail in fish displaying the broad golden stripe.

Colour of juvenile (Fig. 2): overall sky blue with pair of bright yellow stripes converging at snout, upper, narrow one extending along back to end of dorsal fin and wider midlateral stripe to base of caudal fin.

Colour of holotype in alcohol (Fig. 3): generally brown with narrow dark scale margins; fins translucent tan.

Remarks: The family Nemipteridae was reviewed by Russell (1990), who included nine species in the genus *Pentapodus*: *P. bifasciatus* (Bleeker, 1848); *P. caninus* (Cuvier, 1830); *P. emeryii* (Richardson, 1843); *P. nakasakiensis* (Tanaka, 1915); *P. paradiseus* (Günther, 1859); *P. porosus* (Valenciennes, 1830); *P. setosus* (Valenciennes, 1830); *P. trivittatus* (Bloch, 1791); and *P. vitta* (Quoy & Gaimard, 1824). Two additional species, *P. aureofasciatus* Russell, 2001 and *P. numberii* Allen & Erdmann, 2009, were described since Russell's review.

Pentapodus can be divided into two main groups on the basis of caudal fin shape. One group containing *P. emeryii*, *P. numberii*, *P. paradiseus*, and *P. setosus* is characterised by the possession of long trailing filaments on one or both caudal-fin lobes. All other members of the genus, including *P. komodoensis*, lack filamentous caudal lobes. It is separable from most of the non-filamentous species in having the predorsal scales extending forward only to about the anterior margin of the eye and in possessing scales on the lower limb of the preopercle. The only other species with these features are *P. aureofasciatus* (Fig. 4) and *P. trivittatus* (Fig. 5) The latter species differs in having a different colour pattern, longer

Figure 3. *Pentapodus komodoensis*, preserved holotype, 104.1 mm SL, Komodo Islands, Indonesia (G. Allen photo)

snout (greater than eye diameter), and deeper (greatest depth about 2.8-3.2 vs. 3.7-4.1 in SL), more robust body. Both *P. komodoensis* and *P. aureofasciatus* display a yellow midlateral stripe, but that of the latter species is much narrower (about one-fourth body depth) than in *P. komodoensis*, which has a stripe that occupies about one half of the body depth, at least anteriorly. The new species also has a larger eye, which in *P. aureofasciatus* is about equal to the snout length. Both *P. trivittatus* and *P. aureofasciatus* are widespread in the East Indian region and sympatric with *P. komodoensis*.

The new species is currently known only from the Komodo Islands, where it is locally common. It generally occurs in small schools, containing up to about 20-30 individuals, over rubble slopes at depths of about 12-25 m.

Etymology: This species is named *komodoensis* with reference to the type locality.

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Figure 4. *Pentapodus aureofasciatus*, adult, approximately 125 mm SL, underwater photograph, Anilao, Luzon, Philippines (G. Allen photo)

Figure 5. *Pentapodus trivittatus*, adult, approximately 150 mm SL, underwater photograph, Raja Ampat Islands, West Papua, Indonesia (G. Allen photo)

Table 1. Proportional measurements (as percentage of SL) of type specimens of *Pentapodus komodoensis*.

	Holotype MZB 20598	Paratype MZB 20599	Paratype WAM P.33354	Paratype WAM P.33354	Paratype WAM P.33354
Standard length	104.1	111.4	102.9	92.8	89.6
Body depth at dorsal origin	26.0	26.2	25.7	24.5	25.1
Maximum depth	18.3	16.2	18.5	17.2	17.1
Body width	31.2	29.4	29.7	30.4	30.7
Head length	8.1	9.4	8.3	9.3	8.5
Snout length	11.6	10.4	10.2	10.2	10.4
Eye diameter	7.7	9.8	7.8	10.3	8.3
Interorbital width	3.0	2.9	3.0	2.8	3.0
Suborbital depth	9.5	9.0	8.9	8.7	9.9
Upper-jaw length	8.3	8.3	8.8	8.7	9.4
Caudal-peduncle depth	22.1	19.7	21.9	21.6	21.8
Caudal-peduncle length	33.7	33.9	33.8	33.9	33.7
Predorsal length	65.0	66.7	66.7	65.5	62.6
Preanal length	35.0	36.3	34.7	37.4	35.7
Prepelvic length	31.9	31.3	30.1	31.7	31.8
Prepectoral length	48.1	47.3	47.2	49.6	51.3
Dorsal-fin base length	5.8	6.1	6.3	7.0	5.7
First dorsal spine	13.9	11.9	14.5	10.3	14.8
Longest dorsal spine	11.6	8.3	11.0	13.0	11.4
Last dorsal spine	11.0	11.8	11.7	10.3	11.8
Longest dorsal ray	13.6	15.3	13.6	16.1	16.0
Anal-fin base length	2.8	3.0	3.4	3.9	3.5
First anal spine	6.1	5.9	6.6	8.1	7.3
Second anal spine	8.3	8.2	7.8	9.3	9.4
Third anal spine	11.3	10.8	11.3	11.4	10.8
Longest anal ray	20.4	20.0	20.0	20.3	20.2
Pectoral-fin length	21.4	22.5	22.1	24.1	21.9
Pelvic-fin length	15.1	13.3	15.5	15.1	15.2
Pelvic-spine length	17.4	16.6	17.0	19.6	19.6
Caudal-fin length	5.2	3.1	3.2	2.7	2.7
Caudal concavity	26.0	26.2	25.7	24.5	25.1

FAMILY CHAETODONTIDAE

Forcipiger wanai n. sp.

Allen, Erdmann & Jones Sbrocco
(Figs. 1-2; Table 1)

Holotype: MZB 20577, female, 141.5 mm SL, Numamuran Strait, 02°27.178'S, 134°31.832'E, Cenderawasih Bay, West Papua Province, Indonesia, 10-20 m, spear, G.R. Allen, 12 September 2010.
Paratypes: BPBM 41049, 90.6 mm SL, same location as holotype, 30-35 m, spear, G.R. Allen, 11 November 2008; MZB 20586, 3 specimens, 98.4-100.1 mm SL, collected with holotype; USNM 400000, 95.3 mm SL, collected with BPBM paratype; WAM P.33049-004, 3 specimens, 99.0-118.6 mm SL, collected with BPBM paratype.

Diagnosis: A species of the chaetodontid genus *Forcipiger* with the following combination of characters: dorsal rays XI,24-25; anal rays II,18-19; pectoral rays usually 15 (occasionally 16); total gill rakers on first branchial arch 14-18; tubed lateral-line scales 56-65; snout extremely long and slender, its length, 2.6-3.2 in SL; gape tiny, 3.5-8.3 in eye diameter; maximum size to about 15 cm SL or about 17 cm TL; colour in life mainly brown with black upper head and bright yellow bar immediately behind head; dorsal and anal fins yellow-orange, brown basally, and narrow blue posterior margin; conspicuous black spot covering most of last few anal rays.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays XI,25 (one paratype with 24); anal rays III,19 (18-19); pectoral rays 15 (two paratypes with 16) ; total gill rakers on first branchial arch 14 (14-17); tubed lateral-line scales 59 (56-65); scales above lateral line to dorsal-fin origin 9 (9-10); scales below lateral line to anal-fin origin 25 (23-25); circumpeduncular scales 25 (23-25).

Body moderately deep and strongly compressed laterally, depth 2.7 (2.3-2.6) in SL and maximum width of body 3.9 (4.0-4.6) in depth; head length contained 1.8 (1.8-2.0) in SL; snout extremely slender and elongate, its length 2.6 (2.6-3.2), in SL; eye 8.4 (5.4-7.6), interorbital width 9.1 (7.3-9.0), least depth of caudal peduncle 9.1 (7.3-8.9), length of caudal peduncle 14.3 (10.9-13.4), all in head length.

Mouth extremely small, the gape 4.1 (3.5-5.9) in eye diameter; pair of small teeth on lower jaw, just behind gape; single conspicuous nasal opening on each side of snout; about one half eye diameter distance in front of anterior edge of orbit; nostril with fleshy rim and well-developed posterior flap; margins of preorbital and suborbital smooth; margin of preopercle and opercle smooth, except a blunt, flattened spine present on upper part of opercle; ventroposterior margin of operculum strongly angular.

Scales of head and body finely ctenoid; lateral line complete, ascending gradually to middle of body, then descending relatively steeply to caudal peduncle; scales on top of head extending forward to between anterior edge of eye and nostrils, forming a narrow strip of scales on middle of interorbital (flanked by naked supraorbital shelf that is sculptured with prominent ridges); suborbital and posterior part of preorbital scaled; long, tubular snout scaleless; preopercle with 9 (8-9) transverse rows of scales; dorsal and anal fins with basal scaly sheath, increasing in height posteriorly until covering about two-thirds height of fin at anterior soft dorsal rays and middle anal rays, then decreasing in height; preorbital, lips, chin, and isthmus naked; inter-radial membranes of caudal fin scaled basally; inner axil and distal half of pectoral-fin base scaleless.

Figure 1. *Forcipiger wanai*, adult, about 140 mm SL, underwater photograph, Cenderawasih Bay, West Papua, Indonesia (G. Allen photo)

Figure 2. *Forcipiger wanai*, preserved holotype, 141.5 mm SL, Cenderawasih Bay, West Papua, Indonesia (G. Allen photo)

Origin of dorsal fin about level with pectoral-fin insertion; dorsal spines high and deeply incised, gradually increasing in length to fourth or fifth spines, then gradually decreasing; first dorsal spine 1.8 (1.7-1.9) in second dorsal spine; second dorsal spine 2.1 (1.9-2.6) in third dorsal spine; third dorsal spine 1.2 (1.0-1.4) in fourth dorsal spine; last dorsal spine 3.6 (2.8-3.6) in head length; longest soft dorsal ray 3.6 (2.5-3.6) in head length; length of dorsal fin base 2.1 (1.8-2.2) in SL; first anal spine 2.0 (1.8-2.2) in second anal spine; second anal spine 1.2 (1.1-1.3) in third anal spine; third anal spine 2.7 (2.3-2.8) in head length; longest soft anal ray 2.8 (2.2-2.7) in head length; base of anal fin 2.2 (2.0-2.2) in base of dorsal fin; caudal fin emarginate, upper lobe clearly longer than lower, its length 3.3 (2.2-3.0) in head length; pectoral fins elongate, reaching to about level of anal spines or slightly posterior, longest ray 3.1 (2.5-3.1) in head length; filamentous tips of pelvic fins reaching beyond origin of anal fin, the longest ray 4.2 (3.2-4.3) in SL.

Colour in life (Fig. 1): body and adjacent basal portion of dorsal and anal fins brown; prominent bright yellow bar from base of first three dorsal spines to belly, merging with bright yellow pelvic fins; nape and upper half of head, including top of elongate snout, black; breast and lower half of head white; dorsal and anal fins mainly yellow orange (except brown basal portion) with narrow blue posterior margin and prominent black spot posteriorly on anal fin; pectoral and caudal fins translucent.

Colour of holotype in alcohol (after 3 months of preservation, Fig. 2): body and dorsal and anal fins yellowish brown; nape and upper half of head black; breast and lower half of head tan; pectoral and caudal fins translucent with dusky brownish rays; pelvic fins whitish; prominent black spot covering last 5-6 anal rays.

Remarks: This species is closely related to the wide-ranging (East Africa to Hawaiian Islands and French Polynesia) *Forcipiger longirostris* (Broussonet) and most likely evolved from the same ancestral stock. Allen *et al*. (in preparation) have shown that Cenderawasih Bay is home to an inordinate number of endemic reef fishes, scleractinian corals, and stomatopods. Based on these data and additional genetic and palaeogeological information it is evident that Cenderawasih Bay was effectively isolated for lengthy periods during the past five million years, thus facilitating the evolution of a diversity of species that show marked genetic and/or morphological differences compared to neighbouring populations outside the bay.

The two species are very similar in general appearance, especially with regards to the extremely elongate snout, which clearly separates them from *Forcipiger flavissimus* (see Randall & Caldwell, 1970). They differ from each other most notably with regards to overall colour pattern. The body of *F. longirostris* is overall bright yellow, in contrast to the sombre brown hue of *F. wanai*. However, both species exhibit a melanistic variety that is overall dark brown to blackish. The dark variety is exceptionally rare in *F. wanai* with a proportion of more than 100 normal individuals seen per single dark coloured fish. In addition to the basic colour difference between the two species there are discrepancies in counts for pectoral rays and lateral-line scales. *Forcipiger wanai* usually has 15 pectoral rays (only two with 16 rays of 9 specimens counted) compared to a strong modal count of 16 for *F. longirostris* (only 6 of 43 specimens with 15 rays, data from Randall & Caldwell, 1970). Similarly, there is a difference in lateral-lines scales with counts usually ranging from 59-62 (except one specimen with 56 and one with 65 scales, mean = 60.8, n = 16, counts on both sides unless lateral line damaged) in *F. wanai* compared with 61-74 (mean = 67.6, n = 43, only one fish with less than 63 scales) in *F. longirostris*. There is also an apparent difference in maximum size. Randall (2005) reported a total length of 22 cm for *F. longirostris*, considerably longer than our largest specimen, which measures about 17 cm.

The habitat of *F. wanai* consists primarily of outer or seaward reef slopes and deep passages and channels at depths of about five to at least 40 m. The species occurs both on relatively silty reefs adjacent to the mainland of Cenderawasih Bay, as well as clear waters of offshore reefs and submerged atolls. It typically occurs in pairs containing similar-sized individuals. During a single 60-minute dive up to about 15 pairs may be encountered at some locations. *Forcipiger flavissimus* is typically the most common member of the genus, far outnumbering *F. longirostris* at most areas in Indonesia. However, at Cenderawasih Bay, *F. flavissimus* is extremely rare in relation to *F. wanai*.

Genetic methodology: We assessed the genetic relationships between the putative new species, *Forcipiger wanai*, and its congeners, *F. longirostris* and *F. flavissimus*, using mitochondrial DNA sequence analysis. Tissue samples from the three species were collected from Cenderawasih Bay, and other Indonesian locations including Banda Islands, Flores, and three localities at the Raja Ampat Islands (Fig. 3) and stored in 95 % ethanol. Genomic DNA was extracted by 10 % Chelex (Walsh *et al*., 1991) and we amplifed the 3' end of the mitochondrial control region using the primers CR-A and CR-E (Lee *et al*., 1995) following the PCR protocols of Drew *et al*. (2008). Excess nucleotides and primer were removed using Shrimp Alkaline Phosphatase and Exonuclease I following the protocols of Barber *et al.* (2006). Cleaned PCR products were sequenced using BigDye Terminator 3.1 sequencing chemistry (Applied Biosystems, Foster City, California) following manufacturer's protocols and electrophoresed on an ABI 3730 DNA Analyzer (Applied Biosystems). Forward and reverse sequence strands were reassembled and proofread using Sequencher 4.7 (Gene Codes Corporation, Ann Arbor, Michigan), then aligned

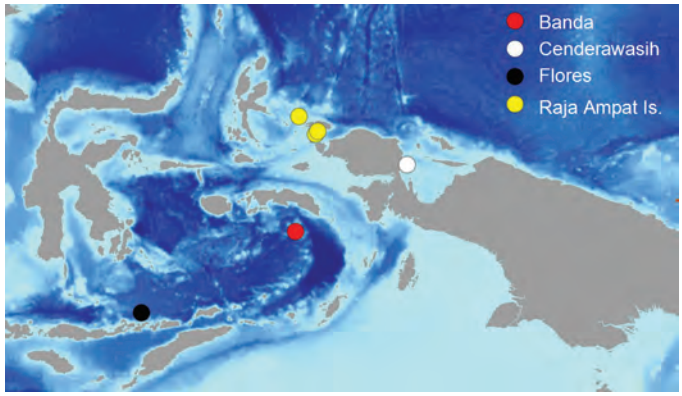

Figure 3. Indonesian collection localities for the *Forcipiger* specimens sequenced in this study.

using TCoffee (Notredame *et al*., 2000, Di Tommaso *et al*., 2011) with subsequent edits made by eye. Phylogenetic relationships were assessed through neighbor-joining analysis using uncorrected p-distances, and through maximum parsimony analysis conducted in PAUP* 4.0b10 (Swofford, 2002). Maximum parsimony trees were obtained through an heuristic search with simple sequence addition and TBR branch swapping. Gaps were considered missing data for both neighbor-joining and parsimony analyses. Clade support was assessed by 1,000 bootstrap replicates of both neighbor-joining and parsimony trees.

Genetic results: Analysis of a 414 base-pair alignment of the mitochondrial control region DNA sequences from 43 individuals revealed three highly-differentiated clades within the *Forcipiger* genus, each with 100 % bootstrap support from both neighbor-joining and maximum parsimony analyses (Fig. 4). Maximum uncorrected sequence divergence within clades was 3 % within the *F. flavissimus* clade, 5.1% within the *F. longirostris* clade, and 6.2 % within the *F. wanai* clade. *F. wanai* was most closely related to *F. longirostris*, with a minimum sequence divergence of 15.7 % between members of these two clades. Minimum sequence divergence between members of the more distantly related *F. flavissimus* clade was 31.5 % for *F. longirostris* and 33.2 % for *F. wanai*. These results, however, indicate that *F. longirostris* may be paraphyletic since two individuals identified on the basis of morphology as *F. longirostris* from the Banda Islands possessed mitochondrial haplotypes that placed them within the *F. wanai* clade. We hypothesise that the placement of these two samples within the *F. wanai* clade could be the result of ancestral polymorphism and incomplete lineage sorting between the two clades at the mitochondrial control region locus, or it could be due to gene flow between the Cenderawasih Bay and the Banda Islands followed by mitochondrial introgression of the *F. wanai* haplotypes into the Banda population. Further investigation with nuclear loci is required in order to distinguish between these two hypotheses.

Etymology: The species is named *wanai*, which is the name used by local inhabitants (Wandammen language group) in the south-western portion of Cenderawasih Bay for this species.

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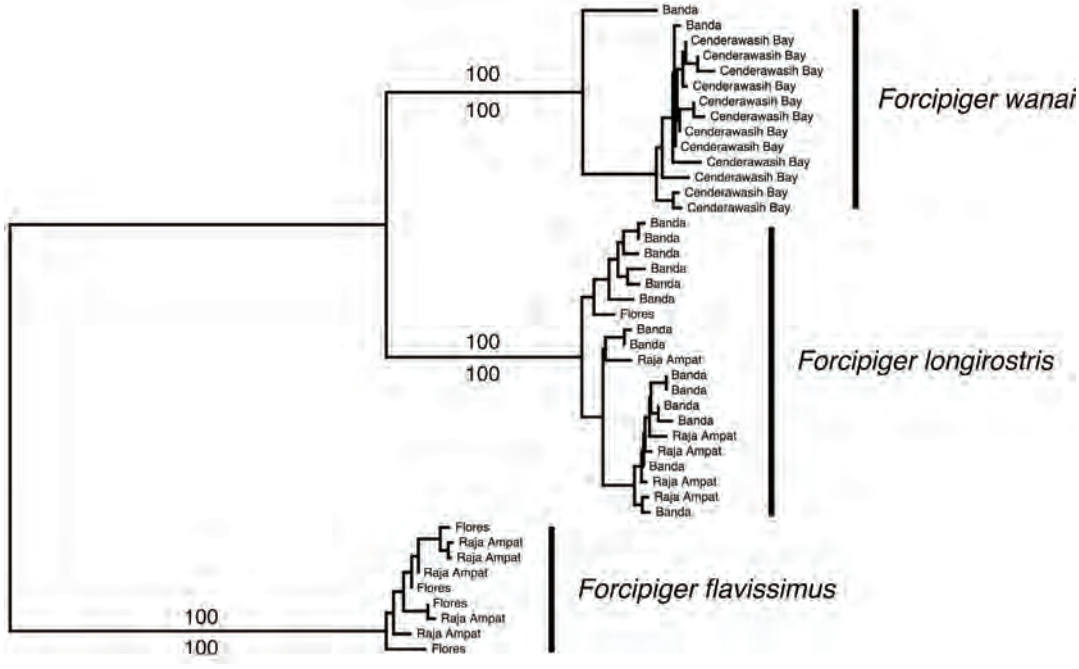

Figure 4. Neighbour-joining tree generated from a 414bp sequence alignment of the mitochondrial control region. Numbers above and below nodes indicate support of major *Forcipiger* clades based on 1,000 bootstrap replicates from neighbour-joining and maximum parsimony analyses, respectively. Tip labels reference sampling localities shown in Figure 3.

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Table 1. Proportional measurements (as percentage of SL) for selected type specimens of *Forcipiger wanai*.

	Holotype MZB 20577	**Paratype MZB 20578**	**Paratype WAM P. 33049**	**Paratype WAM P. 33049**	**Paratype MZB 20586**	**Paratype USNM 400000**	**Paratype BPBM 41049**
Standard length (mm)	141.5	122.7	118.6	100.6	98.4	95.3	90.6
Body depth	36.9	41.9	38.2	42.6	43.8	42.2	42.9
Body width	9.4	10.4	9.6	10.0	11.1	10.3	9.4
Head length	55.5	56.3	56.1	50.1	51.9	54.8	55.3
Snout length	37.8	37.7	38.3	31.7	32.1	34.8	34.8
Eye diameter	6.6	7.4	7.4	9.0	9.7	8.8	8.2
Interorbital width	6.1	6.3	6.5	6.9	7.0	6.6	6.3
Depth of caudal peduncle	6.1	6.4	6.3	6.9	7.1	6.5	6.5
Length of caudal peduncle	3.9	4.6	4.3	4.6	4.6	4.6	5.1
Predorsal distance	55.1	56.5	56.1	51.9	53.7	55.3	54.9
Preanal distance	79.6	84.3	80.2	77.2	78.2	79.7	80.8
Prepelvic distance	60.4	60.4	59.9	55.8	54.9	58.0	61.3
Length of dorsal-fin base	48.6	49.8	46.3	54.2	52.4	50.6	51.7
Length of anal-fin base	22.6	22.2	21.8	25.5	25.8	24.4	23.5
Pectoral-fin length	32.5	34.8	32.2	39.8	38.2	38.4	38.5
Pelvic-fin length	23.7	27.4	28.0	31.2	29.2	23.5	30.4
Pelvic-spine length	13.0	15.3	13.7	16.7	15.3	16.1	16.1
1st dorsal spine	4.4	5.7	5.1	5.6	4.8	6.0	5.3
2nd dorsal spine	8.1	8.6	8.8	8.9	8.9	10.0	10.2
3rd dorsal spine	17.3	18.6	18.8	16.6	19.7	19.8	22.8
4th dorsal spine	20.3	23.2	22.3	23.0	23.4	22.8	26.5
Last dorsal spine	15.5	19.3	15.4	18.6	17.6	18.8	20.0
Longest soft-dorsal ray	15.3	18.3	15.8	18.4	18.5	19.5	22.0
1st anal spine	8.6	8.1	8.2	8.4	9.0	9.4	9.5
2nd anal spine	17.0	18.2	16.9	17.0	16.5	17.6	18.1
3rd anal spine	20.5	21.3	20.2	22.2	21.5	21.8	22.1
Longest soft-anal ray	19.5	21.5	20.8	23.1	21.5	21.3	23.7
Caudal-fin length	17.0	18.8	19.4	21.1	24.1	20.0	21.0

FAMILY POMACENTRIDAE

Amblyglyphidodon flavopurpureus n. sp.

Allen, Erdmann & Drew
(Figs. 1-5; Tables 1-2)

Holotype: MZB 20578, male, 94.0 mm SL, Numamuran Strait, 02°27.178'S, 134°31.832'E, Cenderawasih Bay, West Papua Province, Indonesia, 8-15 m, spear, M.V. Erdmann, 12 September 2010.
Paratypes: MZB 20587, 6 specimens, 80.8-93.3 mm SL, collected with holotype.

Diagnosis: A species of the pomacentrid genus *Amblyglyphidodon* with the following combination of characters: dorsal rays XI-XIII (usually XIII),12-13 ; anal rays II,14; pectoral rays 16; gill rakers on first branchial arch 7-8 + 18-19, total rakers 25 to 27; tubed lateral-line scales 13-17 (usually 16); suborbital and preorbital naked; colour in life mainly greyish purple except bright blue on cheek and breast, yellowish brown on forehead region, and brilliant yellow orange on caudal peduncle and adjacent body below posterior half of soft dorsal fin; fins mainly dusky purplish or bluish grey except dorsal and ventral margins of caudal fin and sometimes inner portion of pelvic fins yellow-orange.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays XIII,12 (XIII, 12-13, except one specimen with XI,13 and another with XII,12); anal rays II,14; pectoral rays 16; gill rakers on first branchial arch 7 + 19 (7-8 + 18-19), total rakers 26 (25-27); tubed lateral-line scales 16; vertical scale rows 28; scales above lateral-line to base of middle dorsal spines 2.5; scales below lateral line to anus 9.5; circumpeduncular scales 12; vertebrae 26.

Body depth 1.7 (1.6-1.7) in standard length, maximum width of body 3.2 (2.8-3.3) in depth; head length contained 3.2 (3.1-3.4) in standard length; snout 3.3 (3.0-3.5), eye 3.0 (2.6-3.0), interorbital width 2.7 (2.7-3.1), least depth of caudal peduncle 2.0 (2.1 - 2.2), length of caudal peduncle 2.6 (2.3-3.0), all in head length.

Mouth oblique, terminally located, maxillary reaching to vertical about at anterior edge of eye; teeth of jaws uniserial with flattened or notched tips, about 34-38 teeth in each jaw; single nasal opening on each side of snout; nostril with low fleshy rim; margin of preorbital and suborbital smooth; pre and suborbital relatively narrow, greatest depth about 2.7 in eye diameter; margin of preopercle and opercle smooth, except blunt, flattened spine present on upper part of opercle.

Scales of head and body finely ctenoid; scales on top of head extending forward to about level of nostrils; suborbital and preorbital naked; preopercle with two rows of large scales and additional row of small scales at margin; dorsal and anal fins with basal scaly sheath; lips, chin, and isthmus naked; inter-radial membranes of caudal fin scaled about two-thirds distance to end of lobes; paired fins scaled only basally; axillary scale of pelvic fin about one-half length of pelvic spine.

Tubes of lateral line ending below posterior spines of dorsal fin; pored scales posterior to tubed scales 4 (2-4); series of 7 (7-9) pored scales mid-laterally on caudal peduncle to caudal-fin base.

Figure 1. *Amblyglyphidodon flavopurpureus*, adult, approximately 90 mm SL, underwater photograph, Cenderawasih Bay, West Papua, Indonesia, in 12 m depth (G. Allen photo)

Figure 2. *Amblyglyphidodon flavopurpureus*, subadult, approximately 50 mm SL, underwater photograph, Cenderawasih Bay, West Papua, Indonesia, in 15 m depth (G. Allen photo)

Origin of dorsal fin at level of fourth tubed scale of lateral line; spines of dorsal fin gradually increasing in length to middle spines, remaining spines about equal; membrane between spines conspicuously incised; first dorsal spine 3.2 (2.2-3.3) in seventh dorsal spine; seventh dorsal spine 1.0 (0.9-1.1) in last dorsal spine; last dorsal spine 1.5 (1.3-1.5) in head; longest soft dorsal ray 2.5 (2.3-2.7) in SL; length of dorsal fin base 1.6 (1.6-1.7) in SL; first anal spine 3.4 (2.5-3.0) in second anal spine; second anal spine 1.1 (1.1-1.3) in head; longest soft anal ray 2.9 (2.8-3.1) in SL; base of anal fin 1.9 (1.8-1.9) in base of dorsal fin; caudal fin moderately forked with angular lobes, its length 2.8 (2.6-3.0) in SL; pectoral fins reaching to about level of anal spines, longest ray 2.8 (2.7-2.9) in SL; filamentous tips of pelvic fins reaching beyond origin of anal fin, longest ray 2.6 (2.4-3.0) in SL.

Colour in life (Figs. 1-2): adult mainly greyish purple except bright blue on cheeks and breast, yellowish brown on forehead region, and brilliant yellow orange on caudal peduncle and adjacent body below posterior half of soft dorsal fin; dorsal and anal fins mainly dusky purplish or bluish grey except posterior half of soft dorsal fin and last few anal rays translucent whitish; caudal fin bluish to translucent whitish with yellow dorsal and ventral margins; pelvic fins bluish except sometimes yellowish on posterior half.

Colour of juveniles (about 3-6 cm SL; Fig. 3): silvery grey (slightly darker on forehead) with bluish transverse streak on most of scales on upper half of body; purple or mauve hue on lower head and breast region; iris bright yellow with inner ring of blue; dorsal and anal fins greyish, becoming translucent posteriorly, with yellow anterior margin on anal fin and faint yellow streak on anterior edge of soft dorsal fin; caudal fin translucent with yellow margins dorsally and ventrally, finely edged with blue; pelvic fins entirely bright yellow.

Colour of holotype in alcohol (after 3 months preservation; Fig. 4): head and body generally brown with slightly darker brown scale margins; caudal peduncle and adjacent posteriormost body yellowish tan; dorsal, anal, and pelvic fins blackish except posterior half of soft dorsal fin translucent whitish; caudal fin translucent dusky grey with tan dorsal and ventral margins.

Remarks: This species is closely related to the wide-ranging *Amblyglyphidodon aureus* Cuvier and most likely evolved from the same ancestral stock, similar to the situation already explained for *Forcipiger wanai* on page 1123. Cenderawasih Bay was effectively isolated for lengthy periods during the past five million years, thus facilitating the evolution of a diversity of species that show marked genetic differences compared to neighbouring populations of sibling species outside the bay. However, the situation has been complicated by the apparent re-colonisation of *Amblyglyphidodon aureus*, and although it is rare, genetic evidence (Allen *et al*., in preparation) shows that hybridisation sometimes occurs in the bay.

The two species share most meristic and morphometric features and colour pattern differences are the best means of distinguishing them. *Amblyglyphidodon aureus* is uniformly bright yellow over much of its range in the central and western Pacific in vivid contrast to the mainly purplish colour of *A. flavopurpureus*. However, in some areas, for example at Christmas Island (Indian Ocean) and some parts of Indonesia (e.g. Raja Ampat Islands and Bali) there is a largely purplish variety that differs from *A. flavopurpureus* in having bright yellow anal and pelvic fins. The Bali and Christmas Island populations also exhibit yellow dorsal fins, but at the Raja Ampat Islands this fin is either pale yellowish or similar to that of *A. flavopurpureus* (i.e. translucent whitish).

Figure 3. *Amblyglyphidodon flavopurpureus*, juvenile, approximately 30 mm SL, underwater photograph, Cenderawasih Bay, West Papua, Indonesia, in 12 m depth (G. Allen photo)

Figure 4. Preserved holotype of *Amblyglyphidodon flavopurpureus*, 94 mm SL (G. Allen photo)

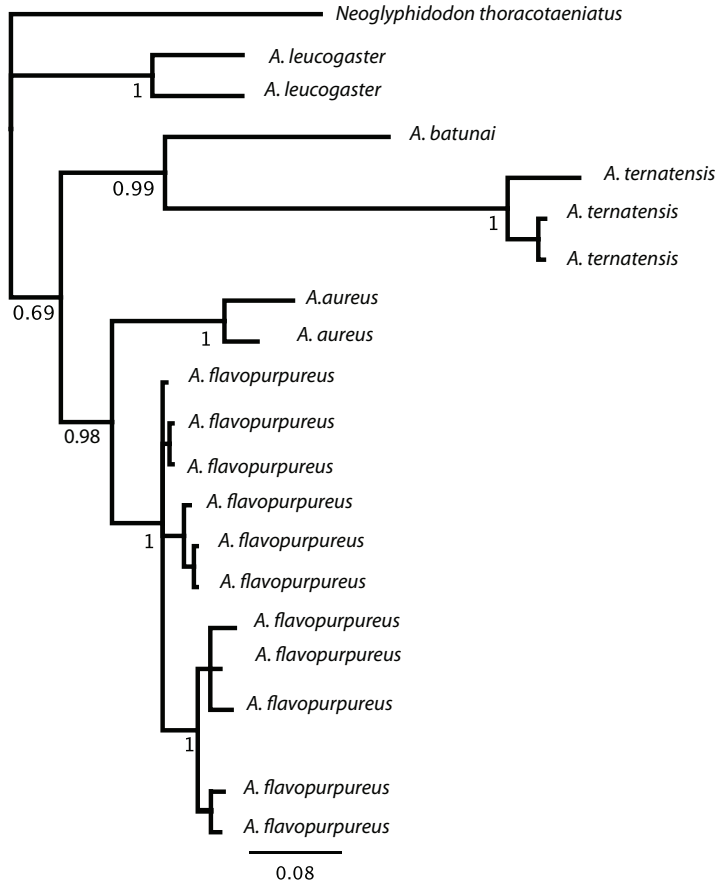

Figure 5. Bayesian phylogenetic reconstruction of mtDNA Control Region sequences based on 1,000,000 generations (25 % burn in). Numbers at nodes represent posterior probabilities of each split.

The habitat of *A. flavopurpureus* consists primarily of outer reef slopes at depths of about 10-30 m, frequently where there is an abundance of gorgonian sea fans, or black coral. Similar to *A. aureus*, eggs are deposited on dead gorgonian branches and guarded by the parents. This species is abundant in very clear water of offshore, submerged atolls in the south-western portion of Cenderawasih Bay. The habitat at these sites is typically adjacent to steep, sometimes vertical dropoffs.

Genetic methodology: Whole genomic DNA was extracted from fin clips using 10 % Chelex (Walsh *et al*., 1991). We amplified a segment of the rapidly evolving control region (D-loop) segment of the mitochondrial genome using PCR with the primers CRA and CRE (Lee *et al*., 1995) using the following PCR parameters: initial denature at 94° C for 5 min followed by 39 cycles of denaturing 94° C for 30s, amplification at 50° C for 60s and extension at 72° C for 1:30, with a final extension stage at 72° C for three minutes.

PCR products were visualised using a 1 % agarose gel and enzymatically prepared for sequencing by digestion in 0.5U of shrimp alkaline phosphotase and 5 U of exonuclease III for 30 min at 37° C followed by 15 min at 80° C. Double stranded PCR products were then cleaned using a 75 % isopropanol protocol followed by direct sequencing on an ABI 3730XL housed at the Pritzker Laboratory for Molecular Systematics at the Field Museum, using Big Dye 3.1 terminator chemistry (ABI Corporation, Foster City California).

Sequences were trimmed and aligned by eye using Geneious 5.0.3. To proceed with phylogenetic reconstruction we first identified the most appropriate model of evolution using MrModelTest (Nylander, 2004). The GTR + Gamma was found to be the most appropriate model and we proceeded with reconstruction in a Bayesian framework using MrBayes (Ronquist & Hulsenbeck, 2003) as implemented in Geneious 5.0.3.

Genetic results: We generated 20 haplotypes from 20 fish (11 *A. flavopurpureus*, 2 *A. aureus* and 3 *A. ternatensis*, 1 *A. batunai*, 2 *A. leucogaster* and 1 *Neoglyphidodon thoracotaeniatus*) forming an alignment 467 bp long, with 209 sites (44.8 %) being invariant. A comparison of average genetic similarity between *A. flavopurpureus* and other species is presented in Table 2. Sequences have been deposited in genbank under accession numbers JN998058-JN998062 and JN998067-JN998081. Attempts were made to sequence an additional nuclear loci (RAG2) however the results were not phylogenetically informative.

The phylogenetic reconstruction identified all *A. flavopurpureus* sequences forming a monophyletic group with strong posterior probability support (.98; Fig. 5). The *A. flavopurpureus* clade was sister to *A. aureus* which was also resolved as a monophyletic group. The (*flavopurpureus* + *aureus*) clade was sister to another clade containing the East Indian region endemics *A. ternatensis* and *A. batunai*. Thus, the sister relationship between *A. flavopurpureus* and *A. aureus* is supported by molecular, meristic and morphological data.

Etymology: The species is named *flavopurpureus* (Latin: yellow-purple) with reference to the dominant colours of the new species.

Table 1. Proportional measurements (as percentage of SL) of type specimens of *Amblyglyphidodon flavopurpureus*.

	Holotype MZB 20578	Paratype MZB 20587	Paratype MZB 20587	Paratype MZB 20587	Paratype MZB 20587	Paratype MZB 20587	Paratype MZB 20587
Standard length (mm)	94.0	93.3	92.3	91.1	86.2	82.4	80.8
Body depth	59.6	60.0	57.4	60.9	59.5	58.6	58.3
Body width	18.4	19.3	20.4	19.2	19.4	18.6	17.5
Head length	31.2	31.9	29.6	32.3	31.6	31.9	30.7
Snout length	9.4	9.2	10.0	10.6	9.6	9.5	9.0
Eye diameter	10.4	10.5	10.3	11.0	11.7	11.4	11.6
Interorbital width	11.7	11.6	10.9	11.1	11.7	11.8	9.9
Depth of caudal peduncle	16.0	16.1	15.5	16.4	16.9	16.0	15.6
Length of caudal peduncle	12.0	11.4	13.0	10.6	12.8	11.2	13.4
Predorsal distance	42.8	43.5	43.6	45.7	44.2	43.8	43.9
Preanal distance	64.4	67.8	65.5	65.9	64.6	66.0	62.7
Prepelvic distance	38.2	40.9	37.6	39.5	41.0	38.7	40.1
Length of dorsal-fin base	62.7	62.9	61.2	59.4	62.6	64.2	63.2
Length of anal-fin base	33.0	32.5	33.7	32.9	33.2	33.0	35.3
Pectoral-fin length	35.7	36.4	35.6	35.1	36.4	35.4	34.8
Pelvic-fin length	38.7	36.7	38.1	37.3	42.3	33.0	37.6
Pelvic-spine length	19.9	18.9	20.0	21.6	21.1	19.8	20.0
1st dorsal spine	6.6	6.5	6.9	6.8	7.3	7.3	10.0
7th dorsal spine	21.3	21.8	20.9	22.4	22.0	20.5	22.2
Last dorsal spine	20.9	22.7	22.6	21.1	21.9	20.4	22.4
Longest soft-dorsal ray	39.8	43.6	41.4	37.9	37.1	39.7	40.5
1st anal spine	8.4	8.9	9.1	9.1	9.4	9.7	11.1
2nd anal spine	28.4	24.7	26.3	26.9	24.1	25.0	27.4
Longest soft-anal ray	34.5	32.2	34.1	35.5	33.8	34.5	32.3
Caudal-fin length	35.2	34.1	38.6	36.0	33.2	38.6	37.3
Caudal concavity	11.7	11.7	10.7	11.9	7.3	9.7	9.7

Table 2. Average percent genetic similarity between *Amblyglyphidodon flavopurpureus* individuals and individuals from outgroup (*Neoglyphidodon*) and ingroup (*Amblyglyphidodon*) species for mtDNA Control Region.

Species	Avg. % similarity
N. thoracotaeniatus	76.3
A. ternatensis	72.7
A. batunai	78.2
A. aureus	84.1
A leucogaster	77.3
Within species	90.4

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Walsh, P.S., Metzger, D.A. & Higuchi, R. 1991. Chelex-100 as a medium for simple extraction of DNA for PCR based typing from forensic material. *Biotechniques* 10:506-513.

FAMILY POMACENTRIDAE

Amblyglyphidodon silolona n. sp.

Allen, Erdmann & Drew
(Figs. 1-6; Tables 1-2)

Holotype: WAM P.33253-006, male, 65.1 mm SL, North Button Island, 12°18.560' N, 93°04.070'E, Andaman Islands, 6 m, spear, M.V. Erdmann, 17 January 2010.
Paratypes: WAM P.33253-001, 7 specimens, 56.3-68.4 mm SL, collected with holotype.

Diagnosis: A species of the pomacentrid genus *Amblyglyphidodon* with the following combination of characters: dorsal rays XIII,12 ; anal rays II,13 pectoral rays 17 gill rakers on first branchial arch 7-8 + 15-18, total rakers 22 to 26; tubed lateral-line scales 14-16 (usually 15); preorbital and suborbital scaled; colour in life mainly silvery grey with yellow spinous dorsal fin, pelvic fins, and most of anal fin; also blackish upper and lower edge on caudal fin and black spot dorsally on pectoral-fin base.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays XIII,12; anal rays II,13; pectoral rays 17 ; gill rakers on first branchial arch 8 + 16 (7-8 + 15-18), total rakers 24 (22-26); tubed lateral-line scales 14/16 (14-16, usually 15); vertical scale rows 28; scales above lateral-line to base of middle dorsal spines 1.5; scales below lateral line to anus 10 (9-10); circumpeduncular scales 12; vertebrae 26.

Body depth 1.8 (1.7-1.8) in standard length, maximum width of body 3.6 (3.1-3.6) in depth; head length contained 3.3 (3.2-3.4) in standard length; snout 3.5 (3.1-3.7), eye 2.3 (2.2-2.4), interorbital width 2.9 (2.8-3.1), least depth of caudal peduncle 2.0 (1.9-2.2), length of caudal peduncle 2.1 (2.0-2.3), all in head length.

Mouth oblique, terminally located, maxillary reaching to vertical about at anterior edge of pupil; teeth of jaws uniserial with flattened or notched tips, about 40-44 teeth in each jaw; single nasal opening on each side of snout; nostril with very low fleshy rim; margin of preorbital and suborbital smooth; preorbital relatively narrow, greatest depth about 3.6 (3.6-3.8) in eye diameter; margin of preopercle and opercle smooth, except blunt, flattened spine present on upper part of opercle.

Scales of head and body finely ctenoid; scales on top of head extending forward to snout tip; preorbital and suborbital scaled; preopercle with two rows of larger scales and additional row of small scales at margin; lips, chin, and isthmus naked; dorsal and anal fins with a basal scaly sheath; inter-radial membranes of caudal fin scaled about two-thirds the distance to end of lobes; paired fins scaled only basally; axillary scale of pelvic fin about one-half to two-thirds length of pelvic spine.

Tubes of lateral line ending below posterior spines of dorsal fin; pored scales posterior to tubed scales 4 (2-4); a series of 8 (7-8) pored scales mid-laterally on caudal peduncle to caudal-fin base.

Origin of dorsal fin at level of about fourth tubed scale of lateral line; spines of dorsal fin gradually increasing in length to middle spines, remaining spines about equal except last spine noticeably taller; membrane between spines conspicuously incised; first dorsal spine 2.8 (2.7-3.2) in seventh dorsal spine; seventh dorsal spine 1.0 (0.9-1.0) in last dorsal spine; last dorsal spine 1.4 (1.4-1.6) in head; longest soft dorsal ray 2.7 (2.5-3.0) in SL; length of dorsal fin base 1.6 (1.6-1.7) in SL; first anal spine 2.5 (2.4-3.0) in second anal

Figure 1. *Amblyglyphidodon silolona*, adult, approximately 80 mm SL, underwater photograph, Andaman Islands in 8 m depth (G. Allen photo)

Figure 2. *Amblyglyphidodon silolona*, subadult, approximately 50 mm SL, underwater photograph, Andaman Islands in 5 m depth (G. Allen photo)

spine; second anal spine 1.2 (1.0-1.2) in head; longest soft anal ray 3.2 (3.0-3.3) in SL; base of anal fin 2.1 (19-2.1) in base of dorsal fin; caudal fin moderately forked with angular lobes, its length 2.4 (2.3-2.9) in SL; caudal concavity 2.1 (1.7-2.0) in head length; pectoral fins reaching to about level of anal spines, longest ray 2.6 (2.6-2.9) in SL; filamentous tips of pelvic fins reaching well beyond origin of anal fin, longest ray 2.6 (2.2-2.9) in SL.

Colour in life (Figs. 1-2): adult mainly silvery grey with darker grey scale margins, yellow on breast and belly region; dorsal fin mainly yellow except translucent bluish or grey on posteriormost section; anal fin yellow except bluish or grey on last few rays; caudal fin translucent bluish or grey with narrow black dorsal and ventral margins; pelvic fins yellow; pectoral fins translucent with black spot at base of uppermost rays; iris bluish; lips bluish white.

Figure 3. *Amblyglyphidodon silolona*, juvenile, approximately 30 mm SL, underwater photograph, Andaman Islands in 5 m depth (G. Allen photo)

Colour of juvenile (about 3-5 cm SL; Fig. 3): similar to adult except yellow dorsal spine tips, yellowish dorsal and ventral margins on caudal fin, and yellow colour confined to anterior half of anal fin.

Colour of holotype in alcohol (after 18 months preservation; Fig. 4): head and body generally greyish to silvery (especially on cheek and opercle), nearly solid grey on forehead and back (above lateral line), and with pronounced dark grey scale margins on side (below lateral line); fins translucent whitish to dusky grey; dark grey hue encompassing anterior soft rays of dorsal fin, posterior anal rays, and dorsal and ventral margins of caudal fin; small black spot at base of uppermost pectoral rays.

Figure 3. Preserved holotype of *Amblyglyphidodon silolona*, 65 mm SL (G. Allen photo)

Remarks: On the basis of external morphology the new species appears to be most closely related to *Amblyglyphidodon* batunai Allen and *A. ternatensis* (Bleeker) from the East Indian region. All three species are characterised by a scaled preorbital and suborbital and typically inhabit branching corals in shallow water. The new species differs from *A. batunai* in having more pectoral rays (17 vs. 15) and bright yellow colouration on the lower body as well as on the dorsal, anal, and pelvic fins (compare with illustration of *A. batunai* on page 567). It differs from *A. ternatensis* in having fewer gill rakers (22-26 vs. 29-30) and more pectoral rays (17 vs. 15-16), and general colour pattern (compare with illustration of *A. ternatensis* on page 569). The new species also resembles *A. orbicularis* (Hombron & Jacquinot) from Fiji and Samoa (see Allen & Randall 2002), which is generally silvery grey with yellow pelvic and anal fins, and narrow dark margins dorsally and ventrally on the caudal fin. However, *A. silolona* differs in having yellow on the dorsal fin and fewer gill rakers (22-26 vs. 28-31).

Despite the apparent morphological relationship to *A. batunai* and *A. ternatensis*, our genetic data (see below) indicates a closer affinity to *A. aureus* (Cuvier) and *A. leucogaster* (Bleeker), which are widely distributed mainly in the western Pacific region. The new species differs from *A. aureus* in having a scaled suborbital, usually 13 soft anal rays (vs. 14-15), and usually 15 tubed lateral-line scales (vs. 16-17). It differs from *A. leucogaster* mainly in colour, but also usually has fewer total rakers on the first arch (22-26 vs. usual counts of 26-28).

The habitat of *A. silolona* consists of sheltered waters with extensive colonies of branching corals (frequently *Acropora*) at depths of about 2-12 m.

Genetic methodology: Whole genomic DNA was extracted from fin clips using 10 % Chelex (Walsh *et al*., 1991). We amplified a segment of the rapidly evolving control region (D-loop) segment of the mitochondrial genome using PCR with the primers CRA and CRE (Lee *et al*., 1995) using the following PCR parameters: initial denature at 94° C for 5 min followed by 39 cycles of denaturing 94° C for 30s, amplification at 50° C for 60s and extension at 72° C for 1:30, with a final extension stage at 72° C for three minutes. Additionally, we amplified the nuclear loci TMO4c4 using the primers TMO 4C4f1-5 and TMO 4C4r1-3 (Streelman & Karl 1997) and RAG2 with RAG2F2 and RAG3R1 (Westneat *et al*., 2005) with the following PCR parameters for both loci: initial denature at 94° C for 5 min followed by 39 cycles of denaturing 94° C for 30s, amplification at 55° C for 60s and extension at 72° C for 1:30, with a final extension stage at 72° C for three minutes.

We also sequenced an individual of *Neoglyphidodon thoracotaeniatus* to serve as an outgroup and individuals from *A. batunai*, *A. ternatensis* and *A. aureus* to provide a greater phylogenetic resolution within the genus.

PCR products were visualized using a 1 % agarose gel and enzymatically prepared for sequencing by digestion in 0.5U of shrimp alkaline phosphotase and 5 U of exonuclease III for 30 min at 37° C followed by 15 min at 80° C. Double stranded PCR products were then cleaned using a 75 % isopropanol protocol followed by direct sequencing on an ABI 3730XL housed at the Pritzker Laboratory for Molecular Systematics at the Field Museum, using Big Dye 3.1 terminator chemistry (ABI Corporation, Foster City California).

Control Region sequences were trimmed and aligned by eye using Geneious 5.0.3. Because TMO4c4 and RAG2 sequences exhibit limit sequence heterozygosity direct sequencing was conducting using primers as above.

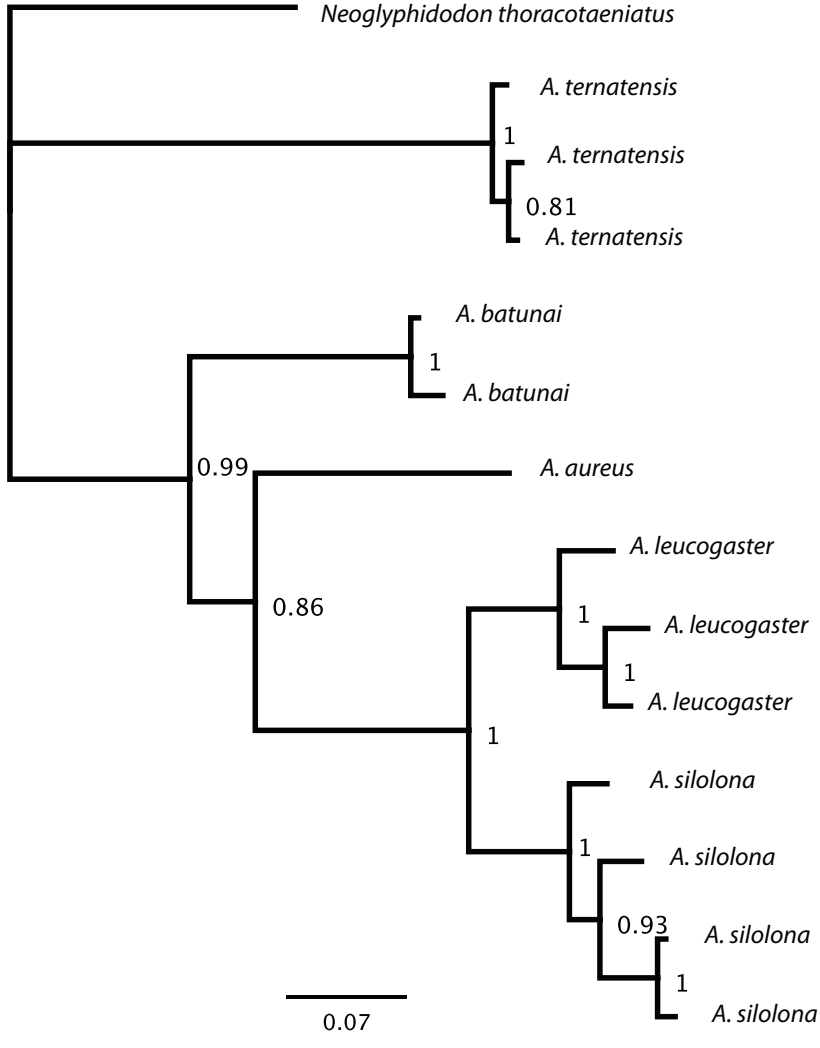

Figure 5. Bayesian phylogenetic reconstruction of mtDNA Control Region sequences based on 1,000,000 generations (25 % burn in). Numbers at nodes represent posterior probabilities of each split.

To proceed with phylogenetic reconstruction we first identified the most appropriate model of evolution using MrModelTest (Nylander, 2004). The GTR + Gamma was found to be the most appropriate model for all loci and we proceeded with reconstruction in a Bayesian framework using MrBayes (Ronquist & Hulsenbeck, 2003) as implemented in Geneious 5.0.3.

Genetic results: For the control region data (Fig. 5) we resolved seven haplotypes from seven different individuals (four *Amblyglyphidodon silolona*. and three *A. leucogaster*). These haplotypes formed an alignment of 380bp in length (244 invariant - 64.2 %) bp in length with minimal gaps.

TMO 4c4 sequences (Fig. 6) were aligned as above except that heterozygous base calls were described using universal ambiguity codes. When completed, we resolved five genotypes from eight different ingroup individuals (three *A. silolona* and two *A. leucogaster*, one each *A. batunai*, *A. ternatensis* and *A. aureus*) and one from the outgroup *N. thoracotaeniatus*. These genotypes formed an alignment of 732bp in length (553 invariant - 75.5 %).

The RAG2 data (Fig. 7) were aligned in a similar fashion with the TMO 4c4 data. We generated a total of 6 genotypes from 20 individuals. These genotypes formed an alignment of 594 bp in length (534 invariant - 89.9 %). All sequences have been deposited in genbank under accession numbers JN998028-JN998067.

We present a table of genetic similarity among all species for each of the three genes sequenced as Table 2.

The reconstructions for both the Control Region and TMO 4c4 resolved *A. silolona* as a monophyletic group with high posterior probability (1.0 for control region and .67 for TMO 4c4, Figs 5-6), indicating that for at least these two loci the species status for *A. silolona* is highly supported. While there are obvious differences between the topology and amount of genetic differentiation between the two loci sampled, they are in agreement with *A. silolona* being distinct at the species level.

The RAG2 data did not support monophyly of *A. silolona*, Rather individuals from *A. silolona, A. leucogaster* and *A. aureus* formed a well supported monophyletic clade (posterior

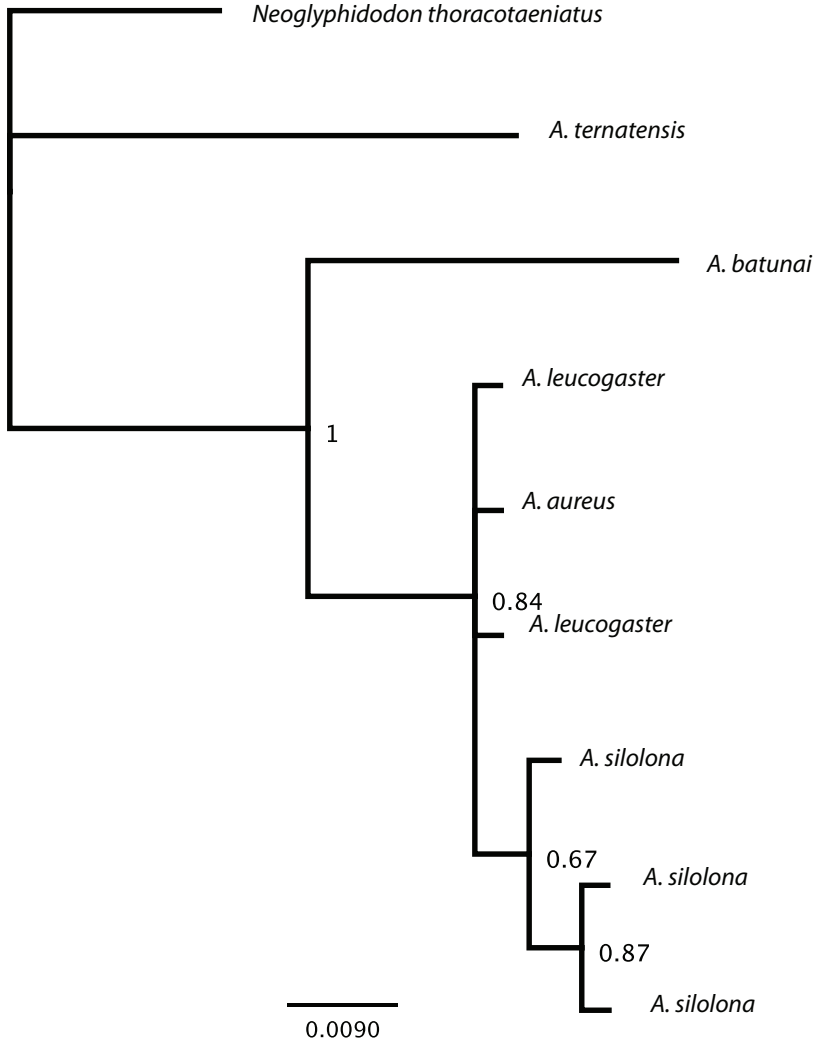

Figure 6. Bayesian phylogenetic reconstruction of nDNA TMO 4c4 sequences based on 1,000,000 generations (25 % burn in). Numbers at nodes represent posterior probabilities of each split.

probability .9). In contrast to the meristic studies, all three genes suggest that the *A. silolona* is genetically more similar to *A. leucogaster* and *aureus* than it is to either *A. ternatensis* or *A. batunai*. Variation in the results from the genes should not be taken as lack of support for this species as a whole. Genes evolve at different rates and may have undergone independent evolutionary pathways, and therefore we do not expect a priori that all genes will convey an identical story. Taken together our data suggest that the phylogeny of *Amblyglyphidodon* is complex and warrants further attention using multiple unlinked genetic markers.

Etymology: The species is named *silolona* with reference to the luxury charter vessel *M.Y. Silolona*, in recognition of owner Patti Seery's generosity in providing opportunities for us to do field research in the East Indian region.

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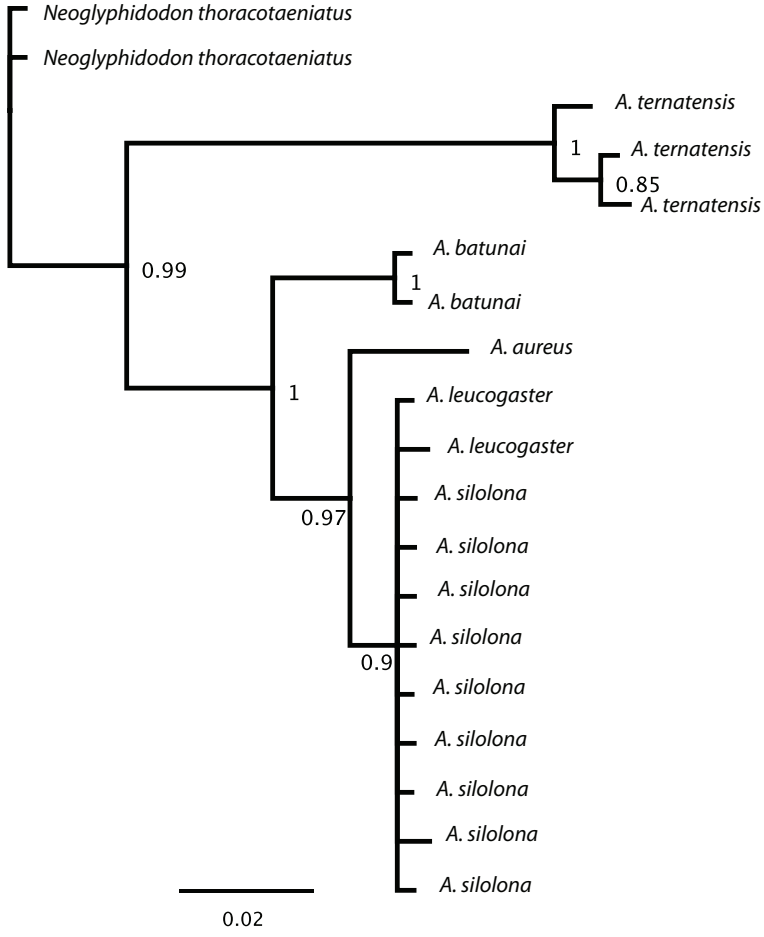

Figure 7. Bayesian phylogenetic reconstruction of nDNA RAG2 sequences based on 1,000,000 generations (25% burn in). Numbers at nodes represent posterior probabilities of each split.

Table 1. Proportional measurements of type specimens of *Amblyglyphidodon silolona* as percentage of the standard length. Damaged fins indicated with asterisk (*).

	Holotype WAM P.33253	Paratype WAM P.33253	Paratype WAM P.33253	Paratype WAM P.33253	Paratype WAM P.33253	Paratype WAM P.33253	Paratype WAM P.33253	Paratype WAM P.33253
Standard length (mm)	65.1	68.4	67.8	66.4	64.3	62.6	60.2	56.3
Body depth	55.9	57.5	55.6	55.6	56.1	56.1	59.6	58.3
Body width	15.5	17.4	15.6	15.8	16.2	16.3	19.3	17.8
Head length	30.3	30.3	29.9	29.7	31.3	30.4	30.9	31.6
Snout length	8.8	9.6	8.6	9.0	8.6	8.9	8.6	8.5
Eye diameter	13.2	12.9	12.7	13.3	13.2	13.7	13.3	14.0
Interorbital width	10.6	11.0	10.0	10.4	10.1	10.4	10.5	10.1
Depth of caudal peduncle	15.1	14.6	15.3	15.5	14.5	15.5	15.4	15.3
Length of caudal peduncle	14.7	13.6	14.2	14.6	13.7	13.7	14.1	13.5
Predorsal distance	41.5	41.5	39.5	43.5	40.4	41.4	43.7	40.7
Preanal distance	65.4	69.4	68.1	65.5	65.9	65.3	63.8	64.8
Prepelvic distance	40.4	44.6	44.2	41.4	43.1	40.3	39.4	40.0
Length of dorsal-fin base	60.7	60.5	60.5	61.6	57.7	61.5	62.5	61.8
Length of anal-fin base	29.0	29.4	29.9	31.8	30.2	29.9	30.4	29.5
Pectoral-fin length	38.4	34.1	36.1	36.1	37.2	34.5	35.9	37.8
Pelvic-fin length	38.4	39.9	38.3	34.8	36.7	45.2	39.9	39.1
Pelvic-spine length	20.4	19.6	19.6	20.6	21.2	21.9	20.8	21.8
1st dorsal spine	7.7	6.7	7.7	8.3	7.6	7.5	7.5	7.8
7th dorsal spine	21.7	21.2	20.8	21.2	22.9	21.7	21.8	24.2
Last dorsal spine	21.0	21.8	19.9	18.2	22.2	19.2	22.8	23.1
Longest soft-dorsal ray	37.5	35.8	34.8	33.7	34.7	35.1	39.5	35.5
1st anal spine	10.3	10.5	10.9	12.0	11.5	10.7	9.3	11.2
2nd anal spine	25.7	26.0	26.8	28.3	27.5	27.2	28.1	29.1
Longest soft-anal ray	31.2	33.8	31.7	31.2	30.2	31.3	32.9	31.8
Caudal-fin length	42.5	39.3	39.7	34.6*	40.4	41.4	42.9	40.7
Caudal concavity	14.4	14.8	14.9	10.7*	17.1	18.2	17.8	9.2*

Table 2. Average percent genetic similarity between *A. silolona* individuals and individuals from outgroup (*Neoglyphidodon*) and ingroup (*Amblyglyphidodon*) species for mtDNA Control Region, nDNA TMO 4c4 and RAG2 genes.

Species	Control region	RAG2	TMO
N. thoracotaeniatus	72.5	96.3	75.7
A. ternatensis	72.1	93.5	82.9
A. batunai	74.8	97.9	97.1
A. aureus	80.3	98.3	99.4
A leucogaster	84.9	99.4	99.5
Within species	94.7	99.8	99.7

FAMILY POMACENTRIDAE

.

Neoglyphidodon mitratus n. sp.

Allen & Erdmann
(Figs. 1-2; Table 1)

Holotype: WAM P.33480-001, male, 62.3 mm SL, Bairoko Inlet, 08°11.008'S, 157°16.622'E, New Georgia Island, Solomon Islands, 10 m depth, spear, G. Allen & W. Starck, 18 October 1973.
Paratypes: WAM P.33480-002, 2 specimens, 39.4-53.7 mm SL, collected with holotype.

Diagnosis: A species of the pomacentrid genus *Neoglyphidodon* with the following combination of characters: dorsal rays XIII,13; anal rays II,13; pectoral rays 17; gill rakers on first branchial arch 8 + 15, total rakers 23; tubed lateral-line scales 15-16; colour in life mainly greyish mauve, whitish on head with brown snout-interorbital and pair of brown bars, one at level of eye and another on opercle extending onto breast; anterior two-thirds of anal fin yellow; black spot at base of upper pectoral-fin rays; juvenile mainly yellow with large blue-edged black spot (ocellus) on middle of dorsal fin.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays XIII,13; anal rays II,13; pectoral rays 17 ; gill rakers on first branchial arch 8 + 15, total rakers 23; tubed lateral-line scales 15 (16 on right side of holotype); vertical scale rows 27; scales above lateral-line to base of middle dorsal spines 1.5; scales below lateral line to anus 8.5; circumpeduncular scales 12.

Body depth 1.9 (1.8-1.9) in SL, maximum width of body 2.6 (2.8-3.3) in depth; head length contained 3.2 (3.1-3.4) in SL; snout 3.4 (3.1-3.7), eye 2.7 (2.6), interorbital width 2.8 (3.1-3.2), least depth of caudal peduncle 2.0 (1.7-1.9), length of caudal peduncle 2.3 (2.1-2.2), all in head length.

Mouth oblique, terminally located, the maxillary reaching to a vertical about at anterior edge of eye; teeth of jaws biserial, consisting of row of about 34-38 larger conical teeth in outer row with row of narrow buttress teeth in spaces between outer row teeth; single nasal opening on each side of snout; nostril with very low fleshy rim; margin of preorbital and suborbital smooth; pre and suborbital relatively narrow, the greatest depth about 3.2 in eye diameter; margin of preopercle and opercle smooth, except blunt, flattened spine present on upper part of opercle.

Scales of head and body finely ctenoid; scales on top of head extending forward to about level of nostrils or slightly anterior; preorbital scaleless or with a few scales posteriorly; suborbital scaled; preopercle with two rows of large scales and additional row of small scales at margin; dorsal and anal fins with a basal scaly sheath; lips, chin, and isthmus naked; inter-radial membranes of caudal fin scaled about two-thirds the distance to end of lobes; paired fins scaled only basally; axillary scale of pelvic fin about one-half length of pelvic spine.

Tubes of lateral line ending below posterior spines of dorsal fin; pored scales posterior to tubed scales 2 (2-3); a series of 8 (7) pored scales mid-laterally on caudal peduncle to caudal-fin base.

Figure 1. *Neoglyphidodon mitratus*, adult (upper left), approximately 70 mm SL, and juvenile (upper right), approximately 30 mm SL, Milne Bay, Papua New Guinea; *N. thoracotaeniatus*, adult (lower left), approximately 70 mm SL, Brunei, and juvenile (lower right), approximately 30 mm SL, West Papua, Indonesia (G. Allen photos)

Origin of dorsal fin at level of fourth tubed scale of lateral line; spines of dorsal fin gradually increasing in length to middle spines, remaining spines about equal; membrane between spines moderately incised; first dorsal spine 2.5 (2.4-2.5) in seventh dorsal spine; seventh dorsal spine 1.0 in last dorsal spine; last dorsal spine 2.0 (1.7-1.8) in head; longest soft dorsal ray 2.7 (2.0-2.1) in SL, longest rays (forming apex of fin) often protruding beyond fin margin as short free filaments; length of dorsal fin base 1.7 (1.7-1.8) in SL; first anal spine 2.2 (2.3) in second anal spine; second anal spine 2.0 (1.8-1.9) in head; longest soft anal ray 3.6 (2.7-2.9) in SL; base of anal fin 2.6 (2.2-2.4) in base of dorsal fin; caudal fin moderately forked with angular lobes and ragged posterior edge (several rays usually protruding beyond margin as free filaments), its length 2.4 (1.7-2.1) in SL; pectoral fins reaching to about level of anal spines, longest

ray 2.7 (2.4-2.6) in SL; filamentous tips of pelvic fins reaching origin of anal fin or beyond, the longest ray 2.6 (2.0) in SL.

Colour in life (Fig. 1, upper left): adult mainly greyish mauve on side, whitish on head with brown snout-interorbital and pair of brown bars, one at level of eye and another on opercle extending onto breast; faint yellow-brown bar sometimes evident above pectoral-fin base; pelvic fins white to yellowish; anterior two thirds of anal fin yellow, clear posteriorly; relatively large black spot at base of upper pectoral-fin rays, usually enclosing smaller blue spot.

Colour of juveniles (about 3-4 cm SL; Fig.1 upper right): mainly yellow, except whitish on breast and belly, with large blue-edged black spot (ocellus) on middle of dorsal fin; narrow blue line converging mid-dorsally in front of eyes and extending posteriorly to dorsal ocellus; similar blue line across lower iris; small blue spot or short band anteriorly on upper edge of caudal peduncle.

Colour of holotype in alcohol (Fig. 2): brownish dorsally, grading to tan or yellowish ventrally; pair of broad dark brown bars on head and thorax with tan spaces between; dorsal fin brown; remainder of fins pale except caudal dusky brownish; dark brown to blackish band/spot covering at least upper half of pectoral-fin base.

Figure 2. Preserved holotype of *Neoglyphidodon mitratus*, 65 mm SL (G. Allen photo)

Remarks: The pomacentrid genus *Neoglyphidodon* Allen contains the following eight species (Allen, 1991): *N. bonang* (Bleeker), *N. carlsoni* (Allen), *N. crossi* Allen, *N. melas* (Cuvier), *N. nigroris* (Cuvier), *N. oxyodon* (Bleeker), *N. polyacanthus* (Ogilby), and *N. thoracotaeniatus* (Fowler & Bean). Most species occur primarily in the East Indian region, although *N. melas* ranges to the Red Sea and western Indian Ocean, *N. carlsoni* occurs at Fiji and Tonga, and *N. polyacanthus* inhabits the south-western Pacific including southern Great Barrier Reef, Lord Howe and Norfolk islands, and New Caledonia. The new species was previously confused with *Neoglyphidodon thoracotaeniatus* from Indonesia, Malaysia (Sabah), Brunei, and the Philippines. The two species appear to be yet another example of an East Indian geminate species pair (see Randall 1998). Although the two species share similar morphometric and meristic features they are clearly separable on the basis of adult and juvenile colour patterns (Fig. 1). In addition, preliminary genetic evidence indicates they are well differentiated at the species level.

The habitat consists of sheltered outer reef slopes, often associated with branching coral in about 15-45 m. Known from Palau, Papua New Guinea, and the Solomon Islands.

Etymology: The species is named *mitratus* (Latin: "wearing a head band") with reference to the distinctive brown bars on the head.

Reference

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Table 1. Proportional measurements (as percentage of SL) of type specimens of *Neoglyphidodon mitratus*.

	Holotype WAM P. 33480-001	Paratype WAM P. 33480-002	Paratype WAM P. 33480-002
Standard length (mm)	62.3	53.7	39.4
Body depth	52.3	53.4	55.3
Body width	20.2	18.8	16.5
Head length	29.2	30.5	32.5
Snout length	8.5	9.9	8.9
Eye diameter	10.8	11.5	12.7
Interorbital width	10.4	9.9	10.2
Depth of caudal peduncle	14.8	18.1	17.0
Length of caudal peduncle	12.8	13.6	15.2
Predorsal distance	37.6	40.4	41.1
Preanal distance	73.4	66.9	70.6
Prepelvic distance	42.2	35.4	37.8
Length of dorsal-fin base	57.3	64.1	58.1
Length of anal-fin base	21.7	27.0	25.9
Pectoral-fin length	37.2	41.9	39.1
Pelvic-fin length	38.5	48.8	51.0
Pelvic-spine length	18.6	19.7	23.1
First dorsal spine	5.9	7.4	7.9
Seventh dorsal spine	14.9	17.7	19.3
Last dorsal spine	14.4	16.9	19.0
Longest soft-dorsal ray	36.9	47.3	50.8
First anal spine	6.4	7.4	7.4
Second anal spine	14.3	16.9	16.8
Longest soft-anal ray	27.4	37.2	34.5
Caudal-fin length	41.7	58.7	48.0
Caudal concavity	13.3	16.4	17.3

FAMILY LABRIDAE

Cirrhilabrus humanni n. sp.

Allen & Erdmann
(Figs.1-4; Table 1)

Holotype: MZB 20589, male, 54.5 mm SL, Pura Island, 08°16.944'S, 124°19.543'E, Alor Strait, Indonesia, 12-13 m, clove oil, M.V. Erdmann, 26 March 2011.
Paratypes (collected with holotype): WAM P.33399-003, 2 specimens, females, 36.2-39.2 mm SL.

Diagnosis: Dorsal rays XI,9; anal rays III,9; pectoral rays 15; lateral-line scales 16-17 + 6-7; median predorsal scales 4-5; single horizontal scale row on cheek below eye 2; gill rakers 14-15; body depth 3.2-3.4 in SL; head length 2.9-3.2 in SL; snout length 3.8-4.3; first two dorsal rays of male slightly elongated, forming short blunt extension; pelvic fins of male broadly fan-shaped; caudal fin of both sexes rounded; live colour pattern features of male include orange to reddish brown overall colouration with reddish median and pelvic fins, and blue spots/streaks and stripes on median and pelvic fins; female generally reddish with pair of narrow blue stripes on back and similar stripe mid-dorsally from dorsal fin origin to snout tip.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays XI,9; anal rays III,9; dorsal and anal soft rays branched except first dorsal ray of paratypes and first anal ray of all specimens; last dorsal and anal soft rays branched to base; pectoral rays 15, uppermost unbranched; pelvic rays I,5; principal caudal rays 13, upper and lower rays unbranched; upper and lower procurrent caudal rays 4; lateral-line 16 + 6; scales above lateral line to origin of dorsal fin 2; scales below lateral line to anus 6; median predorsal scales 5; median preventral scales 5; lateral-line scales 16 + 7 (17 + 6-7) single row of 7 (7-8) scales on cheek; circumpeduncular scales 16; gill rakers 15 (14); vertebrae 25.

Body moderately elongate, depth 3.4 (3.2-3.3) in SL; body compressed, width 1.7 (1.9-2.0) in depth; dorsal profile of head nearly straight, becoming slightly convex on nape; head length 3.0 (2.9-3.2) in SL; snout relatively blunt, its length 4.1 (3.8-4.3) in head; orbit diameter 4.6 (3.9-4.1) in head; interorbital space slightly convex medially, strongly convex laterally, least bony width 4.1 (3.9) in head; caudal-peduncle depth 2.1 (1.9-2.1) in head; caudal-peduncle length 2.1 (1.9-2.1) in head.

Mouth small, the maxilla just reaching vertical at posterior nostril, upper-jaw length 4.5 (5.4) in head; dentition of holotype typical of genus with three pairs of progressively larger canine teeth anteriorly at side of upper jaw, first forward-projecting, next two strongly recurved and outcurved, third much the longest; irregular row of very small conical teeth medial to upper canines; side of upper jaw with about 20 small conical teeth; lower jaw with single pair of forward-projecting canines and row of very small conical teeth in symphyseal gap; side of lower jaw with row of about 23 small conical teeth, decreasing in size posteriorly. Gill rakers small, longest on first branchial arch less than half length of longest gill filaments.

Posterior margin of preopercle with 28 (11-23) very fine, inconspicuous serrae; margins of posterior and ventral edges of preopercle free to about level of middle of pupil. Anterior nostril small and inconspicuous, in short membranous tube with posterior flap, located anterior to upper edge of eye nearly one-half distance to front of upper lip; aperture of posterior nostril much larger than any head pores, without elevated rim, located posterior and slightly dorsal to anterior nostril on vertical with anterior, bony edge of orbit. Pores of cephalic lateralis system adjacent to ventroposterior half of orbit 19; series of 12 pores along margin of preopercle, including three close to ventral margin, linking with four on mandible to front of chin; series of nine pores mid-dorsally on anterior portion of nape, series of five pores on each side on anterior portion of interorbital and snout, and three mid-interorbital pores.

Scales cycloid; head scaled except snout, interorbital space, and ventrally; naked flange at ventral edge of preopercle about half height of scaled portion above; base of dorsal and anal fins with row of large elongate scales, one per membrane (except first scale which covers membranes of first and second spines), longest about one-half spine length (basal scales progressively shorter posteriorly on membranes of soft portion of fin); peduncular lateral-line scales followed by enlarged tubed scale (included in lateral-line count) on base of caudal fin with slightly posterior scale above and below, these three scales followed by vertical row of three enormous scales, middle one overlapping ones above and below, reaching two-thirds distance to posterior margin of fin; pectoral fins scaleless; pelvic fins with median ventral process of two elongate scales, more pointed posterior scale extending nearly to tip of depressed pelvic spine; slender axillary scale of each pelvic fin nearly as long as pelvic spine.

Origin of dorsal fin above third lateral-line scale; first two dorsal spines of male holotype elevated (Fig. 1), 1.8 in head; remaining dorsal spines of male holotype lower and gradually increasing in length, last 2.4 in head; dorsal spines of female paratypes gradually increasing in length, first 3.3-3.5 and last 2.2-2.5 in head; interspinous membranes of dorsal fin

extending above spine tips, supported by terminal cirrus projecting upward from just behind each spine tip; first to third dorsal soft rays longest, 2.1 (2.1-2.5) in head; origin of anal fin on vertical with base of penultimate dorsal spine; first anal spine 4.7 (5.0-5.4) in head; second anal spine 3.7 (3.3-4.1) in head; third anal spine 3.2 3.1-3.4) in head; fourth and fifth anal soft rays longest, 2.2 (2.5-2.6) in head; caudal fin rounded, its length 1.3 (1.1-1.3) in head; second and third pectoral rays longest, 1.5 (1.5-1.7) in head; origin of pelvic fins below pectoral-fin base; pelvic fins of male fan-shaped when fully extended, their length 3.1 (5.0) in head, fin tips reaching well beyond anal fin origin of male holotype when depressed, but not reaching anal-fin origin in female paratypes; length of pelvic-fin spine 2.5 (2.6-2.8) in head.

Colour in life (Figs. 1-2): terminal male reddish brown except orange zone on head, breast and anterior side; dorsal, anal, and pelvic fins bright red with blue margin; blue bands/spots basally on first two dorsal spines; longitudinal row of blue spots on middle of dorsal fin; row of blue spots basally on anal fin; several blue spots at base of pelvic fins; caudal fin greyish brown with iridescent blue streaks; pectoral fins translucent. Female (Fig. 3) mainly red, bluish on lower head and ventrally on side; narrow blue stripes on head and longitudinal rows of iridescent blue to white streaks (one per scale) on side of body. Juvenile mainly red, bluish or white ventrally with thin blue stripes on head, and similar stripes corresponding with each scale row; small black spot dorsally on caudal peduncle. Juvenile body stripes may persist on upper body of female, as well as diffuse remnant of black peduncular spot.

Colour in alcohol (Fig. 4): male tan on head, lower anterior body, and above base of anal fin; remainder of body greyish brown; dorsal fin semi-translucent with black anterior margin, row of black-edged pale spots on middle of fin, and row of blackish spots at base of soft rays; caudal fin grey with about three rows of dark-edged pale spots; anal fin semi-translucent with row of black spots near base; pelvic fins semi-translucent with large black streak basally; pectoral fins semi-translucent. Female generally tan with pair of narrow stripes, one just below dorsal-fin base and another one scale row below lateral line; five narrow brown stripes on head, dorsalmost on middle

Figure 1. Anterior body of *Cirrhilabrus humanni*, male, showing unusual shape of anterior dorsal fin (N. DeLoach photo)

Figure 2. *Cirrhilabrus humanni*, male, approximately 70 mm TL, Pura Island, Indonesia (G. Allen photo)

Figure 3. *Cirrhilabrus humanni*, female, approximately 50 mm TL, Pura Island, Indonesia (G. Allen photo)

Figure 4. *Cirrhilabrus humanni*, preserved male holotype (upper), 54.5 mm SL, and female paratype, 39.2 mm SL (G. Allen photo)

of snout/forehead and ventralmost just below eye; small blackish streak or spot dorsally on side of caudal peduncle; all fins semi-translucent.

Remarks: The new species belongs to a complex of *Cirrhilabrus* that includes *C. joanallenae* Allen, 2000 (eastern Indian Ocean), *C. morrisoni* Allen, 1999 (Hibernia Reef, Timor Sea), *C. naokoae* Randall & Tanaka, 2009 (presumably from Sumatra; purchased from aquarium dealer), and *C. rubriventralis* Springer & Randall, 1974 (Red Sea and western Indian Ocean). Members of this complex typically have a single row of scales on the cheek and share the unique male combination of an elevated anterior dorsal fin, rounded caudal fin, and large fan or club-shaped pelvic fins that lack a filamentous extension. The four species vary only slightly with regards to counts and measurements, which is not unusual among closely related species in this genus. They are best separated on the basis of male colour patterns and the shape of the anterior dorsal fin. The anterior dorsal of *C. humanni*, consisting of a relatively short, broad, lobular pennant (Fig. 1) is very different to the sail-like triangular shape of *C. naokae*, long trailing filamentous extension of the first two dorsal spines in *C. joanallenae* and *C. rubriventralis*, and short straight extension of *C. morrisoni*. Male colour patterns are also diagnostic (see main species section of book for photographs of *C. joanalleni* and *C. naokae*). *Cirrhilabrus morrisoni* is primarily pinkish orange to dark blue on the body with broad blackish margins on the dorsal and anal fins; *C. rubriventralis* is mainly red, except abruptly white ventrally with bright red pelvic fins (blackish in other members of the complex except also red in *C. humanni*).

The new species is currently known only from a single location. The type locality consisted of a gradual rubble slope next to shore at Pura Island, Alor Group, Indonesia where about 10 individuals were sighted at depths of 10-18 m.

Etymology: This species is named *humanni* in honour of Paul Humann, who first sighted this fish while diving with Ned and Anna DeLoach. Paul has been an important contributor to our knowledge of reef fishes through the publications of his company, New World Publications, Inc. of Jacksonville, Florida.

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Table 1. Proportional measurements (as percentage of SL) for type specimens of *Cirrhilabrus humanni*.

	Holotype MZB 20589	**Paratype WAM P. 33399**	**Paratype WAM P. 33399**
Standard length (mm)	54.5	39.2	36.2
Body depth	29.5	30.1	31.2
Body width	17.4	15.3	16.6
Head length	32.8	31.6	34.3
Snout length	8.1	8.4	8.0
Eye diameter	7.2	8.2	8.3
Interorbital width	8.1	8.2	8.8
Upper jaw	7.3	5.9	6.4
Depth of caudal peduncle	15.4	16.6	16.6
Length of caudal peduncle	17.2	15.3	15.2
Predorsal distance	31.6	34.4	32.6
Preanal distance	59.6	60.7	58.6
Prepelvic distance	32.8	32.1	30.7
Length of dorsal-fin base	58.5	59.9	61.0
1st dorsal spine	18.7	8.9	10.5
Last dorsal spine	13.8	14.5	13.8
Longest soft-dorsal ray	16.0	15.1	13.8
Length of anal-fin base	26.6	27.3	26.8
1st anal spine	7.0	6.4	6.4
2nd anal spine	9.0	9.7	8.3
3rd anal spine	10.3	10.2	10.2
Longest soft-anal ray	15.2	12.5	13.0
Caudal-fin length	24.4	27.8	27.3
Pectoral-fin length	22.0	21.4	19.9
Pelvic-spine length	13.0	12.0	12.2
Pelvic-fin length	32.1	20.2	20.2

FAMILY LABRIDAE

Iniistius naevus n. sp.

Allen & Erdmann
(Figs 1-3; Table 1)

Holotype: WAM P.33445-002, 131.9 mm SL, male South Sentinel Island, 10°58.391' N, 92°13.523'E, Andaman Islands, Indian Ocean, 16-20 m, spear, M.V. Erdmann, 25 March 2010.
Paratypes (all females, collected with holotype): BPBM 41085, 2 specimens, 87.7-114.1 mm SL; WAM P.33445-004, 4 specimens, 78.9-119.8 mm SL.

Diagnosis: Dorsal rays IX,12; anal rays III,12; pectoral rays 12; lateral line interrupted, the pored scales 20 + 5 or 6; broad band of small scales on cheek with 6 (6-9) horizontal scale rows containing total of 32-45 scales; 3 small scales dorsoanteriorly on opercle; gill rakers 16-18; body depth 3.0-3.2 in SL; dorsal profile of snout nearly vertical; first two dorsal spines slender and flexible, first slightly longer, 2.5 (2.4-2.6) in head length; space between second and third dorsal spines more than twice that between first and second spines; colour of male in life mainly pale bluish grey except white on middle of side with large dark brown to blackish spot on anterior back; female similar except white patch on anterior side with partial yellow anterior border and bluish scales along ventral border; female also with widely scattered brown dots on back, roughly following lateral line

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays IX,12, soft rays branched except anterior six rays unbranched (first 2-8 rays of paratypes unbranched), last ray branched to base; anal rays III,12, all branched (first 1-2 rays of two paratype unbranched), the last to base; pectoral rays 12, uppermost very short and spine-like, second unbranched; pelvic rays I,5, all soft rays branched; principal caudal rays 12, upper and lowermost unbranched; upper procurrent caudal rays 5; lower procurrent caudal rays 4; lateral-line scales 20 + 5 (one paratype with 20 + 6), the last on base of caudal fin; scales above lateral line to origin of dorsal fin 4; scales above lateral line to middle of spinous portion of dorsal fin 2 (uppermost small); scales below lateral line to origin of anal fin 9 (lower 2 small); circumpeduncular scales 16; gill rakers 16 (16-18); branchiostegal rays 5; vertebrae 25.

Body moderately elongate, greatest depth 3.0 (3.0-3.2) in SL; body very compressed, width 2.9 (2.6-3.3) in body depth; head length 3.2 (3.1-3.3) in SL; snout length (measured from lower edge of orbit to front of upper lip) 2.0 (2.0-2.6) in head length; dorsal profile of snout nearly vertical to level of lower edge of eye, then convex to above eye; front of snout narrowing to sharp ridge extending above eye; similar ridge on front of chin; eye positioned high on head, but about equal to eye diameter vertically below dorsal profile of interorbital space; eye diameter 5.3 (4.2-5.0) in head length; interorbital width 6.3 (6.1-6.6) in head length; caudal-peduncle depth 2.3 (2.2-2.6) in head length; caudal-peduncle length 3.2 (2.7-3.5) in head length.

Mouth moderately large, maxilla extending to or nearly to vertical at anterior edge of orbit, upper-jaw length 3.4 (3.3-3.8) in head length; mouth slightly oblique, forming an angle of about 10-15° to horizontal axis of body; pair of large, recurved, outflaring canine teeth at front of each jaw, overlapping lips when mouth closed, lower pair medial to upper; each side of jaws with close-set series of 11-13 strong conical teeth; two to three irregular rows of small, slightly nodular teeth medial to row of conical teeth in upper jaw, and one to two rows in lower jaw. Tongue broadly rounded, set far back in mouth. Lips thin, lower with well-developed flap along side of mandible. Gill rakers short, longest on first arch about one-half length of longest gill filaments.

Posterior edge of preopercle free below ventral edge of eye by distance about equal to eye diameter, ventral edge extending forward to about level of middle of eye, well behind posterior edge of maxilla; narrow fleshy flap surrounding posterior half of eye, constricted behind middle of eye. Nostrils small, just below level of ventral edge of eye, anterior nostril more than two-thirds eye diameter before eye in holotype, porelike with short rim and dorsoposterior flap; posterior nostril short, near-horizontal slit dorsoposterior to anterior nostril, internarial space slightly less than one-half pupil diameter. Cephalic sensory pores tiny; suborbital (below and behind lower half of eye) pores 6, pair of isolated pores on cheek nearly eye diameter above rear part of maxilla; series of 8 preopercular pores, continuing anteriorly as 3 mandibular pores.

Scales cycloid and very thin; lateral-line scales with a single horizontal tubule, ending posteriorly in a pore; scales on chest about half height of largest scales on side of body; head naked except for three small scales dorsally on opercle and 6 (6-9) horizontal rows on cheek containing total of 45 (32-40) scales, becoming progressively smaller and fewer ventrally; no scales on dorsal and anal fins; two or three rows of scales basally on caudal fin; no pelvic axillary scale; a single scale extending posteriorly from between base of pelvic fins, its length slightly greater than one-third length of pelvic spine.

Origin of dorsal fin above posterior edge of eye, predorsal length 3.8 (3.7-4.2) in SL; first two dorsal spines slender and flexible, remaining spines sharp, pointed and stiff; space between second and third dorsal spines more than twice space between first two spines; space between third and fourth dorsal spines 1.7 (1.7-1.9) in space between second and third dorsal spines; membrane deeply notched between second and third spines; first dorsal spine longest, slightly longer than second, 2.5 (2.4-2.6) in head length; third dorsal spine 5.3 (4.9-5.6) in head length; remaining dorsal spines progressively longer, ninth 4.3 (4.0-4.7) in head length; last two dorsal rays longest, 2.6 (2.8-3.0) in head length; origin of anal fin below base of first dorsal soft ray, the preanal length 1.9 (1.8-2.0) in SL; third anal spine longest, 4.3 (3.6-4.4) in head length; penultimate anal soft ray longest, 2.6 (2.8-3.3) in head length; caudal fin slightly rounded, 4.5 (4.3-4.8) in SL; third and fourth pectoral rays longest, not reaching level of anal-fin origin, 4.4 (4.3-4.9) in SL; pelvic fins just reaching anus or nearly so, first soft ray longest, 5.1 (5.1-5.9) in SL; pelvic spine 4.2 (4.3-5.3) in head length.

Colour in life (male holotype, Fig. 1, upper): head and back bluish grey, scales faintly outlined with pale brown, forming reticulum, more apparent on posterior half of body; 1-2 uppermost scale rows on side (just below dorsal fin) iridescent blue; iridescent blue scales also present ventrally on side above anal fin base and on caudal fin base; generally white on middle of side, brightest anteriorly (just behind pectoral fin); large, dark brown to blackish spot at level of lateral line below bases of seventh to eighth dorsal spines; iridescent blue stripe on mid-dorsal line of snout-forehead between upper lip and dorsal-fin origin; also fainter blue lines on side of head at level of middle of upper jaw and anterior edge of eye; pair of short blue lines on lower part of opercle, and broad pale blue band sloping downward and backward from upper rear edge of opercle to just behind pectoral-fin axil; fins generally translucent to slightly bluish; first two dorsal spines iridescent blue and rows of faint pale spots on dorsal, anal, and caudal fins.

Female (Fig. 1, lower) similar to male except white patch on anterior side with partial yellow anterior border and bluish scales along ventral border; also widely scattered brown dots on back, roughly following lateral line.

Colour of holotype in alcohol: head and most of body uniform yellowish tan except large white patch on middle of side immediately behind pectoral fin (tip of fin partially overlapping white patch); blackish blotch on anterior back, centred on eighth and ninth lateral-line scales and extending onto one scale immediately above and below; all fins translucent whitish or slightly tan Paratypes generally similar, although dark spot slightly variable in position (sometimes centred just below eighth and ninth lateral-line scale) and intensity.

Remarks: Randall *et al*. (2002) gave evidence for two main subgroups within *Iniistius*: one group, containing only *I. pavo* Valenciennes, 1840 and *I. dea* (Temminck & Schlegel, 1845), with the first two dorsal spines greatly prolonged and completely separate from the rest of the fin, and the other group, containing the remaining 17 species (see Parenti & Randall, 2011), with much shorter first two dorsal spines that remain connected to the rest of the fin. They further subdivided the latter group into two lineages, one with only a few scales below the eye containing just three species (*I. aneitensis*, *I. cyanifrons*, and *I. griffithsi*), and another with a relatively broad band of numerous scales below the eye. The new species is assignable to the latter group, and appears most similar to *I. baldwini* (Jordan & Evermann, 1903) and *I. melanopus* (Bleeker, 1857). These three species share similar meristic and morphometric features, as well as many similar elements of the colour pattern. The relatively small dark patch on the back of *I. naevus* in both sexes, clearly separates it from the other two species. The male of *I. baldwini* differs in having the blackish patch on the back at least twice as large as that of *I. naevus*, extending onto the middle of the side. Additionally, it differs in having a broad black submarginal band on the last 1-4 anal rays. There are also slight differences in head length (30.7-32.1 % SL for *I. naevus* vs. 32.2-33.8 % for *I. baldwini*) and the pelvic fin of *I. naevus* is usually longer (16.9-19.8 % vs. 18.5-20.0 %,), although there is some overlap. Females of these two species are nearly identical. Both male and female of *I. melanopus* lack a black patch on the back and the male further differs in having a horizontally elongate black mark on the posteriormost anal fin, similar to that of *I. baldwini*.

The habitat of the type locality consisted of extensive open sand with a gradual sloping bottom. Approximately 30 individuals were sighted over an area of approximately 100 m^2 at depths in 16-25 m.

Etymology: The new species is named *naevus* (Latin: blemish or birthmark) with reference to the main colour pattern feature.

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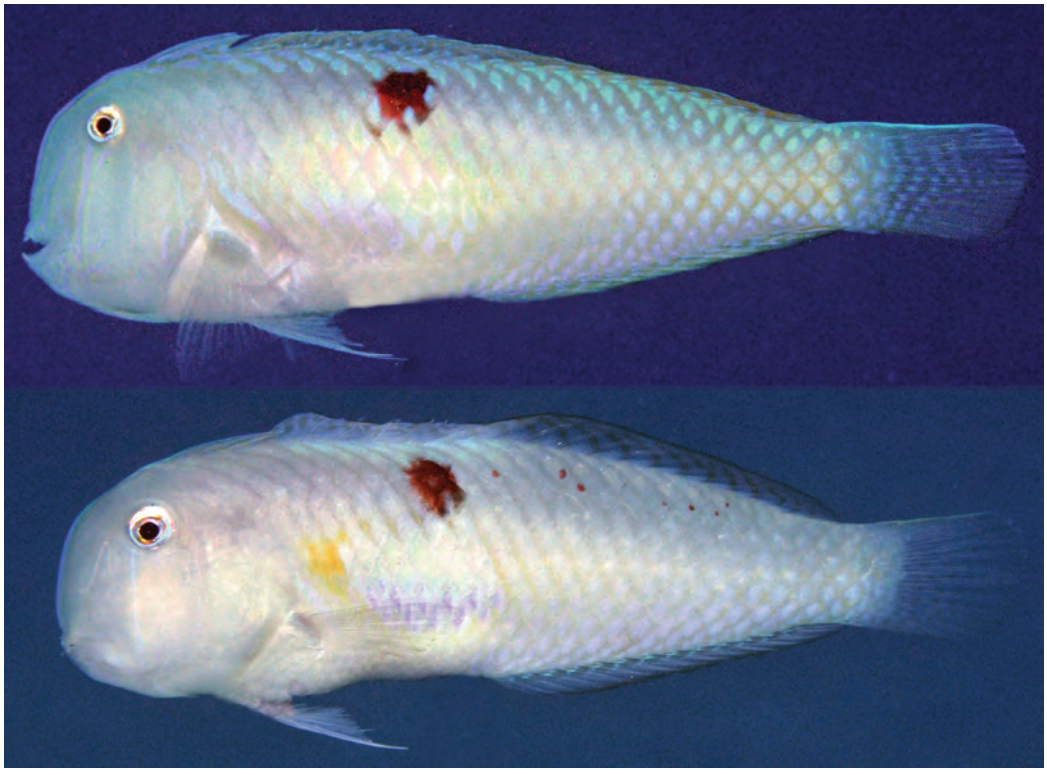

Figure 1. *Iniistius naevus*, underwater photograph of male holotype (upper) and female paratype, 119.8 mm SL (lower), South Sentinel Island, Andaman Islands (G. Allen photos)

Figure 2. *Iniistius naevus*, preserved holotype, 131.9 mm SL, South Sentinel Island, Andaman Islands (G. Allen photo)

Table 1. Proportional measurements as percentage of the standard length for selected type specimens of *Iniistius naevus*.

	Holotype WAM P. 33445	Paratype WAM P. 33445	Paratype BPBM 41085	Paratype WAM P. 33445	Paratype BPBM 41085	Paratype WAM P. 33445
Standard length (mm)	131.9	119.8	114.1	108.3	87.7	80.7
Body depth	33.7	33.9	31.8	32.8	31.8	31.6
Body width	11.6	13.3	11.2	11.4	10.9	10.4
Head length	30.8	32.1	30.8	30.5	31.4	30.9
Snout length	15.8	15.7	14.7	14.4	13.2	12.5
Eye diameter	5.8	6.4	6.8	6.6	7.2	7.3
Interorbital width	4.9	4.8	5.1	4.6	4.9	4.8
Upper jaw	9.0	9.0	8.9	9.1	8.2	8.7
Depth of caudal peduncle	13.2	13.0	11.9	12.5	12.5	12.3
Length of caudal peduncle	9.6	9.2	9.6	10.5	11.2	10.8
Predorsal distance	26.3	27.2	26.9	25.7	25.3	23.5
Preanal distance	51.5	52.3	55.0	55.3	52.1	50.9
Prepelvic distance	29.5	26.5	27.8	27.6	28.1	26.1
Length of dorsal-fin base	75.1	75.4	73.3	76.7	75.7	77.0
1st dorsal spine	12.4	13.3	12.9	12.8	12.8	11.9
2nd dorsal spine	12.7	12.1	11.7	11.6	11.6	11.2
3rd dorsal spine	5.8	6.5	5.8	5.3	6.5	5.7
9th dorsal spine	7.1	7.4	6.5	7.1	7.3	7.6
Longest soft-dorsal ray	12.0	11.0	11.0	10.7	10.7	10.3
Length of anal-fin base	38.7	40.9	35.1	34.0	36.7	37.2
1st anal spine	3.6	3.8	2.6	3.2	4.0	2.6
2nd anal spine	5.8	6.0	5.2	6.1	6.4	5.2
3rd anal spine	7.2	7.5	6.9	7.4	8.0	7.1
Longest soft-anal ray	12.0	11.3	10.7	9.7	10.6	9.3
Caudal-fin length	22.0	22.1	21.9	21.1	22.2	21.2
Pectoral-fin length	22.6	22.1	23.3	20.4	21.0	20.7
Pelvic-spine length	7.3	6.8	7.1	7.1	7.3	6.1
Pelvic-fin length	19.8	19.6	17.4	18.6	17.1	16.9

FAMILY LABRIDAE

Pseudocoris petila n. sp.

Allen & Erdmann
(Figs.1-5; Table 1)

Holotype: WAM P.33264-002, female, 67.7 mm SL, South Cinque Island, 11°14.499' N, 92°41.273'E, Andaman Islands, 10-16 m, spear, G. Allen, 1 April 2010.
Paratype (collected with holotype): WAM P.33264-004, female, 56.9 mm SL.

Diagnosis: Dorsal rays IX,12; anal rays III,12; pectoral rays 13; lateral-line scales 72-75 gill rakers 15-16; body depth 4.8-4.9 in SL; head length 2.9-3.2 in SL; dorsal fin of suspected (not collected) terminal male elevated anteriorly; caudal fin truncate; initial phase bluish grey on side of body, pink ventrally, pair of red stripes on upper back, narrowly separated by blue-edged, dark brown stripe anteriorly and coalescing below posterior dorsal fin; head with broad blue zone behind eye ending in large dark patch on opercular flap; blackish spot on middle of caudal-fin base.

Description: Counts and proportions of holotype, followed by data for paratype in parentheses if different. Dorsal rays IX,12; anal rays III,12; dorsal and anal soft rays branched, last to base; pectoral rays 13, first short and splint like, next unbranched; pelvic rays I,5, soft rays branched; principal caudal rays 14, upper and lowermost unbranched; upper and lower procurrent caudal rays 6 (6-7); lateral-line scales 75 (72); scales above lateral line to middle of dorsal fin 5; scales below lateral line to anal-fin origin 25 (23); total gill rakers on first arch 15 (16); vertebrae 25.

Body elongate, depth 4.8 (4.9) in SL; body compressed, width 1.8 (1.6) in depth; dorsal profile of head gently convex; head length 3.2 (3.3) in SL; snout relatively blunt, its length 4.7 (4.6) in head; eye diameter 5.3 (4.7) in head; interorbital space convex, least bony width 4.9 (4.7) in head; caudal-peduncle depth and length about equal, 3.1 (2.7) in head.

Mouth terminal, oblique (forming angle of about 40° to horizontal axis of body), and small, maxilla just reaching a vertical at posterior nostril, upper-jaw length 5.3 (4.6) in head; front of jaws with pair of forward projecting canines, curving laterally, lower pair fitting between upper pair when mouth closed; side of jaws with about 10-15 slender conical teeth, much smaller than anterior canines; no canine tooth at rear corner of mouth; palate edentate; lips thin, greatest depth of labial flap of lower jaw 2.1 in pupil diameter; tongue thin and wide, projecting beneath broad membrane anteriorly on floor of mouth; longest gill raker about one-third length of longest gill filaments.

Figure 1. *Pseudocoris petila*, initial phase, approximately 65 mm SL, underwater photograph, South Cinque Island, Andaman Islands (G. Allen photo)

Opercular flap prominent, pointed posterior end extending beyond upper base of pectoral fin; preopercular margin thin and smooth, corner broadly rounded; upper end of preopercular margin at level of ventral edge of orbit, anterior end level with front edge of pupil. Nostrils small and inconspicuous; anterior nostril about one pupil diameter in front of anterior edge of eye, with low fleshy rim; posterior nostril about half pupil diameter behind anterior nostril, covered by thin anterior skin flap; series of 11 sensory pores from just in front of anterior nostril through interorbital space to beginning of lateral line; transverse series of five pores just anterior to beginning of scales, dorsally on nape; series of 10 pores encircling orbit from behind upper part of eye to below anterior nostril; preopercular-mandibular series of 10 pores beginning above free end of preopercle and ending at chin, also six smaller pores on lower part of preopercle, dorsal to main pore series.

Scales small and cycloid; progressively smaller scales extending forward on nape to above upper end of preopercular margin; no median predorsal scales; about 12 transverse scale rows on either side of naked predorsal midline of head; no scales on head; prepelvic area fully scaled (may be embedded), in about 9-10 rows; dorsal and anal fins scaleless; small scales on about basal one-fourth of caudal fin, including one large tubed scale (continuation of lateral line); no scales on base of paired fins; midventral, pointed, fleshy process at base of pelvic fins, its length about equal to pupil diameter; lateral line following dorsal contour of body to below ninth dorsal soft ray, then deflected obliquely downward to level of eleventh dorsal soft ray, before continuing midlaterally to base of caudal fin; last pored scale on base of caudal fin slightly larger and more pointed than previous scales.

Origin of dorsal fin above upper end of gill opening; predorsal length 1.3 (1.2) in SL; spines of dorsal and anal fins flexible; membranes of spinous portion of dorsal and anal fins not incised; spine tips continuing as slender, tapering flexible rod that reinforces fin margin more than half way to next spine; anterior part of dorsal fin elevated in male (see remarks); anterior dorsal fin not elevated in females; first dorsal spine 4.6 (5.3) in head; ninth (last) dorsal spine longest, 3.6 (2.8) in head; first six soft dorsal rays subequal, 3.0 (2.4) in head; preanal length 1.9 in SL; first anal spine 12.5 (8.5), second anal spine 6.8 (5.2), and third anal spine 5.0 (3.5), all in head; third anal soft rays longest, 3.4 (3.0 in head; caudal fin truncate, its length 1.9 (1.6) in head; pectoral fins pointed, third ray longest, 1.4 in head; prepelvic length 3.6 (3.5) in SL; pelvic fin length 3.0 (2.9) in head, pelvic-fin tips falling well short of anus when depressed; length of pelvic-fin spine 4.6 (3.8) in head.

Colour of initial phase in life (Figs. 1-3): head bluish, pink below eye; dark grey stripe on side of snout, broad blue zone behind eye ending in large dark blackish to dark blue patch covering opercular flap (above pectoral-fin base); bluish grey on side of body, pink ventrally; pair of red stripes dorsally on head, continuing on upper back, narrowly separated by blue-edged, dark brown stripe anteriorly and coalescing below posterior dorsal fin; pupil-sized black spot on middle of caudal-fin base; dorsal, anal, and caudal fins mainly semi-translucent red, sometimes with small blue-white spots on dorsal fin; pectoral and pelvic fin translucent with slight reddish hue.

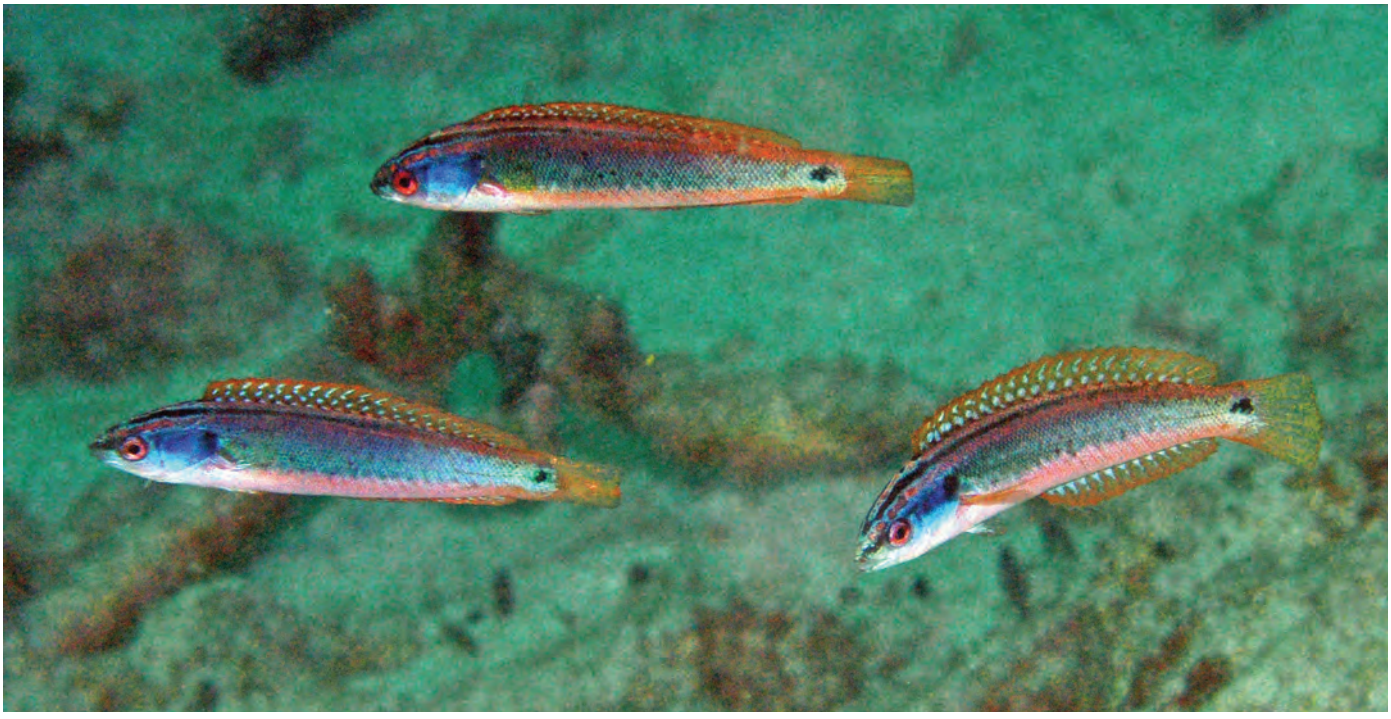

Figure 2. *Pseudocoris petila*, initial phase, approximately 50-65 mm SL, underwater photograph, South Cinque Island, Andaman Islands (G. Allen photo)

Figure 3. *Pseudocoris petila*, initial phase, approximately 65 mm SL, underwater photograph, South Cinque Island, Andaman Islands (G. Allen photo)

Figure 4. *Pseudocoris petila*, preserved female holotypye, 67.7 mm SL, South Cinque Island, Andaman Islands (G. Allen photo)

Colour in alcohol (Fig. 4): brown dorsally on head and on upper half of body, pale yellowish tan ventrally; dark grey stripe on side of snout, continuing behind eye as expanded dark grey area posteriorly to opercular flap; conspicuous blackish spot at middle of caudal-fin base; fins semi-translucent whitish.

Colour of presumed (see remarks) male (Fig. 5): head and upper back dark green, yellow-green on lower head and lower anterior side, grading to greyish posteriorly; broad zone of black on upper two-thirds of side, interrupted below posterior dorsal spines/anterior soft dorsal rays by large yellowish patch with black bar through centre; lower edge of black zone with blue "zigzag" margin; red iris; blue area encompassing snout tip, lips, and chin; dorsal fin mainly black with bluish basal stripe and narrow blue outer margin; anal fin whitish with narrow blue margin: caudal fin translucent with blue upper and lower margins; pelvic fins dusky brownish; pectoral fins translucent.

Remarks: *Pseudocoris* was reviewed by Randall & Walsh (2008). The genus contains the following six species: *P. aequalis* Randall & Walsh, 2008 (Coral Sea), *P. aurantiofasciatus* Fourmanoir, 1971 (widespread western and central Pacific to Christmas and Cocos-Keeling islands), *P. bleekeri* (Hubrecht 1876; Indonesia to Japan), *P. heteroptera* (Bleeker, 1857; widespread Indo-west and central Pacific), *P. ocellata* Chen & Shao, 1995 (Taiwan to Japan), and *P. yamashiroi* (Schmidt, 1931; widespread Indo-west and central Pacific). As pointed out by Randall & Walsh (2008) the six species have similar meristic features, including the same number of dorsal and anal rays, gill rakers, and similar number of lateral-line scales. Morphometric features are also of limited use, although a few species exhibit elongation of the first two dorsal spines in terminal males. Colour pattern differences provide the best means of separation, although these are diverse and usually consist of different patterns for juvenile, initial phase (male and female), and terminal phase (male) individuals.

Figure 5. *Pseudocoris petila*, presumed terminal male, approximately 80 mm SL, underwater photograph, Weh Island, Sumatra, Indonesia (G. Allen photo)

The new species is clearly separable on the basis of its unique initial phase colour pattern (Figs. 1-3). Although we did not collect any males, we are reasonably confident that a terminal phase individual (Fig. 5) photographed at Weh Island, off the north-western tip of Sumatra, belongs to this species. Its general colour pattern and elongate first two dorsal spines indicate a possible close relationship with *P. bleekeri*.

The type locality consisted of a sand, rubble, and weed bottom, with scattered rocky boulders in 10-16 m depth. The presumed terminal male was sighted adjacent to a steep dropoff in about 25 m depth.

The new species is currently known only from the Andaman Islands with a sighting of the presumed terminal male off north-western Sumatra (approximately 585 km southeast of the Andaman Islands). Most likely it occurs throughout coral reef areas of the East Andaman Sea.

Etymology: This species is named *petila* (Latin: thin or slender) with reference to the elongate body shape.

Reference

Randall, J.E. & Walsh, F. 2008. A pictorial review of the Indo-Pacific labrid genus *Pseudocoris*, with description of a new species from the Coral Sea. *aqua, International Journal of Ichthyology* 14(2): 45-58.

Table 1. Proportional measurements (as percentage of SL) for type specimens of *Pseudocoris petila*.

	Holotype WAM P. 33264-002	**Paratype WAM P. 33264-004**
Standard length (mm)	67.7	56.9
Body depth	20.8	20.2
Body width	11.8	12.5
Head length	31.3	29.9
Snout length	6.6	6.5
Eye diameter	5.9	6.3
Interorbital width	6.4	6.3
Upper jaw	5.9	6.5
Depth of caudal peduncle	10.0	11.2
Length of caudal peduncle	10.0	11.1
Predorsal length	24.1	24.6
Preanal length	53.9	51.3
Prepelvic length	27.9	28.3
Length of dorsal- fin base	65.3	66.8
First dorsal-spine length	6.8	5.6
Last dorsal-spine length	8.7	10.7
Longest soft-dorsal ray	10.5	12.7
Length of anal-fin base	33.7	37.4
First anal-spine length	2.5	3.5
Second anal-spine length	4.6	5.8
Third anal-spine length	6.2	8.6
Longest soft-anal ray	9.3	9.8
Caudal-fin length	16.5	18.6
Pectoral-fin length	21.9	21.3
Pelvic-spine length	6.8	7.9
Pelvic-fin length	10.3	10.2

FAMILY PINGUIPEDIDAE

Parapercis bimacula n. sp.

Allen & Erdmann
(Figs. 1-3; Table 1)

Holotype: MZB 20595, 100.2 mm SL, male, Nusa Dua, 08°48.025'S, 115°14.356'E, Bali, Indonesia, 6-20 m, clove oil, M.V. Erdmann, 30 April 2011.
Paratypes: BPBM 41086, 2 specimens, 86.4-87.1 mm SL, Ahmed, 08°20.292'S, 115°39.655'E, Bali, Indonesia, 5-10 m, clove oil, M.V. Erdmann, 2 December 2011; MZB 20596, 3 specimens, 72.4-84.2 mm SL, collected with BPBM paratypes; WAM P.33459-003, 2 specimens, 50.5-84.2 mm SL, collected with holotype; WAM P.33548-001, 105.3 mm SL, Tulamben, 08°16.366'S, 115°35.524'E, Bali, Indonesia, 5-10 m, clove oil, M.V. Erdmann, 3 July 2010.

Diagnosis: Dorsal-fin rays IV,21; anal-fin rays I,17; pectoral-fin rays 17 (rarely 16); lateral-line scales 59; three recurved canine teeth on each side at front of lower jaw; no palatine teeth; scales on body ctenoid, becoming cycloid on abdomen and breast; scales on opercle ctenoid; scales on cheek weakly ctenoid to cycloid; body depth 5.2-6,1 in SL; caudal fin slightly rounded; pelvic fins reaching slightly beyond anal-fin origin; colour of head and body generally pale bluish grey to white; colour in life mottled brown on upper half, 10 red bars on lower half of side from pectoral-fin base to caudal-fin base, red bar below eye with pair of small black spots, large black spot on spinous dorsal fin, three rows of black spots on soft dorsal fin, and caudal fin with brown to reddish bands and whitish or yellow central portion.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal-fin rays IV,21; anal-fin rays I,17; all dorsal and anal soft rays branched, the last to base; pectoral-fin rays 17 (one paratype with 16), branched except uppermost; pelvic-fin rays I,5; branched caudal-fin rays 15; upper procurrent caudal-fin rays 10, posterior 2-3 segmented; lower procurrent caudal-fin rays 8-9, posterior 2-3 segmented; lateral-line scales 59 (not including 3 smaller pored scales on base of caudal fin); scales above first lateral-line scale to origin of dorsal fin 7; scales below lateral line posteroventrally to origin of anal fin about 12; median predorsal scales 10; circumpeduncular scales 26; gill rakers 6 +10 = 16 (4-7 + 10-11 = 14-18); pseudobranchial filaments 18 (17-18); branchiostegal rays 6; vertebrae 29.

Body depth at anal fin origin 5.8 (5.2-6.1) in SL; body nearly cylindrical anteriorly, width 1.0 (0.9-1.2) in depth, strongly compressed posteriorly; head length 4.4 (3.2-4.5) in SL; snout length 2.3 (2.2-3.3) in head length; eye diameter 3.2 (3.3-4.9) in head length; interorbital space slightly concave, least fleshy width 9.6 (7.9-11.9) in head length; caudal-peduncle depth 3.0 (2.5-3.4) in head length; caudal-peduncle length 2.7 (2.7-3.5) in head length.

Figure 1. *Parapercis bimacula*, approximately 110 mm SL, underwater photograph, Tulamben, Bali, Indonesia (G. Allen photo)

Mouth large, maxilla reaching vertical through anterior third of eye, upper-jaw length 1.9 (1.9-2.8) in head length; mouth oblique, forming angle of about 15-18° to horizontal axis of body, lower jaw projecting; front of upper jaw with five, variable-sized, recurved canine teeth on each side; side of upper jaw with single row of 16 slender conical teeth that curve posteriorly; broad band of villiform teeth in about 10 rows medial to canines at front of upper jaw, gradually narrowing posteriorly in jaw to single row; front of lower jaw with three recurved canine teeth on each side, increasing in length posteriorly; band of about 5-6 rows of villiform teeth medial to canines at front of lower jaw, medial row continuing laterally in jaw posterior to last canine as a row of 4-7 increasingly larger and more strongly recurved teeth, followed by single row of small conical teeth to end of jaw; vomer with chevron-shaped band of conical teeth in about three irregular rows, anterior row of 11 (9-11) much larger than others; no palatine teeth; lips smooth, their inner surface with large fleshy papillae; tongue broadly rounded, reaching forward to posterior vomerine teeth.

Gill membranes with broad free fold across isthmus. Gill rakers short and spinous, the longest about one-fourth length of longest gill filaments. Nostrils small, anterior in front of centre of eye (viewed from side), half way to groove at edge of upper lip, with slight anterior rim and pointed posterior flap (nearly reaching posterior nostril when laid back); posterior nostril dorsoposterior to anterior nostril, aperture ovate, with slight rim. Pores of cephalic sensory system include row of five pores on each side from front of snout to middle of interorbital space, including small pore between nostrils; two median pores in posterior interorbital space, followed by median pore on occiput and two irregular transverse series of pores posteriorly on occiput (first anterior to scaled part of nape and second continuing to anterior end of lateral line on body); about 20 pores from posterior eye to below ventral part of eye, some with additional pores in side branch, including two pores above front of upper lip; 11 pores along free edge of preopercle; mandibular series with five pores to front of chin; irregular series of small pores in naked area dorsal to free edge of preopercle.

Opercle with single sharp spine at level of ventral edge of pupil (when viewed laterally); margin of interopercle smooth except for 4-5 tiny, close-set serrae on small bony prominence at upper edge; preopercle broadly rounded, its free edge smooth, extending ventrally and forward from level of lower edge of eye to below mid-eye level.

Scales finely ctenoid on body, becoming cycloid on breast and abdomen; scales on opercle ctenoid; scales on cheek weakly ctenoid to cycloid, small, embedded, in about 21 irregular vertical rows, from rear edge of upper jaw to posterior edge of preopercle, with additional short rows of scales extending dorsally to behind ventral half of orbit; no scales on dorsal, anal, or pelvic fins; progressively smaller scales extending out on caudal fin to at least three-fourths length of fin; base of pectoral fins covered with ctenoid scales; lateral line broadly arched over pectoral fin, then gradually declining to straight midlateral portion on posterior half of body.

Origin of dorsal fin over third or fourth lateral-line scales, predorsal length 2.9 (2.9-3.2) in SL; third (longest) dorsal spine 3.1 (3.0-4.9) in head length; fourth (shortest) dorsal

Figure 2. *Parapercis bimacula*, preserved male holotype, 100.2 mm SL, Nusa Dua, Bali, Indonesia (G. Allen photo)

spine, 1.8 (1.5-2.0) in third dorsal spine, membrane between fourth dorsal spine and first soft ray attached full length of fourth spine above base of ray; anterior dorsal soft rays longest, 2.0 (1.8-2.6) in head length; origin of anal fin below base of fifth dorsal soft ray, the preanal length 2.1 (2.0-2.1) in SL; anal spine 4.7 (4.2-6.3) in head length; anterior anal soft rays longest, 2.0 (1.9-3.0) in head length; caudal fin slightly rounded, 5.1 (4.8-5.3) in SL; pectoral fins broadly rounded when spread, ninth ray longest, 5.1 (4.8-5.3) in SL; origin of pelvic fins below middle of opercle, prepelvic length 3.9 (3.5-4.4) in SL; pelvic spine slender, 2.5 (2.5-3.0) in head length; pelvic fins reaching slightly beyond anal-fin origin, fourth soft ray longest, 5.0 (4.1-4.7) in SL.

Colour in life (Fig. 1): head and body generally pale bluish grey to white; rear part of lower jaw and adjacent chin often orange; side of head with three broad, red bars, increasingly longer posteriorly, first on lower jaw, second below eye, and third on operculum; second head bar with pair of small black spots; 10 red bars (usually with convex edges) on lower half of side from pectoral-fin base to caudal-fin base; middle of each bar often with large, horizontally ovate, blackish spot; row of dark brown or blackish spots, each immediately above ventral body bar; pair of reddish stripes running through upper part of ventral bars; dorsal portion of head and upper side with red or reddish brown spots and blotches; spinous dorsal fin with large black spot between first and third spines, mainly white on remaining portion; soft dorsal fin translucent with three longitudinal rows of black spots; anal fin translucent; caudal fin with 4-5 red brown to yellowish bands and whitish or yellow central portion enclosing several intense black spots; pelvic fins translucent with white base; pectoral fins translucent, fleshy base mainly reddish and white patch on base of lowermost 4-5 rays.

The general pattern is variable and apparently changeable according to behavioural mood and substratum. The red bars on the body are sometimes very faint, except for the ovate dark spots in the middle of each one, forming a longitudinal row. There is also considerable variation in the extent of dark mottling on the back. The most constant, colour pattern feature, hence highly diagnostic, is the pair of small black spots within the red bar below the eye, which is clearly visible in both live and preserved fish.

Colour in alcohol (Fig. 2): overall brown dorsally grading to tan on middle of side and yellowish white ventrally; 10 faint brown bars on side from pectoral-fin base to caudal-fin base; middle of each bar with large, horizontally ovate, blackish spot; pair of widely-spaced black spots below eye; three widely-spaced black spots on rear edge of preopercle; spinous dorsal fin with large black spot between first and third spines, dusky brown on remaining portion; soft dorsal fin semi-translucent tan with three longitudinal rows of black spots; anal fin tan with pair of faint dark stripes near margin; caudal fin with 3-4 faint brown bands and about 10 intense black spots on central portion; pelvic fins tan; pectoral fins semi-translucent tan.

Remarks: The new species is very similar to *P. clathrata* Ogilby, 1911. Both species have nearly identical meristic and morphometric features as well as remarkable similarities in general colour pattern. However, they exhibit important differences with regards to head colouration (Fig. 3) and presence (in *P. clathrata*) or absence (in *P. bimacula*) of sexual dichromatism. The male of *P. clathrata* has a distinctive ocellated black spot above the gill opening, a feature that is lacking in both sexes of *P. bimacula*. Both species have a large brown to reddish patch straddling the preopercle margin, which in *P. clathrata* usually has numerous, small black spots instead of the plain colouration of *P. bimacula*. The most diagnostic feature of *P. bimacula* is the pair of black spots within the red bar below the eye. *Parapercis clathrata* has an isolated brownish patch on the lower cheek instead of a complete bar and lacks the pair of black spots.

The new species is presently known from Indonesia (Komodo, Bali, and Pulau Weh off the north-western tip of Sumatra), and the Andaman Islands. The habitat consists of near shore, sand-rubble bottoms with scattered rock and coral outcrops in about 3-20 m, but most commonly in less than eight m.

Etymology: Named *bimacula* (Latin: two-spot) with reference to the diagnostic colour pattern below the eye.

Reference

Ogilby, J.D. 1910. On new or insufficiently described fishes. *Proceedings of the Royal Society of Queensland* 23: 1-55.

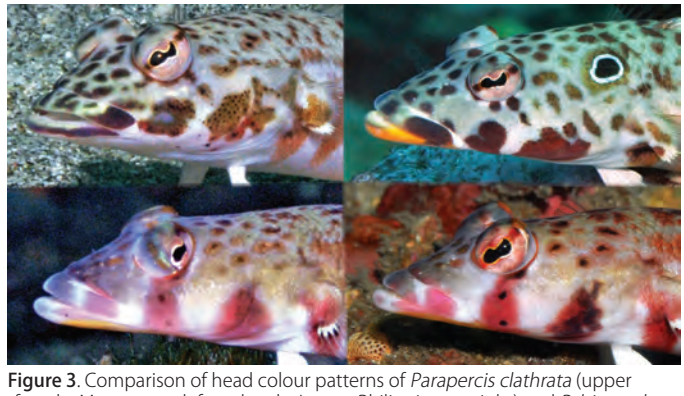

Figure 3. Comparison of head colour patterns of *Parapercis clathrata* (upper -female, Myanmar at left and male, Luzon, Philippines at right) and *P. bimacula* (lower - Bali, Indonesia) (G. Allen photos)

Table 1. Proportional measurements (as percentage of SL) for selected type specimens of *Parapercis bimacula* (* denotes damaged fin).

	Holotype MZB 20595	Paratype WAM P. 33548	Paratype BPBM 41086	Paratype BPBM 41086	Paratype MZB 20596	Paratype MZB 20596
SL	100.2	105.3	87.1	86.4	84.2	75.6
Body depth	17.3	19.1	15.8	17.1	18.5	16.4
Body width	17.6	16.2	17.1	15.5	17.5	17.3
Head length	23.0	22.4	23.7	22.5	30.2	31.5
Snout length	9.9	9.2	10.4	10.4	10.3	10.3
Eye diameter	7.2	6.6	7.1	6.8	6.2	7.5
Interorbital width	2.4	2.8	3.0	3.1	2.6	2.6
Upper-jaw length	11.9	11.1	12.1	11.8	10.9	11.2
Caudal-peduncle depth	7.7	8.9	9.4	8.3	9.0	9.4
Caudal-peduncle length	8.4	8.4	8.7	8.3	8.7	9.5
Predorsal length	34.4	32.0	32.7	33.2	32.8	34.5
Preanal length	47.8	46.8	47.9	50.0	49.0	50.5
Prepelvic length	25.3	26.5	24.7	22.7	25.2	28.7
Dorsal-fin base	60.0	61.8	60.0	59.6	60.1	58.5
Fourth dorsal spine	7.4	7.5	6.4	6.4	6.4	6.6
Fifth dorsal spine	4.1	4.1	3.7	3.1	3.3	4.2
Longest dorsal ray	11.7	10.2	11.9	12.7	11.8	12.2
Anal-fin base	43.7	45.4	43.6	43.8	44.4	40.9
Anal spine	4.9	5.0	5.2	5.3	5.3	4.8
Longest anal ray	11.3	11.1	11.8	11.7	10.6	12.2
Caudal-fin length	19.8*	18.4	18.8	19.3	18.1	18.4
Pectoral-fin length	19.8	19.6	20.9	19.3	19.0	20.6
Pelvic-fin length	20.2	21.8	21.2	22.9	23.3	22.0
Pelvic-spine length	8.1	8.0	8.4	9.3	9.3	7.3

FAMILY PINGUIPEDIDAE

Parapercis sagma n. sp.

Allen & Erdmann
(Figs. 1-3; Table 1)

Holotype: MZB 20597, 71.6 mm SL, male, Pulau Panjang, 02°58.560'S, 132°17.732'E, Fakfak Peninsula, Papua Barat Province, Indonesia, 60 m, rotenone, M.V. Erdmann & G.R. Allen, 21 March 2009.
Paratypes: BPBM 40709, 55.0 mm SL, off west coast of Tutuba Island, 05°33' 39.28"S, 167°16' 29.82"E, Vanuatu, steep slope with rubble and sand with rocky outcrops, small caves, undercuts, and many gorgonians, 80 m, quinaldine and hand net, B. Greene, 7 October 2006; WAM P.33090-011, 53.2 mm SL, collected with holotype

Diagnosis: Dorsal-fin rays V,21; anal-fin rays I,17; pectoral-fin rays 16-17; lateral-line scales 53; four recurved canine teeth on each side at front of lower jaw; no palatine teeth; scales on body ctenoid except cycloid on prepelvic area; scales on opercle ctenoid; cheek covered with small cycloid scales; body depth 5.7-6.3 in SL; caudal fin slightly rounded; pelvic fins reaching beyond anal-fin origin; colour of head and body generally white, eight large brown saddles along back; series of 8-9 red-orange spots, extending from behind upper pectoral-fin base to lower caudal-fin base, separated from above saddles by white mid-lateral stripe; caudal fin white centrally with large red to brown spot at upper base and diffuse reddish spot on lower base.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal-fin rays V,21; anal-fin rays I,17; all dorsal and anal soft rays branched, the last to base; pectoral-fin rays 17 (left side of one paratype with 16), branched except uppermost; pelvic-fin rays I,5; branched caudal-fin rays 15; upper procurrent caudal-fin rays 8 (8-10), posterior 4 segmented; lower procurrent caudal-fin rays 8 (7-8), posterior 3-4 segmented; lateral-line scales 53 (not including 2-3 smaller pored scales on base of caudal fin); scales above first lateral-line scale to origin of dorsal fin 6; scales below lateral line posteroventrally to origin of anal fin 10; median predorsal scales 10 (9-10); circumpeduncular scales 20 (21-23); gill rakers 6 +10 = 16 (5 + 10-11 = 15-16); pseudobranchial filaments 13; branchiostegal rays 6; vertebrae 31.

Body depth at anal fin origin 6.3 (5.7-5.9) in SL; body nearly cylindrical anteriorly, width 1.2 (1.3) in depth, strongly compressed posteriorly; head length 3.1 (3.0-3.3) in SL; snout length 3.4 (3.6-3.8) in head length; eye diameter 3.5 (3.5-3.8) in head length; interorbital space slightly concave, the least fleshy width 9.6 (10.9-11.1) in head length; caudal-peduncle depth 3.7 (3.8) in head length; caudal-peduncle length 4.0 (3.5-3.9) in head length.
Mouth large, maxilla reaching vertical through anterior third of eye, upper-jaw length 2.4 (2.7) in head length; mouth oblique, forming angle of 19° to horizontal axis of body, lower jaw projecting; front of upper jaw with pair of recurved canine teeth on each side; band of villiform teeth in about 10 rows medial to canines at front of upper jaw, gradually narrowing posteriorly in jaw to 2-3 rows, teeth in outer row largest; front of lower jaw with four recurved canine teeth on each side,

Figure 1. *Parapercis sagma*, freshly collected paratype (BPBM 40709), 55.0 mm SL, Tutuba Island, Vanuatu (R. Pyle photo)

increasing in length posteriorly; band of about 5-6 rows of villiform teeth medial to canines at front of lower jaw, medial row continuing laterally in jaw posterior to last canine as a row of increasingly larger and more strongly recurved teeth, followed by single row of small conical teeth to end of jaw; vomer with chevron-shaped band of 11 conical teeth in two irregular rows; no palatine teeth; lips smooth, their inner surface with large fleshy papillae; tongue broadly rounded, reaching forward to posterior vomerine teeth.

Gill membranes with broad free fold across isthmus. Gill rakers short and spinous, the longest about one-third length of longest gill filaments. Nostrils small, anterior in front of centre of eye (viewed from side), half way to groove at edge of upper lip, with slight anterior rim and broad, based, pointed posterior flap (not reaching posterior nostril when laid back); posterior nostril dorsoposterior to anterior nostril, aperture ovate, with slight rim. Pores of cephalic sensory system include row of five pores on each side from front of snout to middle of interorbital space, including small pore between nostrils and another just behind posterior nostril; two median pores in posterior interorbital space, followed by median pore on occiput and two irregular transverse series of pores posteriorly on occiput (first anterior to scaled part of nape and second continuing to anterior end of lateral line on body); about 10 pores posteriorly and ventrally around eye to above middle of upper lip; six pores along free edge of preopercle; mandibular series with seven pores to front of chin; irregular series of small pores in naked area dorsal to free edge of preopercle.

Opercle with single sharp spine, slightly above level of dorsal edge of pupil (when viewed laterally); margin of interopercle smooth; preopercle broadly rounded, its free edge smooth, extending from behind middle of eye to below middle of eye.

Scales finely ctenoid on body, except cycloid on prepelvic area; scales on opercle ctenoid; small cycloid scales completely covering cheek except broad naked area around eye and lower margin of preopercle; no scales on dorsal, anal, or pelvic fins; caudal fin with small scales on inter-radial membranes, nearly to posterior margin; base of pectoral fins covered with ctenoid scales; lateral line broadly arched over pectoral fin, then gradually declining to straight midlateral portion on posterior half of body.

Origin of dorsal fin over third lateral-line scale, predorsal length 2.9 (2.9-3.2) in SL; fourth (longest) dorsal spine 4.2 (4.0-4.9) in head length; fifth dorsal spine, 1.1 (1.2) in fourth dorsal spine, membrane between fifth dorsal spine and first soft ray attached about two-thirds length of fifth spine above base of ray; penultimate dorsal soft ray longest, 1.9 (2.1-2.5) in head length; origin of anal fin below base of fourth dorsal soft ray, preanal length 2.1 (1.9-2.1) in SL; anal spine 6.6 (5.7-6.0) in head length; penultimate anal soft ray longest, 2.3 (2.5-2.7) in head length; caudal fin slightly rounded, 5.0 (5.1) in SL; pectoral fins broadly rounded when spread, ninth ray longest, 4.7 (4.2-4.5) in SL; origin of pelvic fins below middle of opercle, prepelvic length 3.8 (3.2-3.7) in SL; pelvic spine slender, 3.2 (2.8) in head length; pelvic fins reaching base of third soft anal ray, fourth soft pelvic ray longest, 3.8 (3.4-3.5) in SL.

Colour when freshly collected (Figs. 1-2): head and body generally white; pair of yellowish bands on side of snout and faint reddish band below eye; reddish bar behind eye with 2-3 intense blackish spots on upper portion; similar reddish bar on rear margin of preopercle with four brown to blackish spots, lowermost vertically elongate; forehead with scattered blackish spots; eight large brown saddles (each with darker scale margins) along back from below dorsal-fin origin to

Figure 2. *Parapercis sagma*, freshly collected holotype, 71.6 mm SL, Pulau Panjang, West Papua, Indonesia (M. Erdmann photo)

caudal peduncle; series of 8-9 red-orange spots, extending from behind upper pectoral-fin base to lower caudal-fin base, separated from above saddles by white mid-lateral stripe; faint brownish bar corresponding with each red-orange spot, extending both dorsally and ventrally from spot; spinous dorsal fin mainly white except black spot at base of first two spines; soft portion of dorsal fin semi-translucent with two rows of black spots on middle portion and row of similar spots along base; anal fin semi-translucent whitish; caudal fin white centrally with large red to brown spot at upper base and diffuse reddish spot on lower base; pelvic fins white; pectoral fins semi-translucent with narrow red bar on base and white patch covering basal portion of lowermost fin rays.

Colour in alcohol (Fig. 3): head and body generally tan without markings except faint remnants of brown saddles along back; fins uniformly pale except faint remnants of dark spots on dorsal fin.

Remarks: The new species is most similar to *Parapercis biordinis* Allen, 1976 from Western Australia and *P. diplospilus* Gomon, 1980 from the Philippines, Indonesia, and Papua New Guinea. All three species are characterised by the presence of two dark spots at the base of the caudal fin. *Parapercis biordinis* has two additional dark spots in the central part of the caudal, only a single row of dark spots on the dorsal fin, and two rows, each with four small black spots, on the lower two-thirds of the body. It also differs from *P. sagma* in having 18 anal rays, 18 pectoral rays, and 7-8 predorsal scales (vs. usual counts of 17 anal and pectoral rays, and 9-10 predorsal scales). The pattern of *P. diplospilus* (Fig. 4) is more similar to that of *P. sagma*, both species having about eight brown saddles along the back. However, the pair of caudal-base spots of *P. diplospilus* are equally vivid blackish, unlike the condition in *P. sagma*, which has a diffuse lower spot. The former species also differs in having a row of large brown blotches along the lower side, as well as meristic differences including 22 soft anal rays, 18 soft anal rays, 14-16 pectoral rays, and 58-60 lateral-line scales. It also differs in having the membrane between the last dorsal spine and first soft ray attached at the base of the soft ray.

The new species is presently known only on the basis of the type specimens from Vanuatu and the Fakfak Peninsula of West Papua, Indonesia. The habitat consists of sand-rubble bottoms with scattered rock and coral outcrops in 60-80 m.

Etymology: Named *sagma* (Greek: saddle) with reference to the pattern of dark saddles on the back.

References

Allen, G.R. 1976. Descriptions of three new fishes from Western Australia. *Journal of the Royal Society of Western Australia* 59(1): 24-30.

Gomon, J.R. 1980. *Parapercis diplospilus* (Pisces: Mugiloididae), a new species from the Philippine Islands. *Proceedings of the Biological Society of Washington* 93(4): 989-996.

Figure 3. *Parapercis sagma*, preserved holotype, 55.0 mm SL, Pulau Panjang, West Papua, Indonesia (M. Erdmann photo)

Figure 4. *Parapercis diplospilus*, approximately 90 mm TL, Milne Bay, Papua New Guinea (N. Coleman photo)

Table 1. Proportional measurements (as percentage of SL) for selected type specimens of *Parapercis sagma*.

	Holotype MZB 20597	**Paratype WAM P. 33090**	**Paratype BPBM 40709**
Standard length	71.6	53.2	55.0
Body depth	15.8	16.9	17.5
Body width	12.7	13.1	13.9
Head length	32.1	30.2	32.9
Snout length	9.5	8.0	9.2
Orbit diameter	9.1	8.0	9.4
Interorbital width	3.4	2.7	3.0
Upper-jaw length	13.1	11.3	12.0
Caudal-peduncle depth	8.8	8.0	8.6
Caudal-peduncle length	8.0	8.5	8.5
Predorsal length	34.2	30.9	34.4
Preanal length	48.7	48.4	51.3
Prepelvic length	26.0	26.7	31.2
Dorsal-fin base	63.5	59.5	59.4
First dorsal spine	3.8	1.5	2.8
Fourth dorsal spine	7.7	6.2	8.3
Fifth dorsal spine	7.3	5.1	6.8
Longest dorsal ray	16.5	12.2	15.6
Anal-fin base	45.3	41.3	42.5
Anal spine	4.9	5.3	5.5
Longest anal ray	14.0	11.1	13.3
Caudal-fin length	20.0	19.5	19.5
Pectoral-fin length	21.4	22.2	23.9
Pelvic-fin length	26.5	28.5	29.3
Pelvic-spine length	8.4	10.2	10.5

FAMILY TRICHONOTIDAE

Pteropsaron longipinnis n. sp.

Allen & Erdmann
(Fig. 1-5, Table 1)

Holotype: MZB 20604, male, 29.0 mm SL, oceanic patch reef east of Point Mangguar, 02°54.652'S, 134°58.744'E, Cenderawasih Bay, West Papua, Indonesia, 70 m, clove oil, M.V. Erdmann, 17 September 2010.
Paratypes: USNM 404346, 5 specimens (1 male, 3 females, and 2 juveniles), 12.2-29.4 mm SL, collected with holotype; WAM P.33364-001, 3 specimens (2 females and juvenile), 12.2-25.1 mm SL, collected with holotype; WAM P.33404, male, 33.3 mm SL, Tanjung Bactanwutun, 08°13.160'S, 123°36.060'E, Lewalling Bay, Lembata, Indonesia, clove oil, 72 m, M.V. Erdmann, 30 March 2011.

Diagnosis: Dorsal rays III + 22-23 (usually 22); anal rays I,26; pectoral rays 17; lateral-line scales 38; scale rows between dorsal and anal fins 12-13; first dorsal fin on head, behind level of pelvic fins, composed of three spines, very elongate in male, its length about 80 % of SL; pelvic fins extremely elongate in both sexes, 70-78 % of SL in adult; colour in life mainly bluish white with yellow markings on head and along back; elongate pelvic fins of both sexes and dorsal fin of male whitish; dorsal fin of female mainly black.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays III + 22 (23 in one paratype); anal rays 26; all dorsal rays unbranched except last divided at base; all anal rays branched except first two, last divided at base; pectoral rays 17, upper two unbranched, including small uppermost splint-like ray; pelvic rays I,5, all rays unbranched; segmented caudal rays 11 (11-12), 8 (8-9) branched; upper and lower unsegmented caudal rays 1-2 (except 4 lower on one paratype); lateral-line scales 38; lateral scale rows between dorsal and anal fins 12 (12-13); no scales on head, single median predorsal scale; vertebrae 38.

Body elongate, greatest depth at level of pelvic-fin origin, 8.1 (7.2-7.9) in SL; opercular flap extending just beyond base of pectoral fin, head length 3.2 (2.7-3.3) in SL; head depressed, without scales except single median predorsal scale; snout acute and triangular in lateral profile, its rounded tip overhanging lower jaw, broadly triangular in dorsal view; broad premaxillary groove bounded on each side by maxillary spine; snout length, 4.4 (3.9-4.4) in head length; eye diameter 3.3 (3.0-3.6) in head length; interorbital space very narrow, eye of each side nearly in contact; caudal-peduncle short and slender, depth 5.1 (4.9-6.0) in head length; caudal-peduncle length 7.1 (6.4-11.1) in head length.

Mouth oblique, forming an angle of about 30° to horizontal axis of body, snout slightly projecting; mouth large, maxilla reaching vertical at middle of eye, upper-jaw length 2.3 (2.2-2.4) in head length; teeth small and conical; teeth of upper jaw uniserial; lower jaw teeth in about three irregular rows, inner teeth much larger than those of outer rows; small teeth on palatines; tongue relatively narrow with blunt tip; gill opening large, opercular membranes of each side meeting ventrally at about level of posterior edge of iris.

Posterior nostril a small round opening in front of eye; anterior nostril with similar sized aperture, without tube or raised rim; directly anterior to posterior nostril, closer to posterior nostril than tip of maxillary spine. Pattern of cephalic sensory pores illustrated in Fig. 4.

Figure 1. *Pteropsaron longipinnis*, male holotype, 29.0 mm SL, underwater photograph, Cenderawasih Bay, West Papua, Indonesia (G. Allen photo)

Figure 2. *Pteropsaron longipinnis*, female paratype, 25.1 mm SL, underwater photograph, Cenderawasih Bay, West Papua, Indonesia (G. Allen photo)

Figure 3. *Pteropsaron longipinnis*, preserved holotype, male, 29.0 mm SL, underwater photograph, Cenderawasih Bay, West Papua, Indonesia (G. Allen photo)

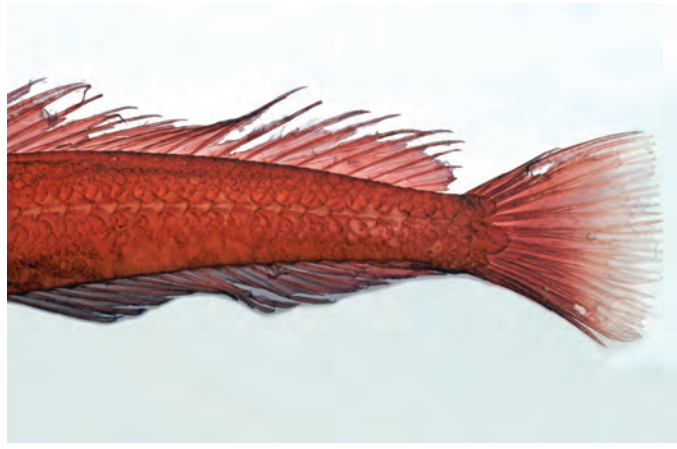

Figure 5. Posterior body of *Pteropsaron longipinnis* (male paratype, 33.3 mm SL, stained with cyanine blue) showing pattern of scales (G. Allen photo)

Body entirely covered with cycloid scales; lateral-line scales (Fig. 5) with raised median ridge and triangular posterior margin; lateral-line scales larger than scales above and below; no scales on fins except base of caudal fin covered with numerous scales including enlarged median scale (largest on body).

Origin of first dorsal fin above rear portion of opercle; snout to first dorsal-fin origin 3.5 (3.1-3.9) in SL; first dorsal fin of adult male extremely elongate, first dorsal spine longest, 1.2 (1.3) in SL; first dorsal spine of adult female moderately elevated, first spine longest, 3.9-5.3 in SL; origin of second dorsal fin above level of about third anal-fin ray; snout to second dorsal-fin origin 2.1 (2.0-2.2) in SL; third or fourth ray of second dorsal fin longest, 7.1 (6.1-7.0) in SL; snout to anal-fin origin 2.1 (2.1-2.3) in SL; fourth or fifth anal ray longest, 8.3 (6.8-9.0) in SL; origin of pelvic fins about pupil diameter anterior to level of first dorsal fin; pelvic fins extremely elongate, fourth ray longest, 1.3 (1.3-2.1) in SL; pectoral fins extending to level of about fifth anal ray, 4.7 (4.5-5.0 in SL); caudal fin relatively short, margin truncate, its length 4.3 (4.0-4.7) in SL.

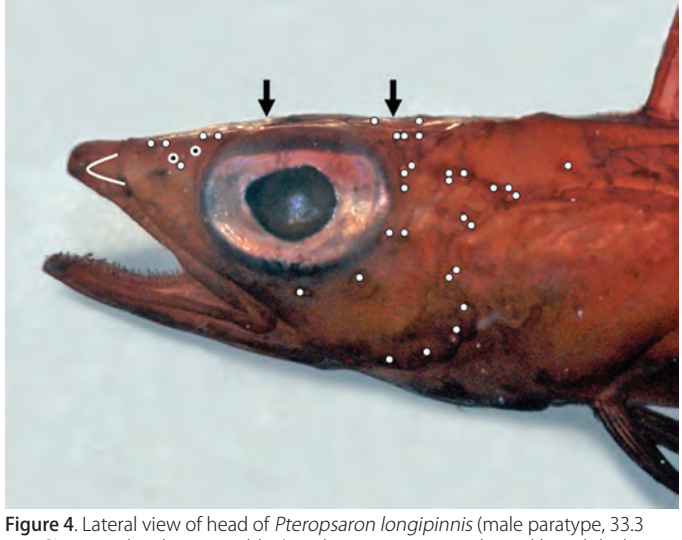

Figure 4. Lateral view of head of *Pteropsaron longipinnis* (male paratype, 33.3 mm SL, stained with cyanine blue), with sensory pores indicated by solid white dots and nostril openings by black dots outlined with white. Anterior arrow marks the position of paired interorbital pores, posterior arrow the position of a cluster of five median postorbital pores. The maxillary spine is outlined with white on the side of the snout (G. Allen photo)

Colour of male in life (Fig. 1): body semi-translucent bluish white with pale yellow internal stripe along vertebral column and series of 11-12 yellow spots/saddles along back, first below first dorsal fin and last on upper caudal-fin base; bright white stripe on median snout, completely encompassing snout tip; yellow band from front of eye to upper jaw; yellow flecks behind eye, on nape, and upper opercle; eye with mainly white iris, but with median green, red, and yellow area, also red upper margin; first dorsal fin bluish white with yellow fin spines; second dorsal fin translucent with individual rays yellow on about basal one-third to one-half, and blue outer margin; caudal fin semi-translucent whitish; anal fin translucent with blue margin; pelvic fins bluish white; pectoral fins translucent with bluish rays.

Colour of female in life (Fig. 2): nearly identical to that described for male except first dorsal fin translucent on basal fourth and jet black above.

Colour in alcohol (Fig. 3); generally uniform whitish with semi-translucent fins, except black on most of first dorsal fin of female.

Remarks: Smith & Johnson (2007) described *Pteropsaron springeri* from 18 specimens collected at Indonesia and the Philippines. Based on osteological evidence and external features they provisionally placed *Pteropsaron* in the subfamily Hemerocoetinae within Trichonotidae, noting that *P. springeri* differs from all other species of the *Pteropsaron/Osopsaron* complex in having the first dorsal fin composed of only three spines and positioned on the head over the posterior end of the occiput.

The new species is remarkably similar to *P. springeri* in terms of overall anatomy, including the cephalic position of the first dorsal fin and its extreme elongation in males. However, the two species differ with regards to several important features. The most obvious of these is the extreme elongation of the pelvic fins in *P. longipinnis*, which reach to the caudal base or beyond. In contrast the pelvic fins of *P. springeri* are much shorter, reaching to about the middle of the anal-fin base. The new species also differs in having smaller scales on the side of the body, arranged in 12 or 13 lateral rows (Fig. 5) compared to eight rows in *P. springeri*. There is also a difference in the number and shape of the lateral-line scales: *P. springeri* has 36-37 scales, which are notched on the posterior margin compared with 38 scales in *P. longipinnis* that are un-notched with a triangular margin (Fig. 5). The caudal-fin base is covered with numerous small scales and one large medial scale in *P. longipinnis* (Fig. 5) and only three large scales in *P. springeri*. There is also a difference in the number of anal-fin rays, 26 in *P. longipinnis* and 24-25 in *P. springeri*. One final difference involves the position of the first dorsal fin relative to the pelvic fins. The first dorsal-fin of *P. longipinnis* is behind the pelvic fins in contrast to *P. springeri*, which has the dorsal-fin in front of the pelvic fins. Moreover, there is a significant behavioural difference between the two species: *P. longipinnis* hovers a short distance above the bottom in midwater in contrast to the bottom-dwelling habit of *P. springeri*, which uses its pelvic fins as a tripod-like supporting mechanism.

This species has only been observed at two Indonesian sites (Cendrawasih Bay, West Papua and northern coast of Lembata, Alor Group) in depths of 70-75m. In both cases it was found in groups of about 15-20 individuals, with 1-3 large males and a harem of smaller females. At both sites the fish were observed towards the base of a steep coral wall on a relatively flat bottom (a relatively narrow Pleistocene reef terrace, with the topography then plunging almost vertically into the depths below 80 m). The bottom was covered with coarse white, coralline sand and exposed to moderate currents. In both cases the water was very clear and cold (approximately 24˚ C), and fish hovered about 2-5 cm off the substrate, apparently feeding in the current, until approached too closely, at which point they would dive into the sand and completely bury themselves. This escape response is very similar to that seen in *Trichonotus* species.

Etymology: The species is named *longipinnis* (Latin: long-fin) with reference to the elongate dorsal and pelvic fins, particularly the latter, which distinguish it from its nearest relative, *P. springeri*.

Reference

Smith, D.G. & Johnson, G.D. 2007. A new species of *Pteropsaron* (Teleostei: Trichonotidae: Hemerocoetinae) from the western Pacific, with notes on related species. *Copeia* 2007(2): 364-377.

Figure 6. *Pteropsaron springeri*, male, about 25 mm SL, underwater photograph, Flores, Indonesia (G. Allen photo)

Figure 7. *Pteropsaron springeri*, female, about 25 mm SL, underwater photograph, Bali, Indonesia (G. Allen photo)

Table 1. Proportional measurements (as percentage of SL) for selected type specimens of *Pteropsaron longipinnis*.

	Holotype MZB 20604	**Paratype WAM P. 33404**	**Paratype USNM 404346**	**Paratype WAM P. 33364**	**Paratype USNM 404346**	**Paratype WAM P. 33364**
Sex	male	male	male	female	female	female
Standard length	29.0	33.3	29.4	25.1	21.6	21.3
Depth at head	12.4	12.6	12.6	12.7	13.9	13.6
Head length	31.7	30.6	30.3	33.9	36.1	36.6
Snout length	7.2	6.9	7.8	8.0	8.8	9.4
Eye diameter	9.7	8.4	10.2	10.4	11.6	11.3
Upper-jaw length	13.8	12.6	12.6	15.5	16.2	15.0
Caudal-peduncle depth	6.2	6.3	6.1	6.8	6.0	6.1
Caudal-peduncle length	4.5	3.3	4.8	4.0	5.6	3.3
Snout to first dorsal fin	28.3	25.5	28.6	30.7	31.9	31.5
Snout to second dorsal fin	47.2	45.3	46.9	51.0	48.6	47.9
Snout to anal fin	48.3	43.8	47.6	47.0	46.8	46.9
Snout to pelvic fin	25.2	25.2	23.8	25.9	29.6	28.6
Longest dorsal spine	80.7	79.6	83.3	25.9	22.2	18.8
Longest soft-dorsal ray	14.1	15.0	14.3	15.9	16.2	16.4
Longest soft-anal ray	12.1	11.1	11.9	12.4	14.8	13.1
Pectoral-fin length	21.4	20.1	21.4	22.3	20.8	21.1
Pelvic-fin length	77.6	75.1	77.2	71.7	59.7	48.4
Caudal-fin length	23.1	21.3	23.5	24.7	22.7	22.1

FAMILY GOBIESOCIDAE

Aspasmichthys alorensis n. sp.

Allen & Erdmann
(Figs. 1-5)

Holotype: MZB 20588, 8.2 mm SL, submerged reef, commonly known by divers as "Kal's Dream", 08°16.260'S, 124°23.737'E, Alor Strait, East Nusa Tenggara Province, Indonesia, 16 m, clove oil, M. Erdmann, 29 March 2011.

Diagnosis: A species of gobiesocid provisionally assigned to the genus *Aspasmichthys* with the following combination of characters: Dorsal rays 7; anal rays 7; pectoral rays 21; caudal rays 17; pelvic disc length 3.9 in SL; head length 2.5 in SL; colour in life maroon grading to whitish or pinkish on lower head, breast, and abdomen with seven darker maroon bars or squarish patches on side, thin white stripe from just anterior of upper edge of eye to upper caudal-fin base, similar white stripe mid-dorsally from snout tip to about middle of body, and yellow caudal fin yellow with dark brown triangular marking in middle portion.

Description: Dorsal rays 7; anal rays 7; pectoral rays 21; caudal rays 17; gill rakers on second arch 6, all rudimentary.

Body moderately wide and depressed anteriorly, greatest depth 6.8 (14.6 % SL) in SL. Caudal peduncle short, depth 2.8 (12.2 % SL) in head length or 0.5 in length of caudal peduncle (6.1 % SL). Anus about equidistant between anal-fin origin and rear margin of pelvic disc. Head large and depressed, its length 2.9 (34.1 % SL) in SL and width 4.1 (24.4 % SL) in SL. Anterior nostril with dermal flap on posterior margin; posterior nostril smaller, above anterior edge of eye. Eye relatively large, 3.1 (11.0 % SL) in head length, its upper edge slightly protruding above dorsal profile of head when alive. Bony interorbital relatively narrow, 7.0 (4.9 % SL) in head length.

Gill membranes attached to isthmus. Upper attachment of gill membrane opposite about third or fourth pectoral ray. Predorsal length 1.4 (70.7 % SL), preanal length 1.4 (69.5 % SL), and prepelvic length 2.8 (35.4 % SL), all in SL. Pelvic disc double (Fig. 5; also see Briggs, 1955), its length 1.6 in head length or 3.9 (22.0 % SL) in SL, and width about equal to its length; no flattened papillae in central part of disc region A, about 3-4 rows across upper (anterior) part of disc; disc region with about 5 rows of flattened papillae across its width; disc region C with 1-2 rows of flattened papillae across its width.

Colour in life (Figs. 1-3): maroon grading to whitish or pinkish on lower head, breast, and abdomen; seven, broad darker maroon bars on side with much narrower pinkish interspaces; thin white stripe from just anterior of upper edge of eye to upper caudal-fin base; similar white stripe mid-dorsally from snout tip to about middle of body; dorsal and anal fins translucent; caudal fin yellow with dark brown triangular marking (apex directed posteriorly) on middle portion.

Colour in alcohol (Fig. 4): uniform yellowish tan.

Remarks: We tentatively assign this species to the genus *Aspasmichthys* Briggs, 1955, following the keys to subfamilies and genera provided by Briggs 1955. However, this allocation is provisional at best due to the very small size, hence fragile nature of the single known specimen, which precludes extensive morphological examination. Additional, preferably larger specimens, are required for a definitive generic assignment. Until now, the genus contained only a single species, *A. ciconiae* (Jordan & Fowler, 1902), which occurs

Figure 1. *Aspasmichthys alorensis*, live holotype, underwater photograph, Alor Strait, Indonesia (G. Allen photo)

Figure 2. *Aspasmichthys alorensis*, live holotype, underwater photograph, showing dorsal view of head, Alor Strait, Indonesia (G. Allen photo)

Figure 3. *Aspasmichthys alorensis*, live holotype, underwater photograph, Alor Strait, Indonesia (G. Allen photo)

Figure 5. *Aspasmichthys alorensis*, close-up view of pelvic disc structure (S. Morrison photo)

in Japan and Korea, ranging south to the Ryukyu Islands and Taiwan. It is not unusual to find Japanese-related species in the zone of cool upwelling that is typical in the straits between the Lesser Sunda (Nusa Tenggara) Islands of Indonesia. Other examples include *Cirrhitichthys aureus* (Temminck & Schlegel, 1842) (Cirrhitidae), *Ostorhinchus schlegeli* (Bleeker, 1854) (Apogonidae), *Chromis albicauda* Allen & Erdmann, 2009 (Pomacentridae), and *Bodianus izuensis* Araga & Yoshino, 1975 (Labridae). The new species differs from *A. ciconiae* in having seven dorsal and anal rays, and 17 caudal rays compared with 11-13 dorsal rays, 8-9 anal rays, and 10-11 caudal rays in *A. ciconiae*. It also differs from this species and all other reef-associated gobiesocids by its unique colour pattern. The colour of *A. ciconiae* is uniformly yellowish red without distinguishing marks (see Masuda *et al*., 1984).

The only known habitat consists of a submerged reef in the Alor Strait, between Alor and Pantar islands. The area is notorious for extremely strong currents and dangerous diving conditions. The fish was discovered while sheltering from currents in a large rocky depression at a depth of 16 m. It appeared to be associated with sponges.

Etymology: The species is named *alorensis* after the type locality, situated in the Alor Group of islands.

References

Briggs, J.C. 1955. A monograph of the clingfishes (Order Xenopterygii). *Stanford Ichthyological Bulletin* 6: 1-224.

Jordan, D. S. & H. W. Fowler. 1902. A review of the clingfishes (Gobiesocidae) of the waters of Japan. *Proceedings of the United States National Museum* 25(1291): 413-416.

Figure 4. *Aspasmichthys alorensis*, preserved holotype (S. Morrison photo)

Masuda, H. , K. Amaoka, C. Araga, T. Uyeno & T. Yoshino. 1984. *The fishes of the Japanese Archipelago*. Tokyo, Tokai University Press.

FAMILY GOBIESOCIDAE

Lepadichthys akiko n. sp.

Allen & Erdmann
(Figs. 1-4)

Holotype: MZB 20592, 10.8 mm SL, oceanic patch reef east of Point Mangguar, 02°25.830'S, 134°59.409'E, Cenderawasih Bay, West Papua, Indonesia, 70 m, clove oil, M.V. Erdmann, 20 September 2010.

Diagnosis: A species of *Lepadichthys* with the following combination of characters: Dorsal rays 12; anal rays 10; pectoral rays 16-17; caudal rays 18; pelvic disc very small, length 9.0 in SL; anus much closer to origin of anal fin than to rear margin of pelvic disc; head length 2.8 in SL; colour in life white with pair of broad maroon stripes on head and body (converging on snout), first along upper back and second midlaterally (passing through eye); also a third, much narrower stripe, on lower part of cheek and opercle, extending to ventralmost part of body on posterior side.

Description: Dorsal rays 12; anal rays 10; pectoral rays 16-17; caudal rays 18; dorsal and anal fins confluent with caudal fin.

Body moderately wide and depressed anteriorly, greatest depth 7.2 (13.9 % SL) in SL. Anus on posterior body, about pupil diameter anterior to anal-fin origin. Head large and depressed, its length 2.8 (36.1 % SL), width 6.4 (15.7 % SL), and depth 8.3 (12.0 % SL), all in SL. Anterior nostril long and tubular, without dermal flap on posterior margin; posterior nostril small, non-tubular, above anterior edge of eye. Eye relatively large, 3.9 (9.3 % SL) in head length, its upper edge slightly protruding above dorsal profile of head when alive. Bony interorbital relatively narrow, 3.3 (2.8 % SL) in eye diameter.

Gill membranes attached to isthmus. Upper attachment of gill membrane opposite about tenth or eleventh pectoral ray. Predorsal length 1.3 (76.9 % SL), preanal length 1.3 (78.7 % SL), and prepelvic length 3.2 (31.5 % SL), all in SL. Single row of small conical teeth in each jaw. Pelvic disc single (Fig. 3; also see Briggs, 1955), relatively small for genus, its length 3.3 (11.1 % SL) in head length or 9.0 in SL, and width about equal to its length; disc region A with three rows of flattened papillae across its width; disc region C with 3-4 rows of flattened papillae across its width.

Colour in life (Fig. 1): white with pair of broad maroon stripes on head and body (converging on snout), first along upper back and second midlaterally (passing through eye); also a third, much narrower stripe, on lower part of cheek and opercle, extending to ventralmost part of body on posterior side.

Figure 1. *Lepadichthys akiko,* live holotype, underwater photograph, Cenderawasih Bay, West Papua, Indonesia (G. Allen photo)

Figure 2. *Lepadichthys akiko*, preserved holotype (S. Morrison photo)

Figure 3. *Lepadichthys akiko*, holotype, close-up view of pelvic disc structure (S. Morrison photo)

Colour in alcohol (Fig. 2): yellowish tan with very faint hint of the two broad dark stripes evident in life.

Remarks: Briggs (1955) revised the family Gobiesocidae. He recognised four species in the Indo-Pacific genus *Lepadichthys* Waite. Several publications by this author since the original revision have significantly increased the number of known species. His most recent paper (2001), describing *L. springeri* from the Philippines included a key to the 10 known species. The new taxa described herein appears to be closest to *L. bolini* Briggs, 1962, described from a single specimen, 30.0 mm SL, from 0.6-3.6 m depth at Espiritu Santo Island, New Hebrides. Both are relatively elongate for the genus and possess a short pelvic disc, and also share a similar number of dorsal, anal, and caudal rays. However, *L. bolini* has more numerous pectoral-fin rays (30 vs. 16-17) and the upper attachment of the gill membrane is opposite the fifteenth pectoral ray, compared to the tenth or eleventh ray in *L. akiko*. The live colouration of *L. bolini* is unknown, but that of the new species appears to differ from all other species in the East Indian region by having a white rather than dark (often maroon to nearly blackish) ground colour.

This species is known only from the holotype collected on sponge on a rubble bottom in 70 m depth at Cenderawasih Bay, West Papua, Indonesia.

Etymology: The new species is named *akiko* (treated as a noun in apposition) as a memorial to Mrs. Akiko Shiraki Dynner. Mrs. Dynner had a lifelong attachment to the ocean, and her loving husband Alan has moreover been a strong supporter of marine conservation initiatives in the Bird's Head Seascape, where this attractive new species was found.

References

Briggs, J.C. 1955. A monograph of the clingfishes (Order Xenopterygii). *Stanford Ichthyological Bulletin* 6: 1-224.

Briggs, J.C. 1962. A new clingfish of the genus *Lepadichthys* from the New Hebrides. *Copeia* 1962 (2): 424-425.

Briggs, J.C. 2001. New species of *Lepadichthys* from the Philippine Islands. *Copeia* 2001 (2): 499-500.

FAMILY GOBIIDAE

Acentrogobius cenderawasih n. sp.

Allen & Erdmann
(Figs. 1-3; Table 1)

Holotype: MZB 20576, 39.3 mm SL, female, East Wandammen Peninsula, 02°33.390'S, 134°39.221'E, Cenderawasih Bay, West Papua, Indonesia, 20-25 m, clove oil, G. Allen & M. Erdmann, 9 November 2008.
Paratypes (collected with holotype): MZB 20585, 34.2 mm SL; WAM P.33045-012, 2 specimens, 34.6-38.0 mm SL.

Diagnosis: Dorsal rays VI + I,11, dorsal spines thin and flexible, anterior 4-5 spines with filamentous tips, that of fourth spine longest 2.8 (2.2-2.3) in SL, reaching to base of posterior rays of second dorsal fin when laid back; anal rays I,11; pectoral rays 18; caudal fin lanceolate, longer than head length; pelvic-fin rays I, 5, with well developed frenum; longitudinal scale series 33 (32-33); transverse-scales from origin of second dorsal fin ventroposteriorly to anal-fin base 8; transverse-scales from anal-fin origin dorsoanteriorly to first dorsal-fin base 9; predorsal-scales 13-14, extending forward to level of rear margin of preopercle; cycloid scales covering body; head scaleless except dorsally and laterally on nape; anterior extent of gill opening below middle of opercle; colour in life pale grey with large, irregular brown blotches dorsally on head and upper half of body; longitudinal row of five, horizontally elongate dark brown blotches on side of body at level of pectoral-fin base (including one at middle of caudal-fin base); fins generally translucent except pelvics white; dark brown spot on upper and lower pectoral-fin base.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays VI + I,11; anal rays I,11; pectoral rays 18; pelvic-fin rays I,5; all dorsal, anal, pectoral and pelvic soft rays branched, except upper and lowermost 1-2 pectoral rays; segmented caudal-fin rays 17; branched caudal-fin rays 13; longitudinal scale series 33 (32-33); transverse-scales from origin of second dorsal fin ventroposteriorly to anal-fin base 8; transverse-scales from anal-fin origin dorsoanteriorly to first dorsal-fin base 9; predorsal-scales 13 (13-14); vertebrae 27.

Body elongate and laterally compressed, more strongly posteriorly; body depth at pelvic-fin base 5.2 (5.2-5.4) in SL; body depth at anal-fin origin 6.2 (5.9-6.5) in SL; head width about equal to its depth at level of preopercular margin; head length 3.3 (3.4-3.5) in SL; snout short and rounded, length 4.4 (3.5-4.7) in head length; eye diameter 3.5 (3.2-3.7) in head length; interorbital extremely narrow, width 11.3 (10.0-10.3) in horizontal eye diameter; distance between snout and origin of first dorsal fin 2.9 (2.8-2.9) in SL, between snout and origin of second dorsal fin 1.9 (1.8), between snout and origin of anal fin 1.8 (1.7-1.8), and between snout and origin of pelvic fins 3.4 (3.0-3.5), all in SL.

Figure 1. *Acentrogobius cenderawasih*, approximately 50 mm TL, underwater photograph, Cenderawasih Bay, West Papua, Indonesia (G. Allen photo)

Mouth terminal; jaws extending to a vertical at anterior edge of pupil; chin relatively smooth, without mental frenum; jaw teeth small and conical, densely packed in several rows, those in outermost row at front of jaws largest, including enlarged, posteriorly curved canine on each side of lower jaw; tongue broad with bilobed anterior margin, broadly attached anteriorly to floor of mouth; anterior extent of gill opening below middle of opercle; pattern of papillae rows and sensory pores on head as shown in Fig. 3; cephalic sensory pores include snout pore, single anterior, medial, and posterior interorbital pores, 2 postorbital pores, 3 preopercular pores, and 3 supra-opercular pores; cheek papillae mainly in longitudinal pattern.

Cycloid scales covering body; head scaleless except dorsally and laterally on nape; predorsal scales extending to level of rear margin of preopercle; no dermal crest or barbels present on head; preopercular spines absent.

First dorsal fin origin behind level of pectoral-fin base; dorsal spines thin and flexible, anterior 4-5 (especially third to fifth) dorsal spines with filamentous tips, that of fourth spine longest 2.8 (2.2-2.3) in SL, reaching to base of posterior rays of second dorsal fin when laid back; longest (penultimate) ray of second dorsal fin 5.2 (5.0-5.9), longest ray (penultimate) of anal fin 4.1 (4.6-5.3) in SL, pectoral fin pointed, middle rays longest, 4.0 (3.3-3.6) in SL; pelvic fins completely connected by membrane, with well-developed frenum (posterior edge smooth, without fleshy lobes); pelvic-fin length 4.0 (3.9-4.1) in SL; caudal fin lanceolate, longer than head, its length 2.6 (2.4-2.8), in SL.

Colour in life (Figure 1): pale grey with large, irregular brown blotches dorsally on head and upper half of body; longitudinal row of five, horizontally elongate dark brown blotches on side of body at level of pectoral-fin base, including one on middle of caudal-fin base; head with diffuse blue, gold, and brown markings, including blue patch on lower operculum; fins generally translucent except pelvics white and faint brown spots on basal part of caudal fin; conspicuous dark brown spot on upper and lower pectoral-fin base.

Colour in alcohol (Figure 2): generally light tan; large, irregular brown blotches dorsally on head and upper half of body; longitudinal row of five, horizontally elongate dark brown blotches on side of body at level of pectoral-fin base, including one at middle of caudal-fin base; large brown patch on lower operculum; fins generally semi-translucent to dusky brownish; dark brown spot on upper and lower pectoral-fin base.

Remarks: The genus *Acentrogobius* as currently recognised contains a range of morphological forms and is most likely a polyphyletic assemblage. Larson & Murdy (2001) highlighted the difficulty presented in trying to characterise this genus in their key to the genera of Gobiinae occurring in the western and central Pacific area - *Acentrogobius* appears in three widely separated couplets. The new taxon falls into the category of *Acentrogobius* species that have the gill opening extending forward to below the level of the opercle rather than below the preopercle or further forward. It is most similar to *A. suluensis* (Herre, 1927), ranging from Indonesia and the Philippines to the Ryukyu Islands. Both species are characterised by a very slender body (depth at pelvic fins about 5.2-5.4 in SL), filamentous dorsal spines, and a lanceolate caudal fin, which

Figure 2. *Acentrogobius cenderawasih*, 39.3 mm SL, female, preserved holotype, Cenderawasih Bay, West Papua, Indonesia (G. Allen photo)

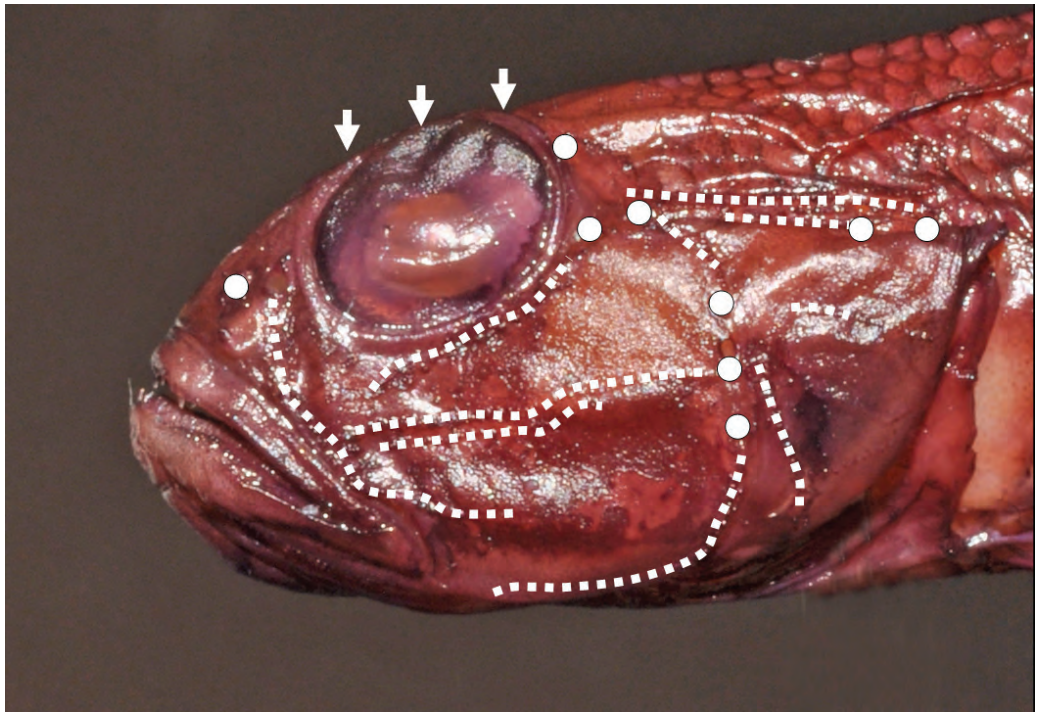

Figure 3. *Acentrogobius cenderawasih*, close-up photograph of head (temporarily stained with cyanine blue) showing pattern of papillae (dotted lines) and sensory pores (solid circles and arrows), paratype (WAM P. 33045), 38.0 mm SL, Cenderawasih Bay, West Papua, Indonesia (G. Allen photo)

is longer than the head. Both species have a row of five dark blotches on the side, a feature shared by most other members of the genus.. However, these are rectangular in *A. suluensis* (Fig. 4) compared to the horizontally elongate spots in *A. cenderawasih*. Additionally *A. suluensis* has a red submarginal band on the upper caudal-fin lobe compared with the mainly colourless fin of *A. cenderawasih*. The new species further differs from *A. suluensis* in having different markings on the head and pectoral-fin base, cycloid rather than ctenoid scales, well developed predorsal scales, and the fourth and fifth spines with the longest filaments rather than the first three spines. Finally, it differs from *A. suluensis* and other *Acentrogobius* in having 11 rather than 9 or 10 dorsal and anal rays.

The new species is also found in deeper water (18-30 m) compared to most other members of the genus, which are most common at depths less than 10 m, frequently in very shallow water (0-3 m) in highly protected near-shore environments, marine lakes, and brackish estuaries.

The new species is known only from the type locality, consisting of a narrow gully on a relatively steep, silty-sand slope, which gradually levels out at about 30 m. Approximately 10 solitary individuals were sighted at depths between 18-30 m. Each fish was associated with a sandy burrow, into which they quickly retreated when approached at close range.

Etymology: The new species is named *cenderawasih* after the type locality, Cenderawasih Bay, West Papua. The name is treated as a noun in apposition.

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Figure 4. *Acentrogobius suluensis*, approximately 60 mm TL, underwater photograph, Bali, Indonesia (T. Tonozuka photo)

Table 1. Proportional measurements (as percentage of SL) for type specimens of *Acentrogobius cenderawasih*.

	Holotype MZB 20576	**Paratype WAM P. 33045**	**Paratype WAM P. 33045**	**Paratype MZB 20585**
Sex	female	female	male	female
Standard length	39.3	38.0	34.6	34.2
Head length	30.5	29.5	29.5	28.9
Head width	18.6	16.1	17.1	16.4
Head depth	18.8	17.4	17.9	17.3
Body depth pelvic origin	19.3	18.9	18.5	19.3
Body depth anal origin	16.0	16.6	15.3	17.0
Caudal-peduncle depth	10.9	10.8	9.5	10.5
Caudal-peduncle length	13.2	14.7	17.3	17.0
Snout length	6.9	6.3	7.2	8.2
Eye diameter	8.7	7.9	9.0	9.1
Interorbital width	0.8	0.8	0.9	0.9
Upper-jaw length	12.5	12.6	11.6	11.1
Snout to 1st dorsal origin	34.1	35.5	35.5	34.8
Snout to 2nd dorsal origin	53.9	55.5	54.9	54.4
Snout to anal fin origin	56.5	55.8	57.2	58.8
Snout to pelvic-fin origin	29.8	28.9	32.9	32.2
Longest dorsal spine	35.6	43.9	44.5	42.7
Longest soft-dorsal ray	19.1	17.4	17.1	19.9
Longest soft-anal ray	24.2	20.3	18.8	21.6
Pectoral-fin length	24.9	27.6	30.6	28.9
Pelvic-fin length	25.2	25.0	24.6	25.4
Caudal-fin length	38.9	36.1	42.2	38.3

FAMILY GOBIIDAE

Grallenia baliensis n. sp.

Allen & Erdmann
(Figs. 1-3, Table 1)

Gobiidae sp. 1.- Kuiter & Tonozuka, 2001: 708, figs. A & B (Tulamben, Bali, Indonesia).

Holotype: MZB 20590, female, 14.8 mm SL, Tulamben, 08°16.525'S, 115°35.587'E, Bali, Indonesia, 6-10 m, clove oil, M.V. Erdmann, 2 December 2010.
Paratypes: BPBM 38650, male, 11.8 mm SL, Tulamben, Bali, Indonesia, 14 m, quinaldine, J.E. Randall, 10 October 2000; BPBM 38816, 4 specimens (all females), 14.5-15.0 mm SL, same data as previous BBPM paratypes except collected on 14 October 1999; MZB 20591, 8 specimens (2 males and 6 females), 10.9-15.3 mm SL, collected with holotype; WAM P.33567-001, 6 specimens (2 males and 4 females), 12.8-15.4 mm SL, collected with holotype; WAM P. 33472-005, 14.5 mm SL, female, Penutukang, 08°08.270'S, 115°23.622'E, Buleleng, Bali, Indonesia, 15 m, clove oil, M.V. Erdmann, 6 May 2011.

Diagnosis: Dorsal rays VI + I,10; anal rays I,8-9 (usually 9); pectoral rays 14-16 (usually 15); head and body lacking scales except on caudal peduncle and small patch behind pectoral-fin base; longitudinal scales on caudal peduncle 5-8; circumpeduncular scales 8-9; depth at pelvic-fin origin 6.7-7.3 in SL; gill opening extending forward to level of middle of opercle; first dorsal spine filamentous in male, 2.3-2.9 in SL; second to fourth dorsal spine longest in female, 9.2-9.7 in SL; longest soft dorsal-fin rays 12.3-16.4 % SL; longest soft anal-fin rays 11.6-13.5 % SL; caudal fin usually shorter than head, 3.8-4.6 in SL, slightly emarginate; colour in life translucent with 12 dark saddles on nape and back, internal dark stripe dorsal to vertebral column, series of large dark blotches midlaterally and ventrally on side of body, dark bar below eye, dark blotch on opercle, dark band on lower pectoral-fin base, and two large dark spots (sometimes joined medially) at base of caudal fin.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays VI + I,10; anal rays I,9 (one paratype with 8); all dorsal soft rays branched (last to base) except first; all anal soft rays branched (last to base) except first 1-2; pectoral rays 15 (one paratype with 14 and one with 16), all rays branched except uppermost; pelvic rays I,5, all soft rays branched, the fifth rays completely joined medially with membrane; pelvic frenum absent; branched caudal rays 11; segmented caudal rays 15; upper unsegmented caudal rays 6 (two paratypes with 9); lower unsegmented caudal rays 6 (6-7); gill rakers 2+ 8 (2 + 7-9); vertebrae 28.

Body elongate, depth at pelvic-fin origin 6.7 (6.9-7.3) in SL; depth at anal-fin origin 8.7 (7.7-9.5) in SL; body compressed,

Figure 1. *Grallenia baliensis*, approximately 14 mm SL, underwater photograph, Bali, Indonesia (G. Allen photo)

width at pectoral-fin origin 2.4 (2.2-2.5) in head length; head length 3.8 (3.7-4.1) in SL; head compressed, width 1.1 (0.9-1.1) in head length; snout short, length 6.5 (5.4-6.3) in head length; eye diameter 3.0 (2.8-2.9) in head length; interorbital space very narrow, eyes of each side nearly in contact; caudal-peduncle depth 3.5 (3.2-3.7) in head length; caudal-peduncle length 1.3 (1.0-1.2) in head length.

Mouth oblique, forming an angle of about 40˚ to horizontal axis of body; lower jaw protruding; mouth relatively large, maxilla reaching vertical at front of pupil, upper-jaw length 2.4 (2.4-2.6) in HL; teeth of jaws unicuspid, slender, in 2-3 rows; row of 8-10 slender teeth in outer row on each side of upper jaw; lower jaw with three rows of teeth anteriorly, narrowing to single row posteriorly; pair of moderately enlarged, recurved, canine-like teeth on anterolateral part of middle row; no teeth on vomer or palatine; edge of lips smooth; anterior margin of tongue concave; gill opening extending forward to level of middle of opercle.

Anterior nostril opening tubular; distal tip of anterior nostril tubule not reaching to upper jaw when adpressed; posterior nostril opening with low rim, situated about midway between anterior nostril and eye; cephalic sensory pores absent; pattern of head papillae similar to that illustrated for *G. lipi* by Shibukawa & Iwata (2007); head and body scaleless except 6-7 (5-8) transverse rows of ctenoid scales on caudal peduncle and patch of a few ctenoid scales immediately behind pectoral fins; circumpeduncular scales 8 (8-9).

Origin of first dorsal fin about pupil diameter behind level of upper pectoral-fin base, snout to first dorsal-fin origin 3.0 (2.9-3.1) in SL; dorsal spines slender and flexible, first dorsal spine long and filamentous in male, 2.3-2.9 in SL; second to fourth dorsal spines longest in female 7.8 (7.4-8.1) in SL; first and second dorsal fins well separated; snout to second dorsal-fin origin 1.9 in SL; spine of second dorsal fin 2.8 (2.5-3.3) in HL; penultimate dorsal soft ray longest, 7.4 (6.1-8.1) in SL; origin of anal fin about even or slightly behind origin of second dorsal fin, snout to anal-fin origin 1.9 (1.8-1.9) in SL; anal spine 3.3 (2.7-3.9) in HL; penultimate anal soft ray longest, 7.4 (7.6-8.6) in SL; caudal fin shorter than head with slightly emarginate posterior margin, its length 4.2 (3.8-4.6) in SL; pectoral fins pointed, middle rays longest, reaching to level of genital papilla, 3.7 (3.9-4.1) in SL; snout to pelvic-fin origin 3.4 (3.3-3.7) in SL; pelvic fins reaching to about anal-fin origin, 3.7 (3.8-4.2) in SL; pelvic frenum absent.

Colour in life (Fig. 1): generally translucent, with details of vertebrae and associated neural and hemal spines clearly evident in underwater photographs; head with large triangular, dark brown or blackish marking below eye and another on opercle; iris greyish with concentration of melanophores covering brain and more loosely scattered melanophores on cheek and operculum, these often within pinkish area; numerous tiny white spots on lips, chin, and cheek, and narrow yellow ring around pupil; about 12 dark brown to black, irregular saddles on upper back, beginning on nape; narrow blackish internal stripe, dorsally along vertebral column, and about five widely spaced irregular blackish blotches extending below and in contact with vertebral stripe, one above pectoral-fin base, one below first dorsal fin, one below inter-dorsal junction, one below about fifth soft dorsal ray, and one on middle of caudal peduncle; row of increasingly smaller dark brown to blackish blotches ventrally on side, the first below and in contact with second vertebral blotch (see above) and last on ventral edge of posterior caudal peduncle; dorsal fins translucent with basal pinkish stripe enclosing numerous tiny melanophores; caudal fin translucent with fine brown margins on rays, tiny white spots on membranes, and two large, dark brown or black spots at base, sometimes narrowly joined medially; anal fin translucent with tiny white spots and last few rays dusky brownish (especially distal tips of last two rays); pectoral fins translucent with brown diagonal band on lower half of base and pair of small brown spots on upper half of base.

Figure 2. *Grallenia baliensis*, approximately 14.8 mm SL, female, preserved holotype, Bali, Indonesia (G. Allen photo)

Figure 3. *Grallenia baliensis*, paratype (MZB), 13.2 mm SL, close-up photograph of posterior body (stained with cyanine blue) showing scalation (G. Allen photo)

Colour in alcohol (Fig. 2): generally yellowish white; tapering brown bar below eye and brown blotch on anterior opercle; smaller brown spots on upper cheek and dense concentration of melanophores on brain; about 12 dark brown to black, irregular saddles on upper back, beginning on nape with irregular band of smaller brown spots just below; midlateral row of vertically elongate, brown spots beginning below level of anterior first dorsal fin to anterior part of caudal peduncle; dorsal fins translucent except basal stripe composed of melanophores; caudal fin translucent with pair of dark brown spots at base (Fig. 3), often coalesced to form more or less solid bar; anal fin translucent with numerous melanophores covering membranes, denser on last few rays; pelvic fins brown; pectoral fins translucent with brown diagonal band on lower half of base and pair of small brown spots on upper half of base.

Remarks: Shibukawa & Iwata (2007) described the genus *Grallenia* with two new western Pacific taxa, *G. arenicola* and *G. lipi*. They also noted the occurrence of *Grallenia cf. lipi* at Bali, Indonesia on the basis of underwater photographs in Kuiter & Tonozuka (2001). Although they did not have specimens for comparison, it appeared to differ in having a heavily pigmented darkened colouration on the head and body. We are able to confirm the Bali species as a new taxa on the basis of our examination of 21 specimens, which are herein designated as types of *G. baliensis*.

The new species is closely related to *G. lipi* (Figs. 4-5), as suggested by Shibukawa & Iwata (2007). Both species differ from *G. arenicola* in lacking several features including scales on the anterior body (except small patch behind the pectoral-fin base), cephalic sensory pores, and a pelvic frenum. They also differ in having a filamentous first dorsal spine in males, longer posterior soft dorsal and anal rays (reaching or nearly reaching caudal-fin base when laid back), and higher number of soft dorsal and anal rays (9-10 vs. 7-8). The two closely allied species differ noticeably from each other in colouration; as mentioned by Shibukawa & Iwata, the Bali fish has much darker and more expansive dark markings on the head and body. Prominent in this regard are the tapering dark bar below the eye and two large spots at the base of the caudal fin (Fig. 3). In addition to colour differences, *G. baliensis* has larger and fewer scales (Fig. 3) on the posterior body (5-8 longitudinal scales, average 6 for 21 specimens, and 8-9 circumpeduncular scales vs. 10-14 and 12 respectively for *G. lipi*). Moreover, soft dorsal and anal fins of *G. baliensis* are shorter (dorsal 12.3-16.4, average = 12.5; anal 11.6-13.5, average = 12.1, all in SL – dorsal and anal measurements for 6 specimens with erect fins in excellent condition) compared with *G. lipi* (dorsal 17.5-21.8 and anal 12.6-18.1 in SL). Finally, there is a modal difference in number of pectoral-fin rays with *G. baliensis* almost always having 15 rays (rarely 14 or 16) compared to the usual count of 16 (rarely 14 or 15, occasionally 17) in *G. lipi*.

The habitat consists of sand/rubble bottoms in about 5-15 m. Loosely scattered, solitary individuals were observed, usually perched on small rocks among the sand. Males are relatively rare or are perhaps more efficient at evading collection. Only five males are present among the 21 type specimens.

Etymology: The species is named *baliensis* with reference to the type locality.

References

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Shibukawa, K. &Iwata, A. 2007. *Grallenia*, a new goby genus from the western Pacific, with descriptions of two new species (Perciformes: Gobiidae: Gobiinae). *Bulletin of the National Museum of Nature and Science (Ser. A)* Suppl. 1: 123-136.

Figure 4. *Grallenia lipi*, male, approximately 15 mm SL, underwater photograph, Mabul, Sabah, Malaysia (R. Kuiter photo)

Figure 5. *Grallenia lipi*, female, approximately 15 mm SL, underwater photograph, Molucca Islands, Indonesia (G. Allen photo)

Table 1. Proportional measurement (as percentage of SL) for selected type specimens of *Grallenia baliensis*.

	Holotype MZB 20590	**Paratype WAM P. 33567**	**Paratype WAM P. 33567**	**Paratype WAM P. 33567**	**Paratype WAM P. 33567**	**Paratype WAM P. 33567**
Sex	female	female	female	female	female	male
Standard length	14.8	15.4	15.2	14.6	13.8	13.4
Head length	26.4	24.7	25.0	26.7	26.8	26.1
Head width	13.5	14.9	13.8	13.7	14.5	14.9
Head depth	14.2	14.3	13.8	14.4	13.8	13.4
Body depth at pelvic origin	14.9	14.3	14.5	13.7	14.5	14.2
Body depth at anal origin	11.5	11.7	10.5	11.6	13.0	11.2
Body width	10.8	10.4	9.9	11.0	12.3	10.4
Caudal-peduncle depth	7.4	7.8	7.2	7.5	7.2	7.5
Caudal-peduncle length	20.3	22.7	25.0	23.3	23.2	23.1
Snout length	4.1	4.5	3.9	4.1	4.3	4.5
Eye diameter	8.8	8.4	8.6	9.6	9.4	9.0
Upper-jaw length	10.8	10.4	10.5	10.3	10.9	10.4
Snout to 1st dorsal origin	33.8	32.5	32.9	34.2	32.6	32.8
Snout to 2nd dorsal origin	53.4	51.3	53.3	53.4	52.2	52.2
Snout to anal-fin origin	54.1	55.2	54.6	55.5	53.6	55.2
Snout to pelvic-fin origin	29.1	29.9	27.0	28.8	29.7	30.6
First dorsal-spine length	10.8	10.4	10.5	10.3	10.9	44.0
Longest dorsal spine	12.8	13.0	12.5	12.3	13.0	13.4
First spine of 2nd dorsal	9.5	8.4	9.9	8.2	8.7	9.7
Longest soft-dorsal ray	13.5	13.0	16.4	12.3	13.0	13.4
Anal-spine length	8.1	6.5	9.2	6.8	7.2	6.7
Longest soft-anal ray	13.5	12.3	13.2	11.6	11.6	12.7
Pectoral-fin length	27.0	26.6	25.7	24.7	25.4	26.1
Pelvic-fin length	27.0	24.7	25.7	25.3	23.9	26.1
Caudal-fin length	23.6	22.7	23.0	21.9	23.9	26.1

FAMILY GOBIIDAE

Methods following Allen & Randall, 2006 and cephalic sensory pore terminology after Akihito, 1984.

Tomiyamichthys gomezi n. sp.

Allen & Erdmann
(Figs. 1-5; Table 1)

Holotype: WAM P.32998-004, male, 44.3 mm SL, Rawis, 11°21.099' N, 119°31.081'E, north-eastern tip of Palawan, Philippines, 13 m, clove oil, M.V. Erdmann, 19 June 2008. **Paratype (collected with holotype)**: WAM P.32998-011, female, 37.4 mm SL.

Diagnosis: Dorsal rays VI + I,10; anal rays I,10; pectoral rays 15; gill rakers rudimentary, only 1-2 feeble rakers on each limb of first gill arch; scales in longitudinal series 47-56; circumpeduncular scales 16-17; no scales on head, nape, and prepectoral area; ctenoid scales on body becoming cycloid on belly, breast, and side anterior to level of about middle of first dorsal fin; posterior oculoscapular canal and associated pores absent; body moderately elongate, depth 5.1-5.8 at pelvic-fin origin; gill opening extending forward to about vertical at posterior edge of preopercle; first dorsal fin elevated, but no filamentous spines, third spine longest, 3.6-4.3 in SL; caudal fin ovate with rounded margin, longer than head, 3.0-3.4 in SL; pectoral fins reaching to level of first dorsal soft ray, 3.5-3.9 in SL; pelvic fins not reaching anal-fin origin, 3.4-4.1 in SL; colour in life pale grey to whitish with orange spots on head, six dark blotches along lower side, brown mottling on upper half (often forming diffuse bars/saddles), and posterior part of first dorsal fin with brown basal blotch.

Description: Counts and proportions of holotype, followed by data for paratype in parentheses if different. Dorsal rays VI + I,10; anal rays I,10; all dorsal and anal soft rays branched, last to base (each major branch of last ray divided); pectoral rays 15, all rays branched; pelvic rays I,5, all soft rays branched, fifth rays joined medially, frenum well developed; segmented caudal rays 17, 13 branched; upper and lower unsegmented caudal rays 4; longitudinal scale series 47 (56); transverse scale rows 13 (12); no scales on head, nape, or prepectoral area; median prepelvic scales about 7-8 (embedded); circumpeduncular scales 17 (16); gill rakers rudimentary, 1 + 1 (2 +2); pseudobranch filaments 9 (8).

Body elongate, depth at pelvic-fin origin 5.8 (5.1) in SL; depth at anal-fin origin 6.3 (6.0) in SL; body compressed, width at

Figure 1. *Tomiyamichthys gomezi*, male holotype, 44.3 mm SL, underwater photograph, north-eastern Palawan, Philippines (G. Allen photo)

pectoral-fin origin 1.5 in body depth; head length 3.6 (3.3) in SL; head compressed, width 1.1 (1.2) in body depth; snout short, its length 5.3 in head length; orbit diameter 3.6 (3.3) in head length; interorbital space very narrow, eye of each side in contact; caudal-peduncle depth 2.8 in head length; caudal-peduncle length 1.7 (1.6) in head length.

Mouth oblique, forming an angle of about 40˚ to horizontal axis of body, jaws about equal; mouth large, the maxilla reaching vertical at posterior edge of pupil, upper-jaw length 2.2 (2.1) in head length; upper jaw with three rows of teeth anteriorly, narrowing to single row posteriorly; teeth of middle row at front of upper jaw smaller than those of other rows; teeth of posterior row recumbent; 2-3 enlarged, slender canine-like teeth on each side at front of upper jaw; lower jaw with about four rows of teeth anteriorly, narrowing to single row posteriorly; five enlarged teeth in outer row on each side at front of lower jaw, posteriormost of these largest and canine-like; no teeth on vomer or palatines; tongue slender, tip rounded; no distinct mental flap.

Gill opening extending forward to vertical at posterior edge of preopercle; gill membranes attached only anteriorly to isthmus, with no free fold; gill rakers rudimentary and inconspicuous, only 1-2 rudiments on upper and lower arch.

Posterior nostril a large, nearly round aperture in front of centre of eye at fleshy edge of orbit, with slight rim, except posteriorly; anterior nostril a short membranous tube, anterorventral to posterior nostril just above edge of upper lip.

Pattern of cephalic sensory pores and papilla rows illustrated in Fig. 3. Anterior oculoscapular-canal pores B', C (single), D (single), E, F, and G; posterior oculoscapular canal and associated pores absent; preopercular-canal pores M' and N; right and left sides of anterior oculoscapular canals fused medially in narrow interorbital space. Most cephalic sensory-papillae rows uniserial or comprising a single papilla, not forming multiple lines or aggregations except double row above opercle and cluster of papillae in longitudinal and transverse rows above upper rear edge of operculum; relatively reduced longitudinal pattern of sensory papillae rows on cheek (Fig. 5). Scales on body progressively larger posteriorly, scale rows irregular, especially anteriorly; ctenoid scales on body becoming cycloid anteriorly (on belly, breast, and side anterior to level of about middle of first dorsal fin); no scales on head or prepectoral area; no scales on fins except for three rows at base of caudal fin.

Origin of first dorsal fin above pelvic-fin origin, predorsal length 3.2 (3.0) in SL; dorsal spines slender and flexible; first dorsal spine 1.1 (1.3) in head length; third dorsal spine 1.0 (1.3) in head length; last membrane of first dorsal fin ending at origin of second dorsal fin; spine of second dorsal fin 2.8 (2.7) in head length; penultimate dorsal soft ray longest, 1.4 (1.9) in head length; origin of anal fin below base of second dorsal soft ray, preanal length 1.7 (1.6) in SL; anal spine 4.1 (4.0) in head length; penultimate anal soft ray longest, 1.3 (1.9) in SL; caudal fin ovate, longer than head, 3.0 (3.4) in SL; pectoral fins pointed, tenth or eleventh ray longest, reaching to level of first dorsal soft ray, 3.9 (3.5) in SL; prepelvic length 3.4 (3.1) in SL; pelvic fins reaching well short of anal-fin origin, 4.1 (3.4) in SL; pelvic spine 3.5 (3.9) in length of longest pelvic ray; pelvic frenum thin, but well developed, membrane reaching tip of pelvic spines.

Colour of male holotype in life (Fig. 1): pale grey on upper half, grading to white below; dark-edged orange spots on side of head and orange bands on posterior part of opercle; brown patch on anterior cheek and brown bar from front of eye to lower lip; dark brown spot above upper rear corner of gill cover; brown mottling dorsally on head and on upper half of body and five brown bars on body, first a saddle across top of nape and last midlateral on caudal peduncle; additional dark brown spot on caudal-fin base; first dorsal fin with dark-edged orange spots, continuation of second brown body bar on basal portion, narrow orange margin, and broad submarginal brown stripe; second dorsal fin with semi-translucent zone along base, small orange spot at base of each fin ray, brownish fin

Figure 2. *Tomiyamichthys gomezi*, female paratype, 37.4 mm SL, underwater photograph, north-eastern Palawan, Philippines (G. Allen photo)

Figure 3. *Tomiyamichthys gomezi*, about 40 mm SL, underwater photograph, Seribu Islands, Java, Indonesia (G. Allen photo)

membranes (lighter on edge of each ray), and double row of blue spots or short bands on outer margin; caudal fin brown to yellowish brown with blue streaks along edge of rays, and three rows of blue spots centrally on basal part; anal fin brown with blue streak between each ray; pelvic and pectoral fins semi-translucent pale grey, with short orange band on lower pectoral-fin base.

Female paratype (Fig. 2) similar, except orange spots and bands of head not as vivid, and second dorsal fin with broader semi-translucent whitish zone on basal half, darker brown on middle part of fin, and broad white outer margin with submarginal yellowish stripe.

Individual photographed at the Java Sea, Indonesia (Fig. 3) generally similar, but body bars less well developed above dark blotches on side.

Colour in alcohol (Fig. 4): generally yellowish tan with brown markings as shown in accompanying illustration.

Remarks: The Indo-Pacific genus *Tomiyamichthys* Smith contains small sand-dwelling gobies that occupy burrows with alpheid shrimps. In addition to the new species, the following nine are currently recognised: *T. alleni* Iwata, Ohnishi & Hirata, *T. fourmanoiri* (Smith), *T. lanceolatus* (Yanagisawa), *T. latruncularius* (Klausewitz), *T. oni* Tomiyama, *T. praealta* (Lachner & McKinney), *T. russus* (Cantor), *T. smithi* (Chen & Fang); and *T. tanyspilus* Randall & Chen. Although the genus has not been comprehensively reviewed, useful references include Iwata *et al*. (2000) and Randall & Chen, 2007. We follow the latter authors and Shibukawa *et al*. (2005) in recognising *Flabellogobius* Smith as a junior synonym of *Tomiyamichthys*.

The new species is separable from most currently recognised *Tomiyamichthys* by the combination of 10 soft dorsal and anal rays, 15 pectoral rays, 47-56 longitudinal scales, presence of both ctenoid and cycloid scales, only 1-2 feeble rakers on each limb of first gill arch, and the absence of the posterior oculoscapular canal and its associated pores (H', K', and L'). The other species sharing a count of 10 dorsal soft rays include *T. alleni* (western Pacific), *T. latruncularis* (Red Sea), *T. praealta* (western Indian Ocean), and *T. russus* (western Pacific). Both *T. alleni* and *T. praelata* differ in lacking ctenoid scales. The new species differs from *T. latruncularis* in having 10 instead of eight anal soft rays and 15 rather than 17 pectoral rays. It differs from *T. russus* in having 15 pectoral rays (rather than a usual count of 18-19 rays), 47-56 longitudinal scales (versus 77-97), and lacking the posterior oculoscapular sensory canal (present in *T. russus*).

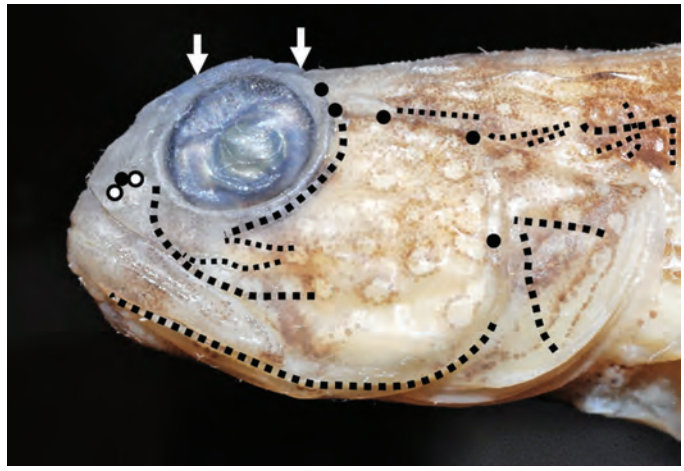

Figure 5. Lateral view of head of *Tomiyamichthys gomezi*, holotype, with sensory pores and main rows of papillae indicated by solid dots and broken lines respectively. Nostril openings indicated by black-edged white dots (G. Allen photo)

The new species is currently known from the type locality at northern Palawan, Philippines and on the basis of an underwater photograph from the Seribu Islands, Java, Indonesia. The habitat consists of sandy bottoms in sheltered water at depths ranging between about 8-15 m.

Etymology: We are pleased to name this species *gomezi* in honour of Dr. Edgardo D. Gomez, former Director of the Marine Sciences Institute, University of the Philippines, for his numerous and invaluable contributions for the advancement of marine science.

Figure 4. *Tomiyamichthys gomezi*, preserved male holotype, 44.3 mm SL, north-eastern Palawan, Philippines (G. Allen photo)

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Table 1. Proportional measurements (as percentage of SL) for type specimens of *Tomiyamichthys gomezi*.

	Holotype WAM P. 32998-004	**Paratype WAM P. 32998-011**
Sex	male	female
Standard length (mm)	44.3	37.4
Body depth (P2 origin)	17.4	19.8
Body depth (A origin)	15.8	16.6
Body width	11.3	12.8
Head length	27.5	29.9
Head width	16.5	16.8
Snout length	5.2	5.6
Orbit diameter	7.7	9.1
Cheek depth	9.0	9.9
Upper-jaw length	12.6	14.4
Caudal-peduncle depth	9.9	10.7
Caudal-peduncle length	16.0	19.0
Predorsal length	31.4	33.7
Preanal length	58.5	62.6
Prepelvic length	29.1	32.4
Base of dorsal fins	53.3	51.9
First dorsal spine	25.5	22.7
Third dorsal spine	28.0	23.3
Fifth dorsal spine	17.8	17.6
Spine of second dorsal fin	9.9	11.0
Longest dorsal ray	20.3	16.0
Base of anal fin	24.2	23.3
Anal spine	6.8	7.5
Longest anal ray	21.0	16.0
Caudal-fin length	33.6	29.1
Pectoral-fin length	25.5	28.9
Pelvic-spine length	7.0	7.5
Pelvic-fin length	24.2	29.1

FAMILY GOBIIDAE

Tomiyamichthys nudus n. sp.

Allen & Erdmann
(Figs. 1-6)

Holotype: MZB 20606, 33.4 mm SL, male, narrow passage between Gam and Waigeo Island at western end of Kabui Bay, 00°25.770'S, 130°33.547'E, Raja Ampat Islands, West Papua, Indonesia, spear, 8 m, G.R. Allen, 21 January 2008.

Diagnosis: Dorsal rays VI + I,10; anal rays I,10; pectoral rays 15; head and body lacking scales; depth at pelvic-fin origin 5.4 in SL; gill opening extending forward to level of middle of opercle; first four dorsal spines filamentous, first spine (including filament) longest 2.1 in SL; caudal fin longer than head with rounded posterior margin; reduced pattern of cephalic sensory pores consisting of anterior oculoscapular canal pores B', C, D, F, and H', and preopercular canals M' and N; colour variable, but mainly brown on head, anterior body, and first dorsal fin, tan to light brown on posterior two-thirds of body with combination of white and brown marbling and three brown bars; sometimes entirely reddish brown with seven narrow white bars on side; median fins brown with blue streaks on anal fin.

Description (proportions as percentage of SL in parentheses): Dorsal rays VI + I,10; anal rays I,10; all dorsal and anal soft rays branched, last to base (each major branch of last ray divided); pectoral rays 15, all rays branched (branching of uppermost and lowermost barely detectable under high magnification); pelvic rays I,5, all soft rays branched, fifth rays completely joined medially with membrane; pelvic frenum well developed; branched caudal rays 12; segmented caudal rays 16; upper and lower unsegmented caudal rays 4 and 3 respectively; vertebrae 26.

Body elongate, depth at pelvic-fin origin 5.4 (18.6) in SL; depth at anal-fin origin 6.8 (14.7) in SL; body compressed, width at pectoral-fin origin 2.2 (12.0) in head length; head length 3.8 (26.3) in SL; head compressed, width 1.8 (16.8) in head length; snout short, length 4.6 (5.7) in head length; eye diameter 3.7 (7.2) in head length; eyes of each side in contact dorsally, without interorbital space; caudal-peduncle depth 2.6 (10.2) in head length; caudal-peduncle length 1.7 (15.9) in head length. Mouth terminal, oblique, forming an angle of about 35° to

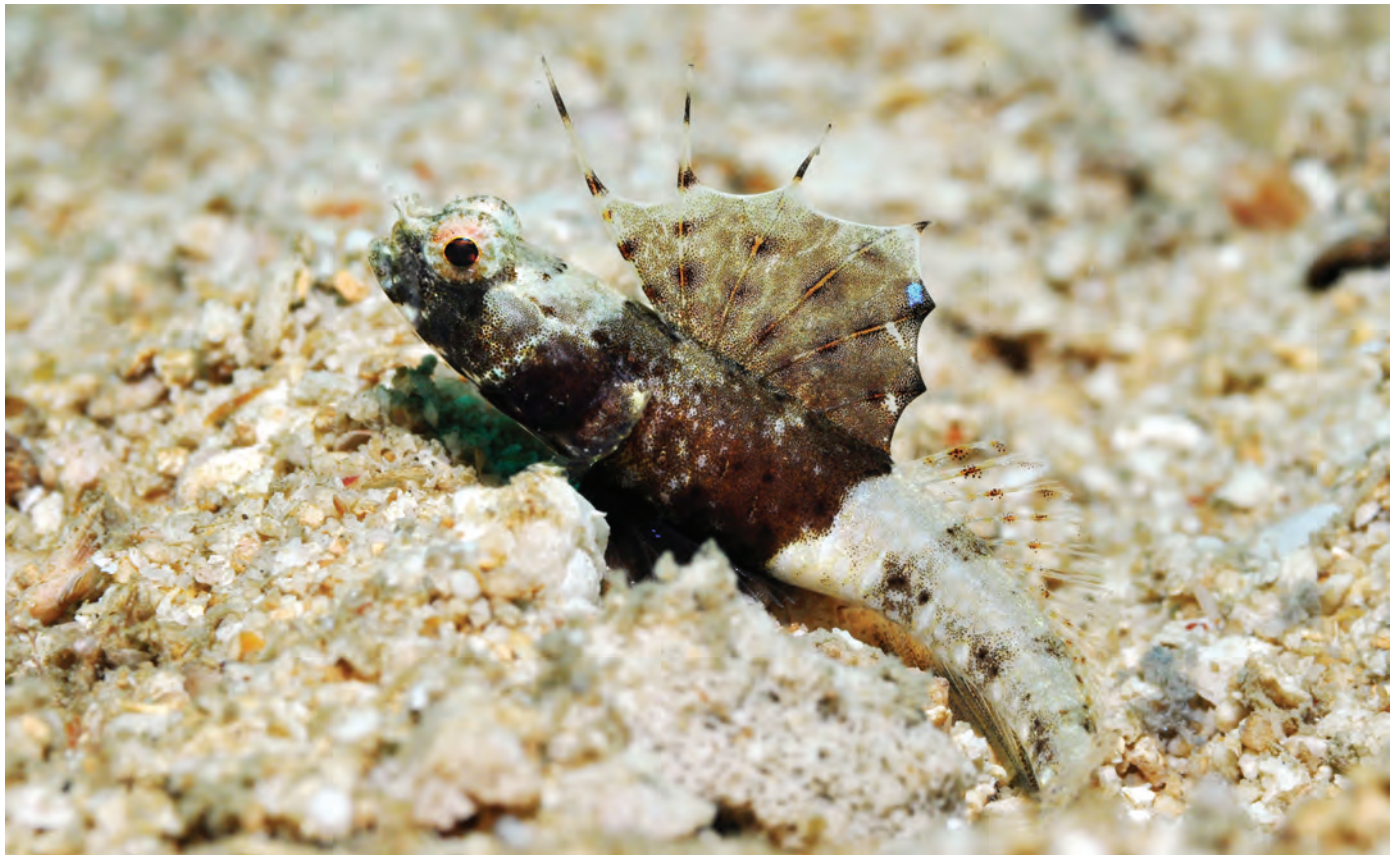

Figure 1. *Tomiyamichthys nudus*, approximately 45 mm TL, underwater photograph, Brunei (G. Allen photo)

horizontal axis of body; mouth large, maxilla reaching vertical at rear edge of orbit, upper-jaw length 2.1 (12.3) in head length; cheek bulging immediately below eye; several rows of small conical teeth on both jaws, no greatly enlarged canines, but teeth of outer row somewhat larger and recurved, also four enlarged teeth medially in posteriormost row of upper jaw; no teeth on vomer; edge of lips smooth; tongue with pointed tip flanked by rounded lobe on each side; gill opening extending forward to level of middle of opercle; gill membranes attached to side of isthmus, without free fold across it; no mental flap.

Posterior nostril a large, oval aperture in front of centre of eye; anterior nostril forming short membranous tube, anteroventral to posterior nostril just above edge of upper lip, with relatively large posterior flap (extending about half way along posterior nostril if depressed); head and body scaleless except few scattered, very tiny scales detected on caudal fin; pattern of cephalic sensory pores and papilla rows as shown in Fig. 5; postoculoscapular sensory canal absent; about 15 short vertical rows of pit organs along middle of side from level of second dorsal fin origin to caudal-fin base (possibly additional rows anteriorly to pectoral-fin base, but obscured by congealed mucus).

Origin of first dorsal fin slightly behind pectoral-fin base, predorsal length 3.4 (29.6) in SL; dorsal spines slender and flexible, first four filamentous; first dorsal spine (including filament) longest 2.1 (47.3) in SL; narrow gap between first and second dorsal fins, about equal to pupil diameter; spine of second dorsal fin 2.4 (10.8) in head length; seventh or eighth dorsal soft ray longest, 4.3 (23.4) in SL; origin of anal fin below base of second dorsal soft ray, preanal length 1.8 (56.3) in SL; anal spine 4.2 (6.3) in head length; penultimate anal soft ray longest, 4.3 (22.8) in SL; caudal fin longer than head with rounded posterior margin, its length 3.2 (31.1) in SL; pectoral fins rounded, middle rays longest, reaching to level of pelvic-fin tip, 4.1 (24.3) in SL; prepelvic length 3.7 (27.2) in SL; depressed pelvic fins reaching to anus, 3.5 (28.4) in SL; pelvic spine 4.5 in longest pelvic soft ray; pelvic frenum thin, the membrane reaching tip of pelvic spines.

Colour in life: Colour variable, frequently "bicolour" pattern (Fig. 1) with head and anterior body (to level of junction between first and second dorsal fins) mainly dark brown, often with pale grey zone on nape and upper cheek; remainder of body marbled light grey brown with three diffuse brown patches midlaterally, each enclosing pair of small black spots; first dorsal fin brown with 2-3 circular darker brown markings along each fin ray, black and white bands on filamentous extensions of first three spines, and small blue mark adjacent to distal tip of fifth spine; second dorsal fin translucent with median row of small black spots; anal fin brown with 3-7 oblique blue lines; pelvic fins black; pectoral fins translucent with alternating brown and white bands along each ray.

Figure 2. *Tomiyamichthys nudus,* approximately 45 mm TL, underwater photograph, Waigeo, Raja Ampat Islands, West Papua, Indonesia (G. Allen photo)

Capable of assuming pattern (Fig. 2) featuring dark head and anterior body composed of dark dorsal saddles, broad dark brown zone across cheek, and slightly oblique band from side of nape, extending across operculum; remainder of body with white and brown marbling and three dark brown bars, first at level of anal-fin origin and last across caudal peduncle, upper and lower section of each bar flanked by pair of vertically elongate white spots.

Another variation (Fig. 3) mottled reddish brown, including dorsal and caudal fins; two dark brown saddles dorsally, including one just anterior to origin of first dorsal fin and one below base of fourth dorsal spine to end of spinous dorsal; seven narrow white bars on side of body, first below origin of second dorsal fin and last at caudal-fin base; anal fin brown to blackish with oblique blue lines; filamentous extensions of first four dorsal spines whitish with dark brown cross bands.

Colour in alcohol (Fig. 4): head and body generally light tan with brown bars as follows: one from side of nape continued onto opercle, one below first dorsal fin (wider than other), one below base of third to fifth soft dorsal rays, one below posterior dorsal rays, and one across caudal peduncle; faint brown and white marbling on side of body, most conspicuous just behind pectoral fin; fin rays generally tan, but fin membranes dusky brown, pectorals paler than other fins.

Remarks: Randall & Chen (2007) provided comments and diagnostic information for the nine described species of *Tomiyamichthys*. This genus, along with *Flabellogobius*, was described in the same paper by Smith (1956). According to Randall & Chen (2007), following the unpublished advice of Koichi Shibukawa, these two genera are synonyms. Shibukawa & Iwata plan to eventually select *Tomiyamichthys* as the senior synonym. The new species differs from all other shrimpgobies in lacking scales, and has a reduced pattern of cephalic sensory pores consisting of anterior oculoscapular canal pores B', C, D, F, and H', and preopercular canals M' and N (pore terminology after Akihito, 1984). Otherwise, it appears to be most closely allied to *Tomiyamichthys* and is therefore provisionally assigned to this genus.

In addition to the type locality (Waigeo Island, Raja Ampat Islands), the new species is known from the following locations on the basis of underwater photographs: Brunei, Malaysia (Mabul, Sabah), north-eastern Kalimantan (Derawan Island), and two location in West Papua including the Bomberai Peninsula (04°4.582'S, 133°01.616'E) and Kokas (02°38.126'S, 132°25.141'E) . The authors' observations at West Papua reveal this species generally occurs in about 3-10 m depth, is usually solitary, and in the manner of all shrimpgobies, shares a sandy burrow with an alpheid shrimp (Fig. 6).

Figure 3. *Tomiyamichthys nudus*, approximately 45 mm TL, underwater photograph, Waigeo, Raja Ampat Islands, West Papua, Indonesia (G. Allen photo)

Etymology: The species is named *nudus* (Latin: naked) with reference to its lack of scales.

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Figure 4. *Tomiyamichthys nudus,* 33.4 mm SL, male, preserved holotype, Waigeo, Raja Ampat Islands, West Papua, Indonesia (G. Allen photo)

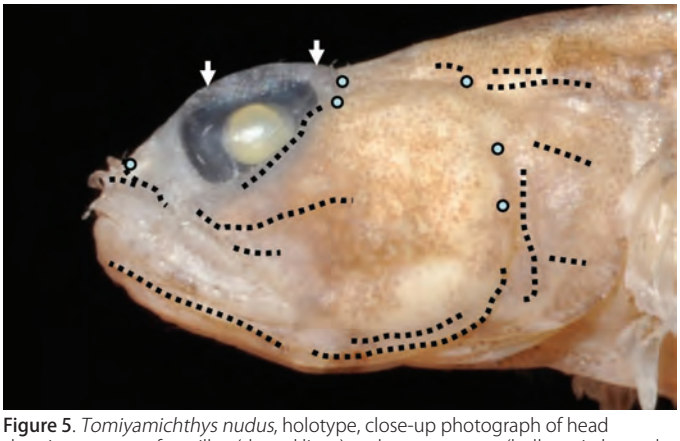

Figure 5. *Tomiyamichthys nudus,* holotype, close-up photograph of head showing pattern of papillae (dotted lines) and sensory pores (hollow circles and arrows) (G. Allen photo)

Figure 6. *Tomiyamichthys nudus,* approximately 45 mm TL, underwater photograph, Kokas, Fakfak Peninsula, West Papua, Indonesia (G. Allen photo)

FAMILY GOBIIDAE

Tryssogobius sarah n. sp.

Allen & Erdmann
(Figs. 1-5; Tables 1-2)

Holotype: MZB 20607, female, 21.7 mm SL, Serbete, 08°07.995' S, 122°59.877'E, Flores, Indonesia, 50-60 m, clove oil, M.V. Erdmann, 1 April 2011.
Paratypes: MZB 20608, 8 specimens, 11.0-13.8 mm SL, collected with holotype; WAM P.33404-001, 10 specimens, 10.7-16.7 mm SL, Bacatanwutun, 08°13.160'S, 123°36.060'E, Lewalling Bay, Lembata, Indonesia, 72 m, clove oil, M.V. Erdmann, 30 March 2011; WAM P.33408-001, 5 specimens, 15.3-18.7 mm SL, collected with holotype.

Diagnosis: Dorsal rays VI + I,10; anal rays I,11; pectoral rays 17-18; single row of scales on cheek; body depth at level of pelvic fins 4.6-5.1 in SL; first dorsal fin relatively narrow (average 13.6 % SL), pointed at tip; pelvic fins reaching slightly beyond anal-fin origin, tip pointed; head and body pearly grey to whitish; first dorsal fin yellowish except thin blue anterior margin and broad blue zone basally with yellow stripe; second dorsal fin bluish with pair yellow stripes, one along base and second submarginal one on outer portion of fin; caudal fin translucent with blue-edged yellow band (sometimes faint) across upper and lower lobe; anal fin bluish with midlateral yellow stripe ending at acute posterior tip of fin; pelvic fins white with bluish posterior tip.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays VI + I,10; anal rays I,11; all dorsal and anal rays branched, the last to base; pectoral rays 18 (two paratypes with 17); upper and lower pectoral rays unbranched; pelvic rays I,5, all soft rays double-branched; pelvic rays forming disk with well-developed frenum; segmented caudal rays 17, 13 (13-14) branched; upper and lower procurrent caudal rays 7 (6-7, occasionally 8); scales in longitudinal series 24 (24-26); transverse scale rows 7 (7-8); median predorsal scales 6, progressively larger anteriorly; anteriormost just behind posterior interorbital pore; single rows of scales on cheek, opercle with three large scales and 1-2 smaller scales; no scales on fins except basally on caudal fin; body scales (Fig. 3) ctenoid to below posterior part of first dorsal fin, cycloid anteriorly, including those of pectoral-fin base and prepelvic area; gill rakers 3 + 13 (3-4 + 10-14); vertebrae 26.

Body depth at pelvic-fin origin 4.6 (4.7-5.1) in SL; body width 1.6 (1.3-1.5) in body depth; head length 3.1 (3.1-3.6) in SL; head width 1.8 (1.65-1.9) in head length; snout length 7.8 (4.7-7.8) in head length; orbit diameter 2.9 (2.6-2.9) in head length; least fleshy width of interorbital 7.8 (4.8-7.1) in head length; caudal-peduncle depth 2.8 (2.5-2.8) in head length; caudal-peduncle length 1.6 (1.4-1.5) in head length.

Mouth oblique, forming an angle of about 38° to horizontal axis of head and body, with lower jaw projecting; maxilla reaching to about level of anterior edge of pupil, upper-jaw length 3.0 (2.7-3.3) in head length; teeth small and conical, slightly curved; teeth of upper jaw in two rows, those of outer row slightly enlarged; outer row teeth of lower jaw widely spaced and restricted to front of jaw, inner row extending full length of dentary; no teeth on vomer; tongue rounded, upper surface with small well-spaced papillae. Anterior end of gill opening reaching vertical at about posterior edge of preopercle; gill rakers moderate, the longest about equal to longest gill filaments.

Anterior nostril a short tube in front of centre of eye at edge of groove above upper lip; posterior nostril a large aperture with slight rim adjacent to cutaneous edge of orbit at level of upper edge of pupil; sensory pores large, nasal pore as large as posterior nostril, separated from it medially by thin septum; pattern of sensory pores and papillae on head as illustrated in Fig. 4.

Origin of first dorsal fin about pupil diameter behind anterior pelvic-fin base, predorsal length 2.7 (2.7-2.9) in SL; second dorsal spine usually slightly longer than first, 2.9 (3.2-4.3) in SL; spine of second dorsal fin 3.5 (2.6-3.3) in head length; longest dorsal soft ray 6.0 (4.8-7.5) in SL; origin of anal fin below origin of second dorsal fin, preanal length 1.7 (1.6-1.8)

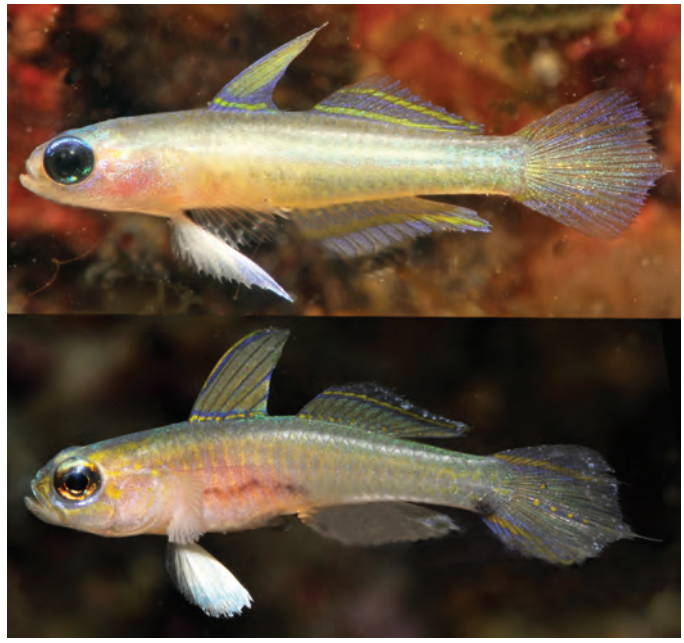

Figure 1. Underwater photographs of closely related *Tryssogobius*: upper – *T. sarah*, male, 15 mm SL, Flores, Indonesia,; lower – *T. colini*, male, 20.7 mm SL (WAM P.33393-001), Flores, Indonesia (G. Allen photos)

in SL; anal spine 4.4 (3.4-4.0) in head length; longest anal soft ray 4.8 (4.9-5.3) in SL; caudal fin rhomboid, about equal to head length, 3.4 (3.3-3.6) in SL; pectoral fins pointed, ninth or tenth ray longest, 3.0 (3.1-3.6) in SL; prepelvic length 3.1 (3.2-3.5) in SL; fifth pelvic soft ray longest, damaged in holotype, 9.9 in SL, 3.3-4.6 in SL for undamaged paratypes; pelvic frenum extending nearly to tip of pelvic spines.

Colour in life (Fig. 1, upper): head and body pearly grey to whitish, often with slight yellow cast and hint of diffuse, short dusky bars along lower half of side; blue rim around lower portion of eye and blue margin on upper edge of pupil; first dorsal fin yellowish except thin blue anterior margin and broad blue zone basally with yellow stripe; second dorsal fin bluish with pair yellow stripes, one along base and second submarginal one on outer portion of fin; caudal fin translucent with blue-edged yellow band (sometimes faint) across upper and lower lobe; anal fin bluish with midlateral yellow stripe ending at acute posterior tip of fin; pelvic fins white with bluish posterior tip; pectoral fins translucent.

Colour in alcohol (Fig. 2): head and body yellowish tan; median fins dusky greyish with semi-translucent stripes (yellow stripes as described above for live colouration); pectoral and pelvic fins semi-translucent whitish.

Remarks: The western Pacific gobiid genus *Tryssogobius* and two new species (*T. colini* and *T. longipes*) were described by Larson & Hoese (2001). Randall (2006) described three additional species (*T. flavolineatus*, *T. nigrolineatus*, and *T. quinquespinus*) and another (*T. porosus*) was added by Larson & Chen (2007). Randall (2006) provided a key to the known species and mentioned that Larson & Hoese's description of *T. colini* was actually based on three species – including two undescribed taxa, one of which Randall described as *T. flavolineatus* and another that is described herein as *T. sarah*. The latter is very similar to *T. colini*, but the two species differ with regards to colour pattern, body depth, basal length and shape of the first dorsal fin, and length and shape of the pelvic fins (Fig. 5). The main differences are summarised in Table 2 and colour patterns are contrasted in Fig. 1. The different first dorsal and pelvic fin shapes are clearly evident in Fig. 1. Only limited data (for three specimens) were recorded for the first dorsal-fin base length of *T. sarah* due to damaged fin membranes, but judging from underwater photographs, this is a useful character. Perhaps the best character for rapid identification of alcohol specimens is the presence of the dark blotch on the lower caudal peduncle in *T. colini* and absence of this feature in *T. sarah*.

Figure 2. *Tryssogobius sarah*, 21.7 mm SL, preserved holotype, Flores, Indonesia (G. Allen photo)

Figure 3. *Tryssogobius sarah*, 15.3 mm SL, preserved paratype (WAM P.33408-001), stained with cyanine blue to show scale pattern, Flores, Indonesia (G. Allen photo)

Comparative material examined for *T. colini* as follows: WAM P.33150-002, 12 specimens, 14.7-22.4 mm SL, Flores, Indonesia; WAM P.33393-001, 12 specimens, 14.7-22.4 mm SL, Flores, Indonesia; WAM P.33150-002, 20.3 mm SL, Anilao, Luzon, Philippines.

We observed the new species at five sites in West Papua (Cenderawasih Bay) and the Alor region of Indonesia. It was invariably seen hovering over clean, white, coarse sand at the base of steep walls or slopes and in close proximity to coral rubble or outcrops. When approached closely it darts under the rubble pieces or outcrops. At four of the five sites it was only seen in the 50-75 m range, although at Tanjung Mangguar in Cendrawasih Bay it was observed in only 42m depth. In all cases, it was hovering in areas exposed to relatively strong currents and frequent cold-water upwelling. In comparison, *T. colini* was found shallower (30-35 m) in a considerably more turbid environment over silty sand without any indication of strong currents. Moreover, it darted directly into holes in the sand (under small pebbles and fine coral rubble) rather than under large coral-rubble pieces or outcrops as seen in *T. sarah*.

The new species is probably widespread in the East Indian region. It is currently known on the basis of specimens and photographs from Indonesia (Bali, Flores, Alor Islands, and West Papua), Papua New Guinea, Palau, and the Ryukyu Islands (Senou *et al*., 2004 as *T*. sp. 1). The species was illustrated from Bali by Kuiter & Tonozuka (2001, page 715) as an undetermined genus and species of ptereleotrid. The two closely related *Tryssogobius* display largely sympatric distributions, but as mentioned above, they exhibit different habitat preferences.

Etymology: This attractive species is named *sarah* (treated as a noun in apposition) in honour of Ms. Sarah Crow, an aspiring young marine biologist who has accompanied the second author on his surveys of cryptic fish biodiversity. It is a pleasure to name this species after this precocious and inquisitive young ichthyologist, with the hope that this will further inspire her future investigations of the marine realm.

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Table 1. Proportional measurements (as percentage of SL) for selected type specimens of *Tryssogobius sarah* (* denotes damaged fins).

	Holotype MZB 20607	**Paratype WAM P. 33408**	**Paratype WAM P. 33408**	**Paratype WAM P. 33408**	**Paratype WAM P. 33408**	**Paratype WAM P. 33408**
Sex	female	female	male	male	male	male
Standard length	21.7	18.7	17.4	15.8	15.3	16.7
Body depth	21.7	21.4	20.7	20.3	19.6	19.8
Body width	13.4	16.0	14.4	14.6	14.4	13.8
Head length	32.3	27.8	31.0	29.7	32.7	29.9
Head width	17.5	17.6	16.7	17.7	17.6	18.0
Snout length	4.1	5.9	4.0	3.8	5.2	4.8
Orbit diameter	11.1	10.7	10.9	10.1	11.1	10.8
Interorbital width	4.1	5.3	4.6	5.7	6.5	4.2
Upper-jaw length	10.6	9.6	10.3	10.8	9.8	10.2
Caudal-peduncle depth	11.5	10.7	10.9	11.4	11.8	10.8
Caudal-peduncle length	19.8	20.3	20.7	20.3	21.6	19.8
Predorsal length	37.3	36.9	35.1	36.7	37.3	36.5
Preanal length	58.5	62.6	55.2	55.7	56.2	59.9
Prepelvic length	32.7	30.5	29.3	29.1	31.4	31.1
Base of dorsal fins	53.0	44.9	46.0	41.1	41.8	40.7
First dorsal spine	31.8	23.5	29.3	24.7	28.8	23.4
Second dorsal spine	34.6	23.5	29.9	28.5	29.4	24.0
Spine of second dorsal fin	9.2	8.6	5.7*	10.1	12.4	10.2
Longest dorsal ray	16.6	13.4	19.0	14.6	20.9	18.0
Base of anal fin	27.6	23.0	23.0	23.4	24.2	22.8
Anal spine	7.4	7.0	8.0	8.2	8.5	7.8
Longest anal ray	20.7	18.7	20.1	19.6	19.0	19.2
Caudal-fin length	29.0	27.8	29.9	29.7	30.7	29.9
Pectoral-fin length	33.2	32.1	28.2	30.4	30.1	30.5
Pelvic-spine length	8.3	8.6	8.6	7.6	7.8	7.8
Pelvic-fin length	10.1*	16.0*	21.8*	30.4	30.1	25.1

Table 2. Comparison of colour pattern and morphological features of *Tryssogobius sarah* and *T. colini*.

Feature	*Tryssogobius sarah*	*Tryssogobius colini*
First dorsal fin colour	Narrow blue anterior margin	Yellow & blue anterior margin
Second dorsal fin colour	Broad yellow stripe at base	Yellow spots at base
Anal fin colour	Blue with midlateral yellow stripe	Whitish without stripe
Body colour	Pearl to yellowish	Faint yellow bars (diffuse posteriorly)
Caudal peduncle colour	No dark spot or blotch	Blackish blotch on lower caudal-fin base
Head colour	No distinct yellow zone behind eye	Distinct yellow zone behind eye
Body depth	Average 20.4 % SL (n = 9)	Average 23.5 % SL (n = 13)
Posterior margin of pelvic fins	Pointed	Rounded
Posterior extent of pelvic fins	Posterior to anal-fin origin	Anterior to anal opening
First dorsal-fin shape	Triangular, narrow pointed tip	Falcate, broad tip
length of first dorsal-fin base	Mean 13.6 % SL (n =3)	Mean 17.0 % SL (n = 9)

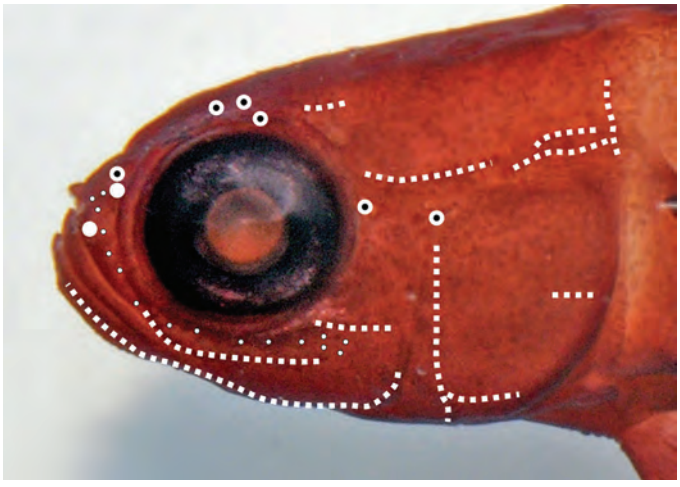

Figure 4. *Tryssogobius sarah*, 15.3 mm SL, preserved paratype, close-up photograph of head showing pattern of papillae (dotted lines and small white dots), sensory pores (white-edged black dots), and nostrils (large white dots) (G. Allen photo)

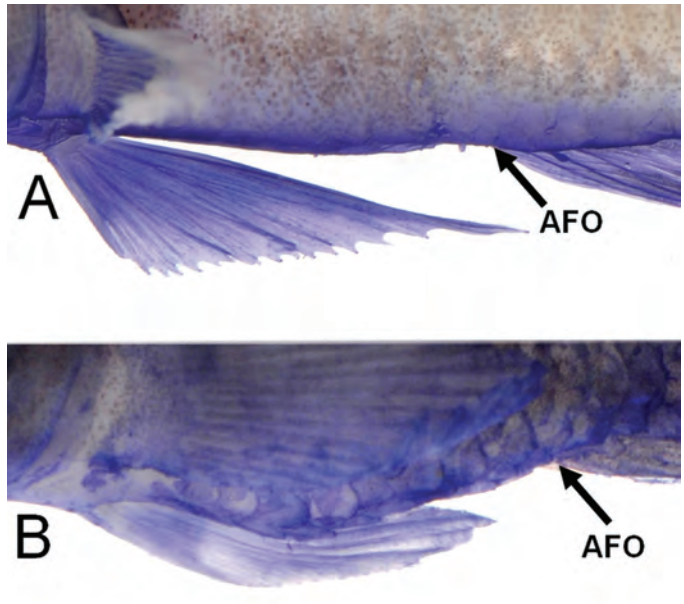

Figure 5. Comparison of pelvic fins of *Tryssogobius* from Flores, Indonesia. A) *T. sarah*, 15.3 mm SL, male paratype, and; B) *T. colini*, 17.6 mm SL, male. The anal fin origin (AFO) is indicated by the arrow (G. Allen photo)

FAMILY GOBIIDAE

Methods following Allen & Randall, 2006 and cephalic sensory pore terminology after Akihito, 1984.

Vanderhorstia wayag n. sp.

Allen & Erdmann
(Figs. 1-4; Table 1)

Holotype: MZB 20610, male, 33.3 mm SL, Wayag Island, 00°09.150'S, 130°03.690'E, Raja Ampat Islands, West Papua, Indonesia, 10-12 m, clove oil, G.R. Allen & M.V. Erdmann, 9 December 2010.
Paratypes (collected with holotype): MZB 20611, female, 31.4 mm SL; WAM P.33559-001, 2 specimens, females, 30.6-31.4 mm SL.

Diagnosis: Dorsal rays VI + I,13; anal rays I,13; pectoral rays 18; scales in longitudinal series 57-60; circumpeduncular scales 15; no scales on head, nape, and prepectoral area; scales entirely cycloid; body elongate, depth 6.0-6.4 at pelvic-fin origin; gill opening extending forward to about vertical at posterior edge of preopercle; dorsal spines progressively longer to third spine; third dorsal spine usually filamentous, 2.8-3.4 in SL; caudal fin ovate with rounded margin, longer than head, 3.1-3.4 in SL; pectoral fins reaching to above anal fin origin or slightly posterior, 3.2-3.5 in SL; pelvic fins not reaching anal-fin origin, 4.2-4.6 in SL; colour in life pale greyish to white with two main rows of reddish spots or rectangular blotches on side, most of larger spots and blotches surrounded by ring of blue spots (often coalesced); short blue and yellow bands on side of snout, cheek, opercle, and side of nape.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays VI + I,13; anal rays I,13; all dorsal and anal soft rays branched, last to base (each major branch of last ray divided); pectoral rays 18, upper two and lower two unbranched; pelvic rays I,5, all soft rays branched, fifth rays joined medially with membrane; segmented caudal rays 15, 13 branched; upper and lower unsegmented caudal rays 5 (5-7) and 6 (6-7) respectively; longitudinal scale series 57 (57-60); transverse scale rows 14 (14-15); no scales on head, nape, or prepectoral area; median prepelvic scales 8 (7-8); circumpeduncular scales 15; gill rakers 2 + 9 (3-4 + 8-9).

Body elongate, depth at pelvic-fin origin 6.4 (6.0-6.2) in SL; depth at anal-fin origin 6.9 (6.4-7.7) in SL; body compressed, width at pectoral-fin origin 1.4 (1.5) in body depth; head length 4.1 (3.4-3.9) in SL; head compressed, width 1.3 (1.2) in body depth; snout short, length 5.1 (4.4-4.7) in head length; orbit diameter 3.6 (3.9-4.2) in head length; interorbital space very narrow, least width 16.4 (20.3-28.0) in head length; caudal-peduncle depth 2.6 (3.0-3.4) in head length; caudal-peduncle length 1.6 (1.8-2.0) in head length.

Mouth oblique, forming angle of about 40° to horizontal axis of body, lower jaw projecting; mouth large, maxilla reaching vertical at anterior edge of pupil or slightly posterior to this point, upper-jaw length 2.7 (2.8-3.4) in head length; front of upper jaw with 3-4 incurved, slender canine teeth on each side with row of smaller, more incurved teeth behind; side of upper jaw with row of small conical teeth; front of lower jaw with 2-3 rows of slender conical teeth, outer row teeth largest, ending in single large recurved canine about one-third back in jaw; remainder of jaw with single row of small conical teeth; no teeth on vomer or palatines; roof of mouth with prominent well-spaced papillae; edge of lips smooth; tongue slender, tip slightly pointed; no distinct mental flap.

Figure 1. *Vanderhorstia wayag*, about 35 mm SL, underwater photograph at Wayag Island, Raja Ampat Islands, West Papua, Indonesia (G. Allen photo)

Figure 2. *Vanderhorstia wayag*, about 35 mm SL, and alpheid shrimp symbiont, underwater photograph at Wayag Island, Raja Ampat Islands, West Papua, Indonesia (G. Allen photo)

Gill opening extending forward to vertical at posterior edge of preopercle; gill membranes attached only anteriorly to isthmus, with no free fold; gill rakers relatively short, longest about one-half to two-thirds length of longest gill filaments of first gill arch.

Posterior nostril large, nearly round aperture in front of centre of eye at fleshy edge of orbit, with slight rim, except posteriorly; anterior nostril short membranous tube, anterorventral to posterior nostril just above edge of upper lip.

Pattern of cephalic sensory pores and papilla rows are illustrated in Fig. 4. Anterior oculoscapular-canal pores B', C (single), D (single), E, F, G, H', K', and L'; preopercular-canal pores M', N, and O'; right and left sides of anterior oculoscapular canals fused medially in interorbital space. Most cephalic sensory-papillae rows uniserial or comprising a single papilla, not forming multiple lines or aggregations except double row between oculoscapular-canal pores H' and K'; relatively reduced longitudinal pattern of sensory papillae rows on cheek.

Scales on body progressively larger posteriorly, scale rows irregular, especially anteriorly; scales entirely cycloid; scales ventrally on abdomen and chest; no scales on head or prepectoral area; no scales on fins except for about 3-4 rows at base of caudal fin, smaller (except first midlateral scale) than last row on caudal peduncle.

Origin of first dorsal fin above pelvic-fin origin, predorsal length 3.2 (2.9-3.1) in SL; dorsal spines slender and flexible, third filamentous (except for one paratype); first dorsal spine 1.9 (1.8-2.1) in head length; third dorsal spine, 2.8 (3.1-3.4, except 5.8 in one) in SL; last membrane of first dorsal fin ending at origin of second dorsal fin; spine of second dorsal fin 2.1 (2.5-2.6) in head length; penultimate dorsal soft ray longest, 1.5 (1.4-1.7) in head length; origin of anal fin below base of first or second dorsal soft ray, preanal length 1.9 (1.7-1.8) in SL; anal spine 3.9 (3.5-4.0) in head length; penultimate anal soft ray longest, 1.5 (1.6-1.8) in SL; caudal fin ovate, longer than head, 3.1 (3.1-3.4) in SL; pectoral fins pointed, the eleventh or twelfth ray longest, reaching to level of first dorsal soft ray, 3.5 (3.2-3.3) in SL; prepelvic length 3.4 (3.0-3.1) in SL; pelvic fins reaching to genital papilla, 4.2 (4.3-4.6) in SL; pelvic spine 2.8 (2.8-3.1) in length of longest pelvic ray; pelvic frenum thin, the membrane reaching tip of pelvic spines.

Colour in life (Figs. 1-2): head and body generally pale greyish to white; two main rows of reddish spots on side, upper row on back with about eight rounded spots and smaller spots between or above, lower row with 8-10 spots or rectangular blotches, also scattered spots above pectoral-fin base and on lower side behind pectoral-fin base; most of the larger reddish spots and blotches surrounded by ring of blue spots (often coalesced), some individuals with blue rings on upper half of body surrounding small spots or no spot present inside blue ring; row of 8-9 dark brown spots from nape, along upper back rear base of dorsal fin, one of these sometimes extending short distance onto base of first dorsal fin at base of sixth spine; short blue and yellowish bands on side of snout, cheek, opercle, and side of nape; head also with diffuse red-brown spots behind eye (2), on anterior cheek, and opercle; black marbling on iris; dorsal fins semi-translucent whitish to clear, bluish outer margin on second dorsal fin; second dorsal fin semi-translucent; caudal fin semi-translucent with blue and brown streaks (except central portion) and sometimes with faint blue-edged red band, mainly on lower half; anal fin semi-translucent grey with broad, blue-edged white stripe along base; pelvic fins white with rows of blue spots, blue outer margin and submarginal red stripe; pectoral fins translucent, white basally, sometimes with pair of small red-brown spots, one each on upper and lower base.

Colour in alcohol (Fig. 3): head and body generally pale tan; three irregular rows of greyish ocelli (remnants of coalesced blue spots described above) on side, some of these surrounding diffuse brownish spots or blotches; row of short grey bands above anal fin; head with oblique brown bands below eye, on side of nape, on cheek, and opercle; fins mainly semi-translucent whitish, except anal fin dusky greyish with basal white stripe.

Remarks: The Indo-Pacific gobiid fishes of the genus *Vanderhorstia* live symbiotically with alpheid snapping shrimps. There are 19 currently recognised species and at least

Figure 3. *Vanderhorstia wayag*, preserved holotype, male, 33.3 mm SL, Wayag Island, Raja Ampat Islands, West Papua, Indonesia (G. Allen photo)

Figure 4. Lateral view of head of *Vanderhorstia wayag* (holotype) with sensory pores and main rows of papillae indicated by solid dots and broken lines respectively. Nostril openings indicated by black-edged white dots (G. Allen photo)

10 undescribed taxa (Senou *et al*., 2004; Shibukawa & Suzuki, 2004; Greenfield & Longenecker, 2005; Winterbottom *et al*., 2005; Allen & Randall, 2006; Randall, 2007).

The combination of 13 dorsal and anal soft rays, 57-60 longitudinal scales, only cycloid scales on the body, filamentous third dorsal spine (very elongate in male), and colour patterns seen in Figs. 1-3 distinguish this species from all other described members of the genus. It belongs to a complex of closely related species allied to *V. ornatissima* Smith, 1959 (Fig. 5), a species that is restricted to the western Indian Ocean, but has been erroneously reported from the western Pacific on the basis of sightings of closely related species. Although *V. ornatissima* exhibits a similar colour pattern it differs from *V. wayag* in having more longitudinal scales (about 65) and possesses ctenoid scales on the posterior half of the body.

It is probably most closely related to *V. phaeosticta* (Randall, Shao & Chen 2007; Fig. 6), which was described from a single specimen from Madang, Papua New Guinea and incorrectly assigned to the genus *Ctenogobiops*. The two species exhibit similar colour pattern and morphometric features, and both lack ctenoid scales. However, there are significant differences in longitudinal scales (46-52 for *V. phaeosticta* vs. 57-60 for *V. wayag*), transverse scales (9-11 for *V. phaeosticta* vs. 14-15 for *V. wayag*), circumpeduncular scales (11-12 for *V. phaeosticta* vs. 15 for *V. wayag*) and number of segmented caudal-fin rays (17-18 for *V. phaeosticta* vs. 15 for *V. wayag*). In addition, *V. phaeosticta* usually has a slightly longer caudal peduncle (1.3-1.7 in head length vs. 1.6-2.0 for *V. wayag*).

Although *V. wayag* is currently known only on the basis of the type specimens from the Raja Ampat Islands, West Papua, Indonesia, it is probably synonymous with *Vanderhorstia* sp. 1 of Senou *et al*. (2004: 361) from the Ryukyu Islands, indicating a probable wide distribution in the East Indian region and far western Pacific. The habitat at the type locality consists of sandy slope in sheltered water at depths ranging between about 8-15 m. Approximately 20 individuals were observed in an area that occupied approximately 50 m^2. Fish occurred singly or in pairs and were invariably associated with an unidentified snapping shrimp of the genus *Alpheus* that share the same burrows (Fig.2), which is typical for members of *Vanderhorstia*.

Etymology: The species is named *wayag* after the type locality, which is also the location of a Conservation International field station. The name is treated as a noun in apposition.

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Figure 5. *Vanderhorstia ornatissima*, about 40 mm SL, underwater photograph at Andavadoaka, south-western Madagascar (G. Allen photo)

Figure 6. *Vanderhorstia phaeosticta*, female, about 30 mm SL, underwater photograph at Flores, Indonesia (G. Allen photo)

Table 1. Proportional measurements (as percentage of SL) of type specimens of *Vanderhorstia wayag*.

	Holotype MZB 20610	Paratype MZB 20611	Paratype WAM P. 33559	Paratype WAM P. 33559
Sex	male	female	female	female
Standard length (mm)	33.3	31.4	31.4	30.6
Body depth (pelvic origin)	15.6	16.2	16.6	16.0
Body depth (anal origin)	14.4	14.3	15.6	13.1
Body width	11.1	11.1	11.1	10.5
Head length	24.6	29.6	25.8	27.5
Head width	12.3	13.4	13.4	13.1
Snout length	4.8	6.4	5.7	6.2
Orbit diameter	6.9	7.0	6.7	6.9
Interorbital width	1.5	1.3	1.3	1.0
Cheek depth	7.8	7.6	7.3	6.5
Upper-jaw length	9.0	9.9	9.2	8.2
Caudal-peduncle depth	9.3	8.6	8.6	8.2
Caudal-peduncle length	15.3	14.6	14.3	14.4
Predorsal length	30.9	33.8	34.1	32.4
Preanal length	53.2	59.9	57.6	54.9
Prepelvic length	29.4	33.4	32.5	32.4
Base of dorsal fins	54.1	54.8	53.8	52.6
First dorsal spine	12.9	14.3	14.3	15.4
Third dorsal spine	35.7	29.6	17.2	32.4
Fifth dorsal spine	10.2	10.2	8.6	10.8
Spine second dorsal fin	11.7	11.5	10.5	11.1
Longest dorsal ray	16.5	17.8	19.1	16.7
Base of anal fin	29.4	27.4	29.6	27.8
Anal spine	6.3	7.3	6.7	7.8
Longest anal ray	15.9	16.9	16.2	16.3
Caudal-fin length	32.1	32.5	30.6	29.1
Pectoral-fin length	28.8	31.2	31.2	30.4
Pelvic-spine length	8.4	7.3	8.3	7.2
Pelvic-fin length	23.7	22.6	23.2	21.9

FAMILY PTERELEOTRIDAE

Methods of counts and measurements following Randall & Suzuki, 2008.

Ptereleotris caeruleomarginata n. sp.

Allen, Erdmann & Cahyani
(Figs. 1-3)

Holotype: WAM P.33246-004, 60.9 mm SL, male, Havelock Island, 12°3.297'N, 92°57.2525'E, Andaman Islands, 45 m, spear, M. Erdmann, 23 March 2010.

Diagnosis: Dorsal rays VI + I,25; anal rays I,24; pectoral rays 22; scales in longitudinal scale series very small and difficult to count, approximately 175; gill rakers 6 +14; body depth at pelvic-fin origin 6.7 in SL; head length 4.9 in SL; chin with low median fleshy ridge; first dorsal fin about twice height of second dorsal fin with filaments on second to fourth spines; third and fourth spines longest, 1.1 in head length; caudal fin asymmetrically rounded, dorsal half more posterior; colour in life mainly bluish; iridescent blue stripe on upper back from middle of nape to end of dorsal fin; horizontal, Y-shaped, yellow mark on cheek and opercle, stem of Y forming stripe below eye and bifurcate part of Y on opercle, extending onto pectoral-fin base; caudal fin yellowish brown with dorsal edge narrowly blue and lower lobe broadly blue.

Description (proportions as percentage of SL in parentheses): Dorsal rays VI + I,25; anal rays I,24; dorsal and anal rays branched distally, last branched at base; pectoral rays 22, upper two and lower two unbranched; pelvic-fin rays I, 4, fourth ray unbranched; segmented caudal-fin rays 17; branched caudal-fin rays 13, only these reaching posterior margin of fin; upper and lower segmented unbranched caudal rays 2; upper and lower procurrent caudal rays 10; scales in longitudinal scale series very small and difficult to count, approximately 175; gill rakers 6 +14; vertebrae 26.

Body elongate and laterally compressed, more strongly posteriorly; body depth at pelvic-fin origin 6.7 (14.9) in SL; body depth at anal-fin origin 7.4 (13.5) in SL; body width 1.8 (8.5) in head length; head length 4.9 (20.5) in SL; head width 2.2 (9.4) in head length; snout short and rounded, 5.2 (3.9) in head length; orbit diameter 3.2 (6.4) in head length; bony interorbital width 5.4 (3.8) in head length; caudal-peduncle depth 2.1 (9.7) and caudal-peduncle length 2.8 (7.4), both in head length.

Figure 1. *Ptereleotris caeruleomarginata*, male holotype, 60.9 mm SL, underwater photograph, Andaman Islands (G. Allen photo)

Mouth very oblique, forming angle of about 66° to horizontal axis of body; lower jaw projecting; maxilla reaching vertical at anterior edge of pupil, upper jaw length 2.8 (7.4) in head length; each side of upper jaw with outer row of ten small recurved canine teeth, posteriormost ones notably smaller; front of upper jaw with inner band of 2-3 irregular rows of small incurved teeth, narrowing to single row posteriorly; front of lower jaw with two rows of small curved canine teeth, anterior outer row of three teeth on each side at front of jaw, and posterior inner row of three widely spaced teeth, two at front of jaw and two at side, separated at front of jaw by 2-3 irregular rows of small teeth, continuing as single row lateral to posterior two canines; no teeth on vomer or palatines; tongue narrow and pointed; gill rakers long, longest at angle about equal to length of longest gill filaments.

No free posterior margin to preopercle; gill opening extending forward to level of middle of opercle; no barbel on chin, instead a broad, undulating, median fleshy ridge, narrowing to thin ridge posteriorly.

Anterior nostril a short tubule at level of upper edge of pupil; posterior nostril elliptical, dorsoposterior to anterior nostril, directly above anterior edge of orbit, with only slightly raised rim; internarial distance about equal to one-third pupil diameter; no cephalic sensory pores; pattern of cephalic sensory papillae very similar to that illustrated for *P. kallista* by Randall & Suzuki (2008).

Figure 2. *Ptereleotris caeruleomarginata*, freshly collected (damaged by spear) male holotype, 60.9 mm SL, underwater photograph, Andaman Islands (G. Allen photo)

Scales cycloid, extremely small, partially to fully embedded, mainly non-imbricate; prepectoral and prepelvic areas with small embedded scales; head scaleless, including nape; no scales on fins except for small embedded scales on about basal half of caudal fin.

First dorsal fin origin above inner base of pectoral-fin; predorsal length 4.1 (24.3) in SL; first dorsal fin about twice height of second dorsal fin; second to fourth dorsal spines with filamentous tips; first dorsal spine 1.3 (15.3) in head length; third and fourth dorsal spines longest, 1.1 (18.2) in head length; second dorsal fin nearly uniform in height, longest ray 1.3 (16.3) in head length; origin of anal fin below base of fourth anal soft ray; preanal length 1.8 (56.2) in SL; anal spine slender, 5.2 (3.9) in head length; fourth anal soft ray longest, 1.8 (11.7) in head length; caudal fin asymmetrically rounded, dorsal half extending slightly more posteriorly, fourth and fifth branched rays longest, 5.1 in SL (19.5); pectoral fins short and rounded, middle rays longest, 1.5 (13.3) in head length; origin of pelvic fins below inner base of pectoral fins; prepelvic length 4.4 (23.0) in SL; pelvic fins (before being damaged after collection) 3.9 (25.5) in SL; pelvic-fin spine 2.5 (8.2) in head length.

Colour of holotype in life (Fig. 1): overall blue except whitish on breast, and abdomen; iridescent blue stripe on upper back from middle of nape to end of dorsal fin; short yellow band from middle of upper lip to anterior edge of eye; two iridescent blue bands directly above, converging on middle of upper lip; horizontal, Y-shaped, yellow mark on cheek and opercle, stem of Y forming stripe below eye and bifurcate part of Y on opercle, extending onto pectoral-fin base; first dorsal fin bluish; second dorsal and anal fins semi-translucent with thin blue outer margin; Caudal fin yellowish brown with dorsal edge blue and lower lobe broadly blue, brownish band dorsally and ventrally, along inner margin of blue areas; pelvic fins translucent basally, broadly blue along anterior edge, and white at tips; pectoral fins translucent.

Colour of freshly collected holotype (Fig. 2): similar to colour in life, except iridescent blue stripes on upper back and fin margins, and blue edges on caudal fin lobes no longer apparent; also caudal fin and anal fins mainly yellow.

Figure 3. Comparison of caudal-fin colouration for closely related species of *Ptereleotris*: *P. caeruleomarginata* (left), *P. grammica* (centre), and *P. uroditaenia* (right) (G. Allen photos)

Remarks: Based on general appearance, particularly the tall first dorsal fin, caudal-fin shape, yellow markings on the head, and iridescent blue stripe along the upper back, the new species appears to be closely related to *Ptereleotris grammica* Randall & Lubbock, 1982 from the Indo-west Pacific region (Mauritius to Great Barrier Reef and Ryukyu Islands), *P. kallista* Randall & Suzuki, 2008 from the Philippines and *P. uroditaenia* Randall & Hoese, 1985 from the East Indian region (Solomon Islands to Brunei). Although we have detected several meristic and morphometric differences, more specimens of all four species are needed to fully evaluate their significance. The new species differs from the other three species in having relatively short dorsal spines. The longest spines is 18.2 % of SL for *P. caeruleomarginata* compared with 22.2-51.6 % for the other species. It is most similar in this respect to *P. grammica*, in which the longest spine is 22.2-32.3 % SLP. It further differs from *P. grammica* in having fewer lower-arch gill rakers (14 vs. 16-18) and from *P. kallista* in having fewer dorsal soft rays (25 vs. 27), fewer anal rays (24 vs. 25), and fewer gill rakers (20 vs. 23-24). Caudal fin colouration is very diagnostic for separating the four species (Fig. 3). *Ptereleotris grammica* and *P. kallista* are also easily differentiated on the basis of their second dorsal and anal fin colouration, consisting of alternating blue and yellow stripes. We also provide genetic evidence below for the separation between *P. caeruleomarginata* and *P. grammica*.

The new species was collected from a rubble bottom in an area of exceptionally strong current in 45 m depth. Although it is currently known only from the Andaman Islands, future collections will probably reveal a more widespread distribution in the East Andaman Sea.

Genetic methodology: Genetic data were collected from tissue samples of the holotype of *P. caeruleomarginata* and a single specimen of *P. grammica* from Menjangan Island, Bali, Indonesia. The specimens were fixed in 95 % EtOH. Mitochondrial DNA was extracted using a 10 % Chelex solution (Walsh *et al*. 1991). A portion of the Cytochrome Oxidase I (COI) region was amplified via PCR using the primers Fish BCH, 5'-TAAACTTCAGGGTGACCAAAAAATCA-3' and Fish BCL, 5'-TCAACYAATCAYAAAGATATYGGCAC-3' (Matt Craig, pers. comm.). The PCR reaction was carried out in 25 µL volumes, using 1 µL of template. Each reaction included 4 µL 10x PCR buffer (Applied Biosystems), 2.5 µL 10 mMdNTPs, 1.25 µL of each primer at 10 mM, 2 µL 25 mM MgCl2 solution, 0.125 µL AmplyTaq Gold™ (Applied Biosystems) and 14.5 µL ddH2O. The thermocycling profile for COI included an initial denaturation of 94˚ C for 3 min, 35 cycles of 94˚ C for 30s, 53˚ C for 30s, and 72˚ C for 60s, with a final extension of 72˚C for 2 min. Segments of the COI region of *Nemateleotris magnifica* Fowler, 1938 and *Parioglossus formosus* (Smith, 1931) were used as outgroups. PCR reactions were checked on 1 % agarose gels stained with ethidium bromide. PCR product was sequenced at the UC Berkeley sequencing facility. Forward and reverse sequences were proofread in MEGA5 (Tamura *et al*., in press) then aligned in MAFFT 6.822 (Katoh & Toh, 2008) using the accurate GI-NS-i algorithm with subsequent alignment by eye. Unweighted parsimony analysis was conducted via the heuristic search option in PAUP* 4.0b10 (Swofford, 2002) with 1,000 bootstrap replicates to assess clade support. Maximum likelihood analyses were conducted in PAUP* 4.0b10 (Swofford, 2002) employing a heuristic search with model parameters determined from ModelTest Server 3.7 (Posada & Crandall, 2005) with 1,000 bootstrap replicates to assess clade support.

Genetic results: We were successful in resolving a 666 base pair segment of the COI region, of which 129 bases were parsimony informative. The tree revealed that *P. caeruleomarginata* is distinct from *P. grammica*, forming a clade with 100 % bootstrap support using maximum parsimony and maximum likelihood analyses (Fig. 4). The results also indicate that these two taxa are sister species.

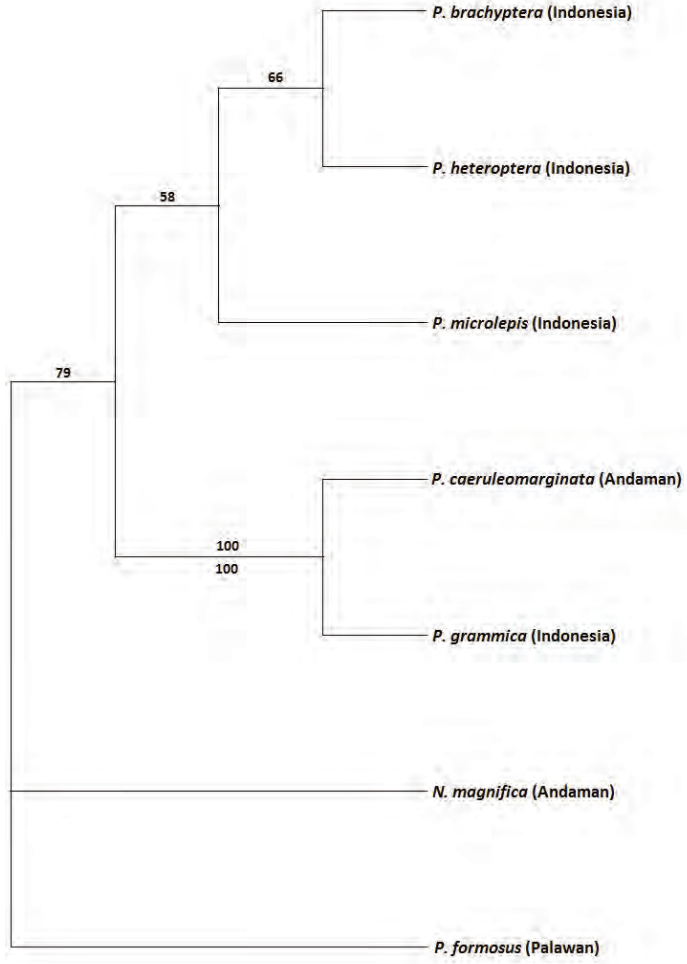

Figure 4. Optimal maximum likelihood topologies for species of *Ptereleotris, Nemateleotris,* and *Parioglossus* generated from 666bp of mtDNA COI region sequence data. Numbers above and below the nodes indicate bootstrap support from 1,000 maximum likelihood bootstrap replicates and 1,000 maximum parsimony bootstrap replicates respectively.

Pairwise genetic difference between *P. grammica* and *P. caeruleomarginata* is 0.0585 (Table 1), whereas the intra-clade pairwise genetic difference from other congeners ranged from 0.1375 to 0.1483. Both the parsimony and likelihood analyses confirm that *P. grammica* and *P. caeruleomarginata* demonstrate a reciprocally monophyletic relationship with other *Ptereleotris* species (Fig. 4). Unfortunately, our results do not resolve more detailed intra-generic phylogenetic relationships due to data limitations. We are currently preparing more mtDNA and nDNA data in order to facilitate a more comprehensive phylogenetic analysis of *Ptereleotris*.

Etymology: The new species is named *caeruleomarginata* (Latin: blue-margin) with reference to the diagnostic caudal-fin markings.

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Table 1. Pairwise genetic distances (for the COI gene region of the mitochondrion) among ptereleotrids included in this study.

		1	2	3	4	5	6	7
1	*P. brachyptera* (Indonesia)	-						
2	*P. heteroptera* (Indonesia)	0.13754	-					
3	*P. microlepis* (Indonesia)	0.13989	0.14826	-				
4	*P. caeruleomarginata* (Andaman)	0.15625	0.18258	0.15301	-			
5	*P. grammica* (Indonesia)	0.15215	0.16066	0.158	0.05848	-		
6	*N. magnifica* (Andaman)	0.17585	0.17711	0.17308	0.18997	0.18847	-	
7	*P. formosus* (Palawan)	0.20204	0.17934	0.16676	0.18321	0.19284	0.17765	-

FAMILY PTERELEOTRIDAE

Methods of counts and measurements following Randall & Suzuki, 2008.

Ptereleotris rubristigma n. sp.

Allen, Erdmann & Cahyani
(Figs. 1-5; Table 1)

Holotype: MZB 20602, 74.1 mm SL, male, Jemeluk, Amed, 08°20.221' S, 115°39.617'E, Bali, Indonesia, 25 m, spear, M.V. Erdmann, 4 May 2011.
Paratypes: MZB 20603, 84.5 mm SL, Kayumerah Bay, 03° 00.884'S, 134° 27.202'E, West Papua, Indonesia, 15-20 m, spear, M.V. Erdmann, 26 April 2006; WAM P.32804-002, 70.6 mm SL, collected with NCIP paratype; WAM P.32927-007, 66.9 mm SL, Fiabacet Reef, 02°13' S, 130°33, Misool, Raja Ampat Islands, West Papua, Indonesia, 65-75 m, clove oil, M.V. Erdmann, 13 November 2007; WAM P.33385-001, 78.7 mm SL, Batbietem Island, 02°14.603'S, 130°33.351'E, Misool. Raja Ampat Islands, West Papua, Indonesia, 50 m, clove oil, M.V. Erdmann, 14 February 2011.

Diagnosis: Dorsal rays VI + I,25 (rarely 27); anal rays I,23-24; pectoral rays 21 (rarely 22); scales in longitudinal scale series very small and difficult to count, approximately 150-160; gill rakers 6-8 +16-18; body depth at pelvic-fin origin 7.7-8.6 in SL; head length 5.0-5.4 in SL; prominent median barbel on chin, followed by 3-4 smaller barbels, folding into median slot behind chin; first dorsal fin about same height as second fin except for elongate second spine in adults; second dorsal spine 3.5-5.6 in head length; colour in life mainly bluish shading to green on upper head and back; pectoral fin with prominent red spot at base.

Description: Counts and proportions of holotype, followed by data for paratypes in parentheses if different. Dorsal rays VI + I,25 (one paratype with 27); anal rays I,23 (three paratypes with 24); dorsal and anal rays branched distally, last branched at base; pectoral rays 21 (one paratype with 22), upper two and lower two unbranched; pelvic-fin rays I, 4, fourth ray unbranched; segmented caudal-fin rays 17; branched caudal-fin rays 13, only these reaching posterior margin of fin; upper segmented unbranched caudal rays 2, lower segmented unbranched caudal rays 1; upper and lower procurrent caudal rays 8-11; scales in longitudinal scale series very small and difficult to count, approximately 150-160; gill rakers 6 +16 (7-8 + 16-18); vertebrae 26.

Body elongate and laterally compressed, more strongly posteriorly; body depth at pelvic-fin origin 7.9 (7.7-8.6) in SL; body depth at anal-fin origin 8.3 (7.6-8.8) in SL; body width 1.8 (1.5-2.0) in head length; head length 5.3 (5.0-5.4) in SL; head width 2.0 (1.9-2.6) in head length; snout short and rounded, 5.6 (4.7-5.3) in head length; orbit diameter 3.1 (3.0-3.7) in head length; bony interorbital width 5.0 (4.8-6.3) in head length; caudal-peduncle depth 1.9 (1.7-2.5) and caudal-peduncle length 1.9 (2.2-2.6), both in head length.

Mouth very oblique, forming angle of about 65° to horizontal axis of body; lower jaw projecting; maxilla reaching vertical at about anterior edge of pupil or slightly posterior, upper jaw

Figure 1. *Ptereleotris rubristigma*, underwater photograph of freshly captured (anaethetised) male holotype, 74.1 mm SL, Bali, Indonesia (G. Allen photo)

length 2.8 (2.6-3.1) in head length; front of upper jaw with three inner, relatively large, conical teeth and much enlarged, outer, recurved canine on each side, followed posteriorly by about eight, progressively smaller conical teeth; front of upper jaw with inner band of 2-3 irregular rows of small conical teeth, narrowing to single row posteriorly; front of lower jaw with two rows of small curved canine teeth, anterior outer row of three teeth on each side at front of jaw, and posterior inner row of four teeth, separated at front of jaw by 2-3 irregular rows of small conical teeth, continuing as single row posteriorly; no teeth on vomer or palatines; tongue narrow with blunt tip; gill rakers relatively long, longest at angle just slightly shorter than longest gill filaments.

No free posterior margin to preopercle; gill opening extending forward to level of middle of opercle; prominent median barbel on chin, followed by 3-4 smaller barbels, folding into median slot behind chin.

Anterior nostril a short tubule at level of upper edge of pupil; posterior nostril elliptical, dorsoposterior to anterior nostril, directly above anterior edge of orbit, with only slightly raised rim and dorsal skin flap (incompletely covering opening); internarial distance about equal to one-third pupil diameter; sensory pores and papillae pattern on head as shown in Fig. 5; about 20 vertical series of papillae on side of body from pectoral-fin base to caudal-fin base, also series of about 10 papillae at base of caudal fin, just posterior to hypural fold.

Scales cycloid, extremely small, embedded, mainly non-imbricate; prepectoral and prepelvic areas with small embedded scales; head naked except scattered embedded scales on nape; no scales on fins except for small embedded scales on about basal half of caudal fin.

First dorsal fin about pupil diameter anterior to level of upper base of pectoral-fin; predorsal length 4.0 (3.8-4.1) in SL; first dorsal fin about same height as second fin except for elongate second spine; second dorsal spine with filamentous tip, 4.2 (3.5-5.6) in head length; middle rays of second dorsal fin slightly longer than others, longest ray 1.4 (1.2-1.6) in head length; origin of anal fin below base of third anal soft ray; preanal length 2.0 (1.8-1.9) in SL; anal spine slender, 3.0 (2.5-3.5) in head length; eighth anal soft ray longest, 1.7 (1.4-1.7) in head length; caudal fin rounded, middle rays longest, 4.3 (4.1-4.3) in SL; pectoral fins short and rounded, middle rays longest, 1.3 (1.3-1.4) in head length; origin of pelvic fins about level with upper pectoral-fin base; prepelvic length 5.3 (4.3-5.2) in SL; pelvic fins 6.3 (6.5-8.4) in SL; pelvic-fin spine 1.5 (1.5-2.0) in head length.

Colour of freshly collected (anaesthetised) male holotype (Fig. 1): Generally blue shading to greenish on upper head and back; yellow stripe through middle of iris; dorsal and anal fins generally translucent, second dorsal with median faint yellow stripe and anal fin white along base; caudal fin whitish or pale grey with blackish central section; pectoral fin with prominent red spot at base; pelvic fins white.

The colour pattern of freshly collected female fish (Fig. 2) is similar to that described for the male holotype above.

Free swimming individuals (Fig. 3) usually have a pronounced darkening on the ventral half of the body, forming a dark grey to blackish stripe posteriorly that extends onto the caudal fin. They also frequently exhibit a reddish stripe below the eye and broad red patch on the middle of the opercle with a narrower reddish band below. The characteristic red spot on the pectoral-fin base is not always evident and apparently can be "switched" on and off.

Colour in alcohol (Fig. 4): head and body generally brown, shading to grey on ventral portion of side; fins semi-translucent, slightly tan, except caudal fin with extensive greyish central portion.

Remarks: The dartfish genus *Ptereleotris* was revised by Hoese & Randall (1985) and three additional species were recently described by Randall & Senou (2008). This species is most similar to and frequently confused with *P. hanae* (Jordan & Snyder, 1901). These sympatric species exhibit remarkably similar colour patterns, but differ in fin

Figure 2. *Ptereleotris rubristigma*, underwater photograph of freshly captured (anaethetised) female paratype (WAM P.32927-009), 66.9 mm SL, Misool, Raja Ampat Islands, West Papua, Indonesia (G. Allen photo)

Figure 3. *Ptereleotris rubristigma*, underwater photograph of subadults, approximately 40 mm SL, Triton Bay, West Papua, Indonesia (G. Allen photo)

morphology, particularly with regards to the first dorsal and caudal fins. The first dorsal of *P. rubristigma* has an elongate second spine in adult males and females, which is lacking in *P. hanae*, regardless of sex or size. Evidently, small females and presumably subadult and juvenile individuals of *P. rubristigma* lack the elongate dorsal spine. One of the paratypes, 66.9 mm SL, does not possess this feature, but it is present in two other female paratypes, 70.6 and 78.7 mm SL. The caudal fin of adult *P. hanae* (Fig. 6) is characterised by 2-6, long trailing filaments. This feature is absent in adult *P. rubristigma*, which invariably have a rounded caudal. Although the colouration is similar, there are a few differences, including the presence of the red spot on the pectoral-fin base and blackish central caudal fin in *P. rubristigma* and a narrow blue stripe on the ventral-posterior body of *P. hanae*.

The new species was observed and collected on sand/rubble bottoms in about 15-60 m depth. It is probably widespread in the East Indian region, but because it has been confused with *P. hanae*, we can reliably report it only from Indonesia (West Papua and Bali). It is probably the same species as *Ptereleotris* sp. 1, reported by Senou *et al*. (2004) from the Ryukyu Islands.

Etymology: The new species is named *rubristigma* (Latin: red-mark) with reference to the diagnostic red spot on the pectoral-fin base.

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Figure 4. *Ptereleotris rubristigma*, preserved holotype, 74.1 mm SL, Bali, Indonesia (G. Allen photo)

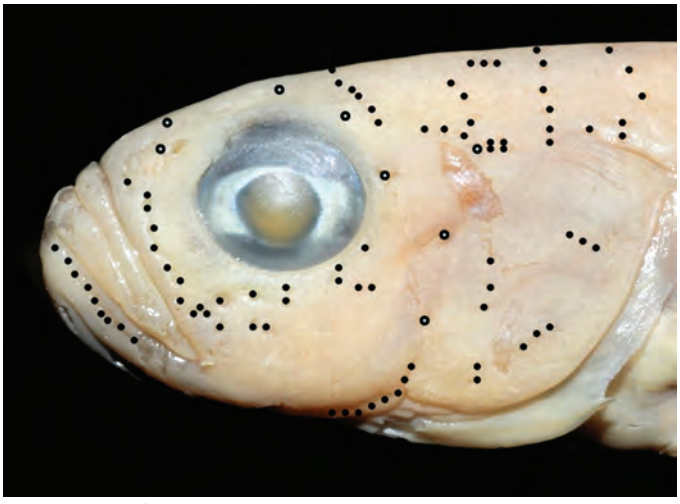

Figure 5. Head of *Ptereleotris rubristigma*, paratype (WAM P.32004-002), 84.5 mm SL, showing pattern of head pores (hollow circles) and papillae (solid circles) (G. Allen photo)

Figure 6. *Ptereleotris hanae*, underwater photograph, approximately 80 mm SL, Bali, Indonesia (G. Allen photo)

Table 1. Proportional measurements (as percentage of SL) of type specimens of *Ptereleotris rubristigma*.

	Holotype MZB 20602	**Paratype MZB 20603**	**Paratype WAM P. 33385**	**Paratype WAM P. 32804**	**Paratype WAM P. 32927**
Sex	male	male	female	female	female
Standard length	74.1	84.5	78.7	70.6	66.9
Body depth at pelvic origin	12.7	12.9	12.2	13.0	11.7
Body depth at anal origin	12.0	11.8	11.7	13.2	11.4
Body width	7.0	6.5	6.7	6.4	7.8
Head length	18.8	18.5	19.3	18.8	20.2
Head width	9.2	9.0	7.5	9.9	8.2
Snout length	3.4	3.9	3.7	3.5	4.3
Orbit diameter	6.1	5.3	6.4	5.1	5.7
Interorbital (bony) width	3.8	3.8	4.1	3.0	3.4
Upper-jaw length	6.7	7.0	6.9	6.4	6.6
Caudal-peduncle depth	9.7	9.9	7.9	11.0	8.8
Caudal-peduncle length	10.1	8.2	7.8	8.5	7.8
Predorsal length	24.7	25.4	26.3	24.2	26.2
Preanal length	49.8	52.7	52.7	54.5	53.1
Prepelvic length	18.9	19.3	20.3	23.4	20.3
First dorsal spine	8.5	16.3	10.3	8.4	16.4
Longest dorsal spine	23.8	26.3	17.9	14.3	28.8
Longest dorsal ray	13.8	15.9	14.0	13.9	12.9
Anal spine	6.3	7.5	5.5	5.8	6.1
Longest anal ray	11.2	13.0	14.0	12.2	11.8
Caudal-fin length	23.5	24.5	23.3	24.6	24.2
Pectoral-fin length	14.4	13.1	14.7	14.0	14.1
Pelvic-spine length	12.8	12.4	9.7	12.6	12.0
Pelvic-fin length	15.9	15.1	11.9	15.4	14.3