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Distribution Range Extensions of *Parapercis bicoloripes* and *P. diplospilus* (Perciformes: Pinguipedidae) in the South China Sea and the Adjacent Waters, with Notes on Ontogenetic Changes in *P. bicoloripes*

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Parapercis bicoloripes Prokofiev, 2010, previously known only from waters off Vietnam, is recorded from the northern Gulf of Thailand, the east coast of the Malay Peninsula, northern Borneo, and Panay, Philippines. Detailed examination of 27specimens (66.1–136.0 mm standard length) revealed significant growth-related changes in several body proportions and coloration. In addition, 11 specimens (44.2–74.1 mm standard length) of *Parapercis diplospilus* Gomon, 1981, previously recorded from Vietnam, the Philippines, Indonesia, Papua New Guinea, and Australia, are reported for the first time from the Gulf of Thailand and off Terengganu State, Malaysia, east coast of the Malay Peninsula.

Key Words: sandperches, distribution, morphology, Thailand, Malaysia, Philippines, Pacific Ocean.

Introduction

The South China Sea overlaps the Coral Triangle, a region of exceptional marine diversity (Hoeksema 2007). Randall and Lim (2000) listed at least 3365 species of marine fishes from the South China Sea, including the Gulf of Thailand. Although a number of regional studies on marine fish faunas in this region have been published recently (*e.g.*, Matsunuma *et al.* 2011; Yoshida *et al.* 2013; Kimura *et al.* 2015), studies on the diversity of marine fishes in this region are still ongoing.

Eleven specimens of a small sandperch collected from the Gulf of Thailand and off Kuala Terengganu, Malaysia (east coast of the Malay Peninsula), were identified as *Parapercis diplospilus* Gomon 1981, a species previously recorded from many localities in the southeastern Indian and western Pacific oceans, including Vietnam, the Philippines, Indonesia, Papua New Guinea, and Australia (Allen *et al.* 2006; Prokofiev 2008; Allen and Erdmann 2012). In addition, 27 specimens of *Parapercis bicoloripes* Prokofiev, 2010, previously known only from the original description of Vietnamese specimens, were collected from many localities in the South China Sea and the adjacent waters, including the Gulf of Thailand, Malaysia and the Philippines. These new records of two sandperch species are reported here as a further step in understanding marine fish diversity in this region.

Materials and Methods

Counts and measurements generally follow Randall *et al.* (2008) and were generally made on the left side. Standard and head lengths are abbreviated as SL and HL, respectively. Gill rakers, including all rudiments, were counted on the outer side of the first right side arch. The last ray of both the soft dorsal fin and anal fin was split to the base, but was counted as a single ray, each being associated with a single pterygiophore. Scale row counts above the lateral line include the dorsalmost longitudinal row of small scales beneath the dorsal-fin base, expressed as 0.5. The distribution map was prepared using Quantum GIS 2.2 (Quantum GIS Development Team 2014), with data from ETOPO1 (Amante and Eakins 2009). Specimens examined in this study are deposited at the following institutions: Laboratory of Marine Biology, Faculty of Science, Kochi University (BSKU),

Kochi; the Kagoshima University Museum (KAUM), Kagoshima; National Museum of Nature and Science (NSMT), Tsukuba; South China Sea Repository and Reference Center, Institute of Oceanography and Environment, Universiti Malaysia Terengganu (UMTF), Kuala Terengganu; and Ichthyology Collection, Museum of Natural Sciences, University of the Philippines Visayas (UPVMI), Miagao.

Parapercis bicoloripes Prokofiev, 2010

(Figs 1–3; Tables 1–2)

Material examined. Twenty-seven specimens, 66.1–136.0 mm SL. **Thailand:** KAUM–I. 23099, 100.2 mm SL, KAUM–I. 23124, 110.9 mm SL, KAUM–I. 23128, 100.5 mm SL, KAUM–I. 23158, 100.9 mm SL, KAUM–I. 24153, 128.4 mm SL, northern Gulf of Thailand, bottom trawl (obtained at fish market in Mahachai). **Malaysia (Terengganu State, east coast of Malay Peninsula):** KAUM–I. 16935, 120.4 mm SL, off Kuala Terengganu, bottom trawl, 11 December 2008 (obtained at Chendering fishing port, Kuala Terengganu); KAUM–I. 41715, 119.1 mm SL, KAUM–I. 41716, 102.7 mm SL, 48 km off Chendering, Kuala Terengganu, 05°16′N, 103°11′E, 70–90 m depth, bottom trawl, 10 September 2011; KAUM–I. 79750, 123.3 mm SL, KAUM–I. 79751, 108.1 mm SL, KAUM–I. 79752, 104.9 mm SL, KAUM–I. 79753, 126.2 mm SL, KAUM–I. 79754, 136.0 mm SL, KAUM–I. 79755, 123.1 mm SL, KAUM–I. 79756, 126.0 mm SL, KAUM–I. 79757, 118.4 mm SL, KAUM–I. 79758, 115.3 mm SL, KAUM–I. 79759, 119.8 mm SL, KAUM–I. 79760, 107.9 mm SL, KAUM–I. 79761, 132.7 mm SL, UMTF 6569, 129.1 mm SL, UMTF 6570, 109.9 mm SL, UMTF 6571, 79.0 mm SL, UMTF 6572, 102.4 mm SL,

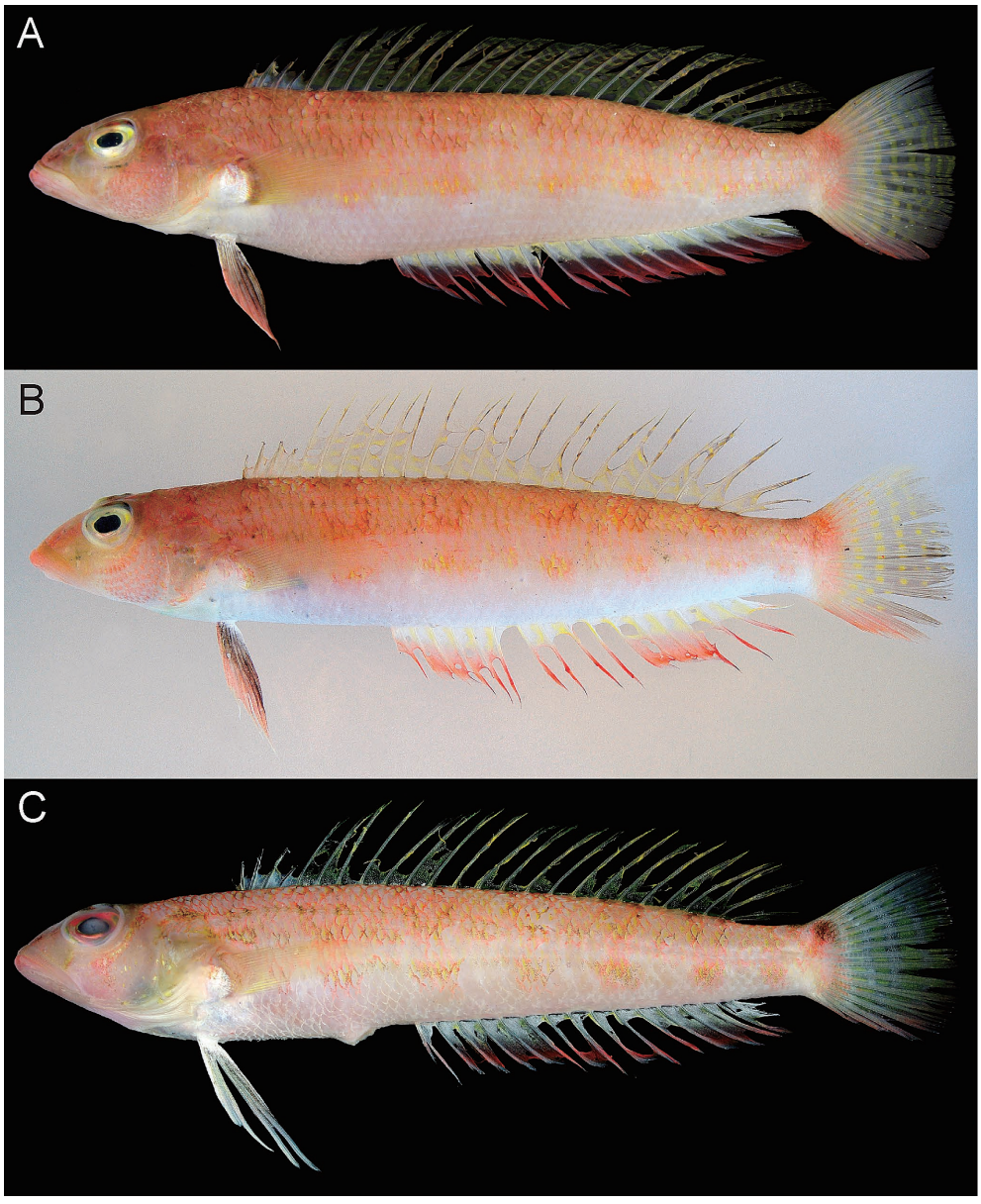

Fig. 1. Fresh specimens of *Parapercis bicoloripes* from Malaysia (A–B) and the Philippines (C). A, KAUM–I. 79754, 136.0 mm SL, off Kuala Terengganu; B, KAUM–I. 16935, 120.4 mm SL, off Kuala Terengganu; C, KAUM–I. 69435, 66.1 mm SL, off Miagao, Iloilo, Panay Island.

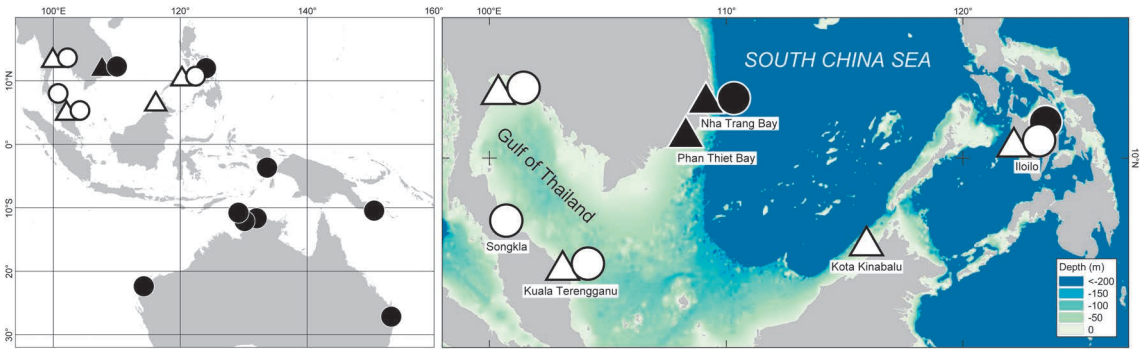

Fig. 2. Distribution of *Parapercis bicoloripes* (triangles) and *P. diplospilus* (circles). Closed and open symbols indicate previously known and new records, respectively.

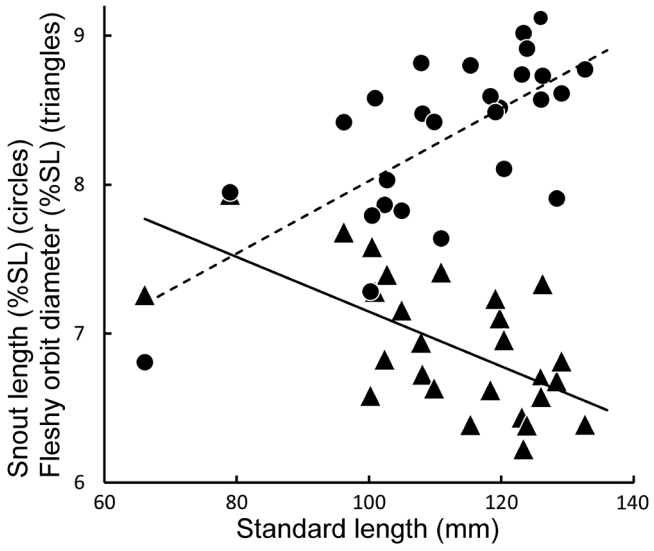

Fig. 3. Ontogenetic changes in relationship of snout length (circles) and fleshy orbit diameter (triangles) as percentage of standard length to standard length (mm) in *Parapercis bicoloripes*.

UMTF 6573, 123.9 mm SL, off Kuala Terengganu, bottom trawl. **Malaysia (Sabah State, Borneo):** KAUM–I. 12491, 96.2 mm SL, off Kota Kinabalu, bottom trawl (obtained at fish market in Kota Kinabalu). **Philippines:** KAUM–I. 69435, 66.1 mm SL, off Miagao, Iloilo, Panay Island, 24 February 2015.

Description. Morphometrics, expressed as percentages of SL, and frequency distribution of selected meristics are shown in Tables 1 and 2. Dorsal-fin rays V, 21; anal-fin rays I, 17; pectoral-fin rays all branched except for uppermost ray; pelvic-fin rays I, 5; branched caudal-fin rays 15 (8 and 7 in dorsal and ventral series, respectively); pseudobranchial filaments 14–20 (18); branchiostegal rays 6.

Body subcylindrical, moderately elongate; moderately deep, depth at anal-fin origin 4.8–5.8 in SL; width at pectoral-fin base 5.7–7.3 in SL. Caudal peduncle short, deep, its depth 0.9–1.1 in length. Head moderately large, length 3.5–3.9 in SL; snout blunt, length slightly longer than orbit diameter; eye relatively large, fleshy orbit diameter 3.5–4.3 in HL; interorbital space moderately wide, least bony width 10.2–15.6 in HL.

Mouth small, slightly oblique, forming angle of about 20° to horizontal axis of head; lower jaw slightly protruding beyond tip of upper jaw; posterior margin of upper jaw reaching vertical drawn through anterior margin of pupil. Upper jaw with outer row of 22–29 incurved caniniform teeth on each side, anterior pair greatly enlarged, about 3 times larger than adjacent teeth in size, other teeth increasingly smaller posteriorly; inner band of villiform conical teeth behind outer caniniform row of upper jaw, broadest anteriorly with 4 or 5 rows maximum, gradually narrowing posteriorly to 1 row at rear of jaw. Front of lower jaw with usually 3 pairs of incurved, enlarged caniniform teeth in distinctly separated outer row (irregular row of 5 pairs of variously sized caniniform teeth in KAUM–I. 79753 regarded as abnormal condition), outermost tooth largest, strongly canted posteriorly, about 3 times size of innermost tooth; inner band of villiform conical teeth medial to caniniform teeth at front of lower jaw, about 4–6 tooth rows in broadest portion, followed by row of small, incurved conical teeth, 2–4 teeth in middle of tooth row moderately enlarged; vomer with single crescentic row of 6–8 moderately large conical teeth, all subequal in size; palatine teeth absent.

Gill membranes free from isthmus, with broad free fold; developed gill rakers short, spinous, longest raker about one-third length of longest gill filament. Nostrils small, anterior nostril with short membranous tube, its tip not reaching posterior nostril when laid back; posterior nostril pore ovate with low fleshy rim.

Pores of cephalic sensory system connected by canals under skin. Three pores in row above maxilla; 3 pores near nostrils, including 1 pore above and 1 below posterior nostril, 1 between nostrils; 2 pores on anterior margin of snout; row of 7–11 pores in infraorbital series, with several branches in posterior portion; 6–8 pores in row on posterior margin of preopercle; interorbital space with 2 pairs of pores in anterior half, irregular medial row of several small pores in posterior half; occiput with numerous small pores; ventral surface of lower jaw with 5 pores on each side, anteriormost pore behind chin.

Opercle bearing short, posteriorly-directed, flattened spine approximately at level of ventral edge of orbit in lateral view; posterior margin of subopercle slightly expanded pos-

Table 1. Morphometrics, expressed as percentages of SL, of *Parapercis bicoloripes* and *P. diplospilus* from the South China Sea and the adjacent waters.

	P. bicoloripes		*P. diplospilus*	
Number of specimens	27		11	
Standard length (mm)	66.1–136.0	Mean	54.1–74.1	Mean
Body depth at anal-fin origin	17.2–20.6	19.2	14.7–16.8	15.7
Body width	13.6–17.6	15.8	14.3–17.4	16.1
Head length	25.7–28.7	26.9	25.7–27.9	27.2
Snout length	6.8–9.1	8.3	6.5–7.7	7.0
Fleshy orbit diameter	6.2–7.9	6.9	6.8–8.4	7.6
Fleshy interorbital width	2.9–4.1	3.5	2.4–3.3	2.8
Bony interorbital width	1.7–2.6	2.2	1.0–1.6	1.4
Upper-jaw length	10.1–12.5	11.5	8.4–9.4	8.7
Pre-dorsal-fin length	26.2–30.6	28.2	26.5–29.5	28.4
Pre-anal-fin length	43.4–49.9	45.5	43.0–47.7	45.4
Pre-pelvic-fin length	23.1–25.7	24.2	21.2–23.1	22.4
Dorsal-fin base length	61.7–66.2	64.3	61.2–68.7	65.5
1st dorsal-fin spine length	2.5–3.5	3.0	1.6–2.7	2.2
2nd dorsal-fin spine length	4.1–5.8	4.8	3.5–5.0	4.4
3rd dorsal-fin spine length	5.7–7.4	6.4	5.3–7.1	6.2
4th dorsal-fin spine length	6.0–9.6	7.4	7.1–8.2	7.7
5th dorsal-fin spine length	4.4–7.2	5.9	4.5–5.4	4.9
Longest dorsal-fin soft ray length	13.8–17.5	15.9	12.9–14.3	13.8
Anal-fin base length	41.3–48.6	45.4	46.2–50.1	47.8
Anal-fin spine length	3.3–5.4	4.5	5.3–6.6	6.2
Longest anal-fin soft ray length	12.2–14.6	13.4	9.3–10.6	9.8
Pectoral-fin length	19.2–22.0	20.2	18.4–20.6	19.5
Pelvic-fin length	20.6–25.7	22.6	20.1–23.2	22.0
Caudal-fin length	18.1–21.4	19.8	18.4–20.6	19.5
Caudal-peduncle depth	8.5–10.2	9.6	7.7–8.5	8.1
Caudal-peduncle length	9.0–11.1	9.9	6.3–8.2	7.5

Table 2. Frequency distribution of selected meristics of *Parapercis bicoloripes* and *P. diplospilus* from the South China Sea and the adjacent waters.

	Pectoral-fin rays					Pored lateral line scales				Scale rows above lateral line[1]			Scale rows above lateral line[2]		
	14	15	16	17	18	52	53	54	55	3.5	4	4.5	3.5	4	4.5
P. bicoloripes			2	23	2	1	14	8	1	11		13	10		16
P. diplospilus	2	9					1	2			7			8	2

	Scale rows below lateral line					Pre-dorsal-fin scale rows				Circumpeduncular scale rows			
	10	11	12	13	14	8	9	10	11	23	24	25	26
P. bicoloripes			2	17	4	5	10	6	1	1	4	10	9
P. diplospilus	1					1	4	2		6			

	Upper gill rakers						Lower gill rakers					Total gill rakers									
	2	3	4	5	6	7	8	9	10	11	12	10	11	12	13	14	15	16	17	18	19
P. bicoloripes			3	4	7	2	1	4	6	4	1			1	2	2	2	3	5	—	1
P. diplospilus	3						1	2				1	2								

[1]to first dorsal-fin spine base; [2]to first dorsal-fin soft ray base.

teriorly, with 8–10 large serrae; posterior edge of interopercle with 2 or 3 weakly developed serrae; preopercle rounded with 11–20 serrae in all; posttemporal area with small exposed bony cleft, its posterior margin smooth.

Lateral line continuous, 3–5 pored lateral-line scales extending onto caudal fin; body entirely covered with developed ctenoid scales, scales on dorsolateral portion with *ca.* 35–50 short cteni; opercle, nape, and dorsal-postorbital region with developed ctenoid scales; cheek covered entirely with weakly developed ctenoid scales, possessing *ca.* 25–30 short cteni; subopercle, interopercle, snout, interorbital space, occipital area and both jaws naked; small, elongate

ctenoid basal scales extending onto pectoral and caudal fins; dorsal, anal, and pelvic fins without basal scales.

Origin of dorsal fin approximately above upper pectoral fin base; dorsal-fin spines relatively short; 4th dorsal-fin spine longest; membrane between 5th spine and 1st soft ray attached near tip of 5th spine, moderately incised; all soft rays subequal in length, 19th ray (sometimes 18th or 20th, rarely 10th or 11th) longest. Origin of anal fin below base of 5th or 6th dorsal-fin soft ray; anal-fin spine weak, slender; 15th or 16th (rarely 14th) soft ray longest. Caudal fin rounded, upper edge slightly pointed posteriorly. Pectoral fin elongate, with rounded posterior contour, 9th or 10th ray longest, its tip almost reaching vertical drawn through anal-fin origin. Pelvic fin origin slightly anterior to level of pectoral-fin base, pelvic-fin spine under skin closely attached to 1st soft ray; 4th soft ray longest, its tip not reaching anus when depressed in specimens of >79 mm SL, just reaching anus in 66.1 mm SL specimen (KAUM–I. 69435).

Fresh coloration. Body pale red, whitish ventrally (Fig. 1); scales on reddish portion of body tinged centrally with yellow; *ca.* 7 large, indistinct, dark Y- or V-shaped markings laterally on body, from behind pectoral fin to caudal peduncle; indistinct rounded red blotch (blackish in smallest specimen, KAUM–I. 69435) on upper part of caudal-fin base, its size subequal to pupil. Head pale red; cheek with 6 or 7 radial rows of reddish or yellow spots (each cheek scale tinged with reddish or yellow); straight, narrow yellow line from anteroventral edge of orbit to dorsal margin of upper jaw; eye yellow or pink, tinged with dark red dorsally. Dorsal fin semi-translucent, membrane of soft-rayed portion with *ca.* 5–8 narrow, wavy, yellow longitudinal stripes, these becoming irregular and conjoined posteriorly. Anal fin pale white, tinged with yellow basally; distal part broadly tinged with red. Pectoral fin pale yellow. Pelvic fin pale red (white in KAUM–I. 69435), basal part broadly blackish, ray tips whitish. Caudal fin semi-translucent, with 5–9 radial yellow bands (or radial rows of small yellow spots), number increasing and width narrowing with growth; ventral edge tinged with red.

Distribution. *Parapercis bicoloripes* has heretofore been recorded only from the Gulf of Thailand, the South China Sea, and the Sulu Sea, including Nha Trang and Phan Thiet bays, Vietnam (Prokofiev 2008, 2010); the northern Gulf of Thailand; off the east coast of the Malay Peninsula and off northern Borneo; and at Panay Island, the Philippines (this study, Fig. 2). Although Mohsin and Ambak (1996: 537, 737, figs 413, 860) recorded *Ryukyupercis gushikeni* (Yoshino, 1975) as "*Parapercis gushikeni* (Yoshino)" from Malaysia and adjacent waters, a photograph of their *R. gushikeni* had the diagnostic coloration of *P. bicoloripes* (see below). Similarly, *P. diplospilus* and *R. gushikeni* recorded from Malaysia by Ambak *et al.* (2010: 230, 231, unnumbered figs) can be identified as *P. bicoloripes*.

Remarks. The original diagnosis of *Parapercis bicoloripes* by Prokofiev (2010) included: dorsal-fin rays V, 20 or 21; anal-fin rays I, 17 [18 soft rays in Prokofiev (2010)]; pectoral-fin rays 17; pored lateral-line scales 55–57; scale rows above lateral line to first dorsal-fin spine base 3.5; frontal canines in lower jaw 6; total gill rakers 12–14; head and body entirely covered with ctenoid scales; fifth dorsal-fin spine connected with first soft ray by membrane along most of its length; upper lobe of caudal fin slightly elongate, pointed; no dark markings on head, body, and median fins; pelvic fin bicolored. The present specimens are largely consistent with this diagnosis, with the following exceptions: pectoral-fin rays [16–18 *vs.* 17 in Prokofiev (2010)], scale rows above the lateral line (3.5 or 4.5 *vs.* 3.5), pored lateral-line scales (52–55 *vs.* 55–57), and total gill rakers (12–19 *vs.* 12–14). The pored lateral-line scale count differences may have arisen from differing counting methods between the two studies. Prokofiev (2010) probably including several pored scales extending onto the caudal fin. The other minor differences in counts most likely represent intraspecific variation.

More notably, the present specimens differ from Prokofiev (2010) in most proportional measurements, including head length (25.7–28.7% SL in the former *vs.* 25.2–26.4% SL in the latter); pre-dorsal-fin length (26.2–30.6% SL *vs.* 23.9–28.4% SL); pre-anal-fin length (43.4–49.9% SL *vs.* 42.5–45.5% SL); pre-pelvic-fin length (23.1–25.7% SL *vs.* 20.9–23.2% SL); caudal-fin length (18.1–21.4% SL *vs.* 15.8–18.1% SL); pectoral-fin length (19.2–22.0% SL *vs.* 16.9–18.4% SL); pelvic-fin length (20.6–25.7% SL *vs.* 19.4–23.9% SL); caudal-peduncle length (9.0–11.1% SL *vs.* 11.4–14.6% SL); and caudal-peduncle depth (8.5–10.2% SL *vs.* 8.2–9.7% SL). Of these, the minor differences in lengths of the head and pelvic fin, and in caudal-peduncle depth, very likely represent individual variation within the species. Differences in pre-dorsal- and pre-anal-fin lengths may be explained by ontogenetic morphological changes (see below) in as much as the material used in the two studies ranged from 66.1 to 136.0 mm SL (present study) and from 88 to 155 mm SL (Prokofiev 2010). The remaining differences between the present specimens and Prokofiev (2010) (lengths of the caudal peduncle, pre-pelvic-fin portion, and caudal and pectoral fins) possibly resulted from different measuring techniques, details of which were not provided by Prokofiev (2010).

Notwithstanding the above-mentioned discrepancies, the present specimens are identified here as *P. bicoloripes*, based on their color pattern. Although 13 additional species of *Parapercis* were newly described subsequent to Prokofiev (2010), *P. bicoloripes* can be distinguished easily from all the congeners by its unique coloration (Ho and Shao 2010; Liao *et al.* 2011; Allen and Erdmann 2012; Ho *et al.* 2012, 2014; Johnson and White 2012; Sparks and Baldwin 2012; Ho and Johnson 2013; Chen *et al.* 2014; Johnson *et al.* 2014; Ho 2015).

Parapercis bicoloripes, having been previously reported from Vietnam as *Parapercis* sp. 1 by Prokofiev (2008), was described by Prokofiev (2010) on the basis of 20 specimens from Nha Trang and Phan Thiet bays, Vietnam. The species had also been recorded by Mohsin and Ambak (1996) and Ambak *et al.* (2010) from Malaysia and adjacent waters, but was misidentified by them as *P. diplospilus* or *R. gushikeni.* The present specimens, therefore, represent the first confirmed records of *P. bicoloripes* from Thailand, Malaysia, and

the Philippines, indicating a widespread distribution of the species in the Gulf of Thailand, the South China Sea, and the Sulu Sea (Fig. 2).

Morphological changes with growth. Analysis of the 26 examined specimens (66.1–136.0 mm SL) indicated that several body proportions change with growth in *P. bicoloripes*. Relative lengths of the snout, bony interorbital space, and upper jaw tend to become greater with growth; in contrast, relative lengths of the fleshy orbit diameter, pre-dorsal-fin portion, pre-anal-fin portion, second dorsal-fin spine, anal-fin spine, and pelvic fin become shorter with growth (Fig. 3). No other significant growth-related proportional changes were apparent.

The blotch on the upper part of the caudal-fin base appeared to become paler and more indistinct with growth. The smallest examined specimen (KAUM–I. 69435, 66.1 mm SL) had a distinct blackish-red blotch on the base (Fig. 1C), in contrast to larger specimens, which had a poorly defined red blotch (Fig. 1A–B). Moreover, the number and width of the yellow bands on the caudal fin become greater and narrower, respectively, with growth. Specimens of <80 mm SL (KAUM–I. 69435 and 79764) possessed about five caudal-fin bands, whereas six to nine bands were present in specimens of >96 mm SL. The bands were relatively wide in the smallest examined specimen, about twice as wide as the spaces between them (Fig. 1C). In contrast, the bands of large specimens were relatively narrow, with a maximum width subequal to or clearly narrower than the spaces between them (Fig. 1A–B).

Although gill raker numbers varied considerably in *P. bicoloripes* (12–19; Table 2), no significant relationship was recognized between their number and either standard length or capture locality, the range in number apparently being as aspect of individual variation.

Parapercis diplospilus Gomon, 1981
(Figs 2, 4A–B, 5; Tables 1–2)

Material examined. Eleven specimens, 44.2–74.1 mm SL. **Thailand:** KAUM–I. 22880, 67.5 mm SL, northern Gulf of Thailand, bottom trawl (obtained at Angsila fishing port, Chonburi Province); NSMT-P 55320, 3 specimens, 44.2–54.9 mm SL, off Songkla; NSMT-P 70071, 3 specimens, 66.5–70.4 mm SL, possibly Thailand (no further locality data); NSMT-P 70944, 61.3 mm SL, Thailand (no further locality data); NSMT-P 115466, 55.8 mm SL, Thailand (no further locality data). **Malaysia:** KAUM–I. 16930, 54.1 mm SL, off Kuala Terengganu, Terengganu, bottom trawl (obtained at Cendering fishing port, Kuala Terengganu). **Philippines:** KAUM–I. 80706, 74.1 mm SL, off Iloilo, Panay Island (obtained at Tigbauan Market, Iloilo), 11 November 2015.

Description. Morphometrics, expressed as percentages of SL, and frequency distribution of selected meristics are shown in Tables 1–2. Dorsal-fin rays V, 22; anal-fin rays I, 18; pectoral-fin rays all branched except for uppermost ray; pelvic-fin rays I, 5; branched caudal-fin rays 15 (8 and 7 in dorsal and ventral series, respectively); pseudobranchial filaments 10 (1) or 11 (1); branchiostegal rays 6.

Body subcylindrical, moderately elongate, deep, depth at anal-fin origin 3.1–4.2 in SL; greatest width at pectoral-fin base 3.4–5.0 in SL. Caudal peduncle short, deep, depth 0.8–1.0 in length. Head small, its length 1.6–2.7 in SL; snout short, pointed, its length subequal to orbit diameter; eye relatively large, fleshy orbit diameter 3.3–4.0 in HL; interorbital space narrow, least bony width 17.2–26.7 in HL.

Mouth small, slightly oblique, forming angle of about 20° to horizontal axis of head; lower jaw slightly protruding beyond upper jaw tip; posterior margin of upper jaw reaching vertical drawn through anterior margin of pupil. Upper jaw with outer row of 18–30 incurved caniniform teeth on each side (number increasing with growth), anterior 2–4 caniniform teeth slightly larger, other teeth increasingly smaller posteriorly; inner band of villiform conical teeth behind outer canine row of upper jaw, broadest anteriorly with 3–5 rows maximum, gradually narrowing posteriorly to 1 row at rear of jaw. Front of lower jaw with usually 4 pairs of incurved enlarged, caniniform teeth (3 and 4 on left and right sides, respectively, in KAUM–I. 16930; 7 or 8 in total) in distinctly separate outer row, innermost tooth usually smallest, its size about half that of other teeth; inner band of villiform conical teeth medial to caniniform teeth at front of lower jaw, broadest portion with about 5 tooth rows, followed by row of small, incurved conical teeth, 3–10 teeth in middle of tooth row slightly enlarged; vomer with crescentic patch of 2 or 3 rows of small conical teeth, subequal in size; palatine teeth absent.

Gill membranes free from isthmus, with broad free fold; developed gill rakers short and spinous, longest raker about one-fourth as long as longest gill filament. Nostrils small, anterior nostril with short membranous tube, its tip not reaching posterior nostril when laid back; posterior nostril pore ovate or elliptical with slightly raised rim.

Pores of cephalic sensory system connected by canals under skin. Row of 3–4 pores above maxilla; 3 pores near nostrils, including 1 pore above and 1 below posterior nostril, 1 between nostrils; 2 pores on anterior margin of snout; row of 11–14 pores in infraorbital series, with several branches in posterior portion; 10 or 11 pores in row on posterior margin of preopercle; interorbital space with 2–5 pairs of pores on anterior half, small pores scattered medially on posterior half; occiput with numerous small pores; ventral surface of lower jaw with 5 pores on each side, anteriormost pore behind chin.

Opercle bearing strong, posteriorly-directed, flattened spine, approximately at level of ventral edge of orbit in lateral view; posterior margin of subopercle well expanded posteriorly, with 13–19 serrae, upper serrae relatively large, number of serrae increasing with growth; posterior edge of interopercle with 2 or 3 weak serrae; preopercle rounded, posteroventral edge with about 6 serrae; posttemporal area with small exposed bony cleft with several indistinct bony protuberances on its posterior margin.

Lateral line continuous, about 3 pored lateral-line scales extending onto caudal fin; body entirely covered with developed ctenoid scales, scales on dorsolateral portion with *ca.* 40 cteni; head, including cheek, preopercle, interopercle,

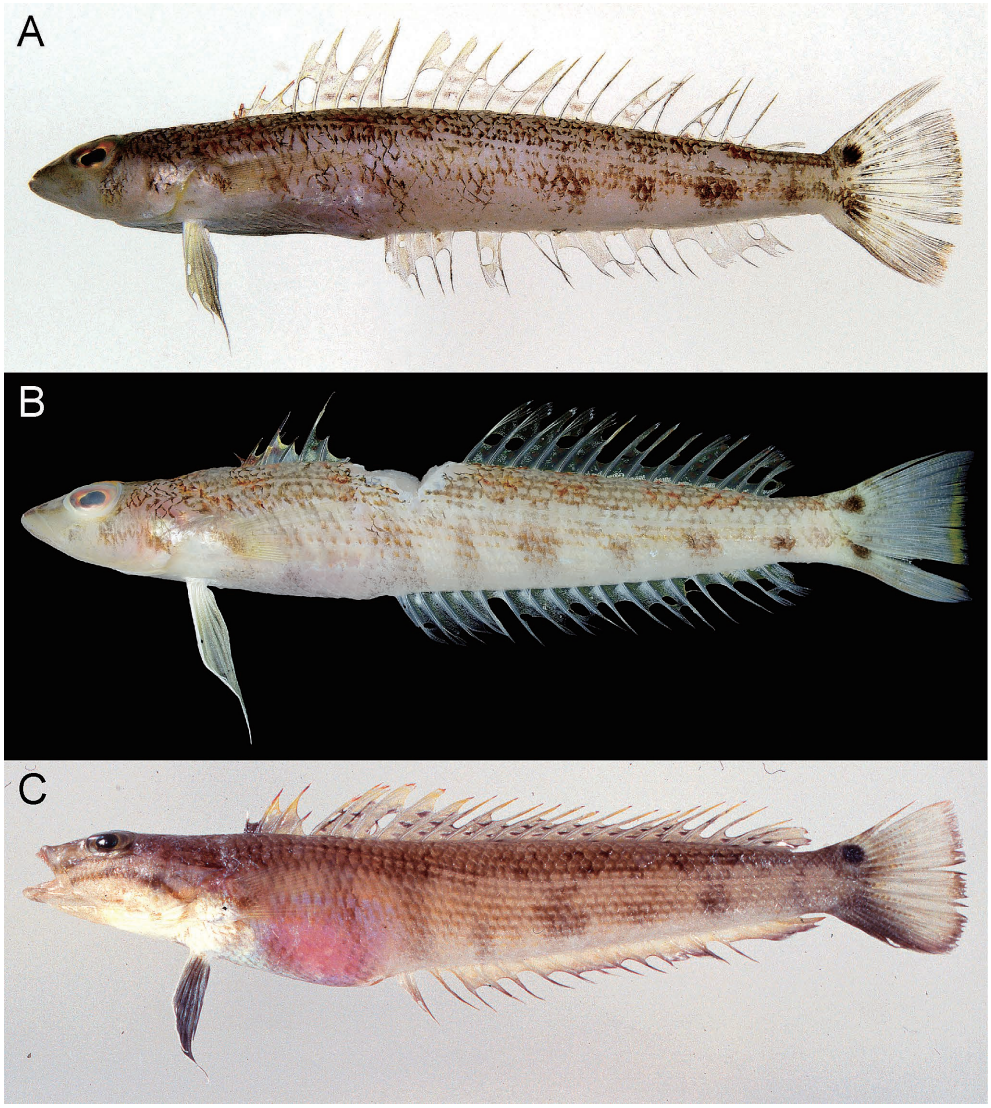

Fig. 4. Fresh specimens of *Parapercis diplospilus* from Thailand (A) and the Philippines (B), and *P. ommatura* from Japan (C). A, KAUM–I. 22880, 67.5 mm SL, northern Gulf of Thailand; B, KAUM–I. 80706, 74.1 mm SL, off Iloilo, Panay Island; C, BSKU 81924, 84.6 mm SL, Tosa Bay, Kochi Prefecture.

Fig. 5. Smallest examined specimen of *Parapercis diplospilus* (preserved). NSMT-P 55320, one of three specimens, 44.2 mm SL, off Songkla, Thailand.

subopercle, and opercle, with ctenoid scales; no scales on snout, interorbital space, occipital area, or both jaws; bases of pectoral and caudal fins covered with small, elongate ctenoid scales; dorsal, anal, and pelvic fins without basal scales.

Origin of dorsal fin posterior to vertical drawn through upper origin of pectoral fin; dorsal-fin spines relatively short; 4th dorsal-fin spine longest; membrane between 5th spine and 1st soft ray attached near tip of 5th spine, deeply incised; anterior soft rays subequal in length, 3rd or 4th ray longest. Origin of anal fin below base of 5th dorsal-fin soft ray; anal-fin spine weak, slender; 4th soft ray longest. Caudal fin truncate to slightly rounded, upper edge (and lower edge in KAUM–I. 80766) slightly pointed. Pectoral fin slightly elongate, with rounded posterior contour, 7th or 8th ray longest, its tip reaching vertical drawn through anal-fin origin. Pelvic fin origin anterior to vertical drawn through pectoral-fin base, spine covered with skin closely attached to first soft ray; 4th soft ray longest, depressed tip almost reaching anus.

Fresh coloration. Body creamy-white, whiter ventrally, darkening dorsally and laterally. (Fig. 4A–B); lower half of lateral body surface above anal fin with transverse row of about 6 large, brown blotches. Head creamy-white, postorbital region and nape brownish. Snout with indistinct narrow brown band (width about half pupil diameter) extending from anterior margin of orbit to tip of snout. Cheek creamy-white, with 2 brown blotches below eye; anterior blotch small, situated between ventral margin of orbit and posterior tip of upper jaw; posterior blotch below postero-

ventral margin of orbit, with slight yellowish tinge. Eye yellow to dull orange, tinged with red posterodorsally; pupil black. Opercle generally brownish. Membrane of spinous portion of dorsal fin pale yellow; membrane between 1st and 3rd spines brownish. Soft-rayed portion of dorsal fin with pale yellow membrane and about 3 poorly defined brownish stripes. Anal-fin semi-translucent, membranes between each ray with brownish tinge. Pectoral-fin membrane semi-translucent, rays with brownish tinge, base with oblique narrow brown band. Pelvic fin pale yellow, with numerous minute melanophores throughout; spine and tips of soft rays white. Two small dark brown ocellated spots on caudal-fin base, subequal to pupil in size. Caudal-fin semi-translucent, with *ca.* 3 narrow, dull orange bands; posterior margin with narrow zone of dark orange tinge.

Distribution. *Parapercis diplospilus* is distributed in the southeastern Indian and western Pacific oceans (Fig. 2): Nha Trang Bay, Vietnam (Prokofiev 2008); Gulf of Thailand (this study); off Terengganu, Malaysia (east coast of Malay Peninsula) (this study); Visayan Islands, the Philippines (Gomon 1981; this study); Kaimana, West Papua, Indonesia (Allen and Erdmann 2009); Milne Bay, Papua New Guinea (Allen and Erdmann 2012); and Australia, including Queensland (Johnson 1999; Robins and McGilvray 1999), Northern Territory (Larson *et al.* 2013), and Western Australia (Hutchins 2001, 2003; Allen *et al.* 2006). Although Ambak *et al.* (2010) recorded the species from Malaysia, their photograph is re-identified here as *P. bicoloripes* (see above).

Remarks. The present specimens, from Thailand, Malaysia, and the Philippines, agree closely with the original description and figures of *P. diplospilus* given by Gomon (1981), including the diagnostic characters of the species [dorsal-fin rays V, 22, with last spine connected by deeply incised membrane to first soft ray; anal-fin rays I, 18; pectoral-fin rays 15; scale rows below lateral line 10; circumpeduncular scale rows 23; 7 or 8 (usually 4 pairs) of caniniform teeth in front part of lower jaw; and 2 prominent dark spots on caudal-fin base]. They differ slightly from Gomon (1981) in having a slightly longer fourth dorsal-fin spine, 7.1–8.2% SL (*vs.* 6.4–7.8% SL in the latter), regarded here as intraspecific variation. Gomon (1981) included a detailed comparison of *P. diplospilus* with *P. ommatura* Jordan and Snyder, 1902 (Fig. 4C), which is similar to the former in overall body appearance. *Parapercis diplospilus* can be readily distinguished from *P. ommatura* by the two dark spots on the caudal-fin base [*vs.* a single (upper) spot in the latter] and blotches on the cheek (*vs.* longitudinal stripes) (Gomon 1981; Fig. 4).

Parapercis diplospilus, originally described by Gomon (1981) on the basis of 21 specimens from the Philippine islands, has subsequently been recorded from many localities in the southeastern Indian and western Pacific oceans, although not from the Gulf of Thailand or east coast of the Malay Peninsula. The present specimens, therefore, represent the first records of the species from these two localities.

The record of *P. diplospilus* from Nha Trang Bay (Prokofiev 2008) may need to be reviewed, as the five Vietnamese specimens described differed significantly from Gomon's (1981) description in having 17 or 18 pectoral-fin rays (*vs.* 14–16 in the latter), six caniniform teeth on the front part of the lower jaw (*vs.* seven or eight), and a relatively greater pelvic-fin length of 25.6–27.5% SL (*vs.* 19.9–23.6% SL). Of these characters, dentition has been treated as an important diagnostic feature of *Parapercis* species (Cantwell 1964). In addition, Prokofiev (2008) considered the difference in pelvic-fin length of the Vietnamese specimens as likely size-related intraspecific variation [the latter specimens being smaller, 37–45 mm SL *vs.* 48.7–78.0 mm SL in Gomon (1981)]. However, the smallest specimen examined here (44.2 mm SL, one of NSMT-P 55320; Fig. 5) clearly had relatively shorter pelvic fins than the Vietnamese specimens (23.0% SL in the former *vs.* 25.6–27.5% SL in the latter). Moreover, Prokofiev (2008) stated that the posterior tip of the depressed pelvic fin extended well beyond the anal-fin origin in the Vietnamese specimens, such not being so in the present smallest specimen. However, the relationship between pelvic-fin length and standard length can not be considered further here due to the limited material available.

Comments on records of *Parapercis ommatura*. Shimada (2013) considered *Parapercis ommatura* Jordan and Snyder, 1902 to be distributed in the northwestern Pacific Ocean, including China, Taiwan, and Japan. Although Prokofiev (2008) recorded *P. ommatura* from Nha Trang Bay, Vietnam, Liao *et al.* (2011) included *P. ommatura sensu* Prokofiev (2008) in the synonymy of their new species, *Parapercis lutevittata* Liao, Cheng, and Shao, 2011. Recently, Ray *et al.* (2015) recorded *P. ommatura*, based on 21 specimens (71.9–100.0 mm SL), from the northern Bay of Bengal, off West Bengal, India. These specimens differed slightly from *P. ommatura* [as redescribed by Imamura and Yoshino (2007) on the basis of 16 specimens (64.5–101.9 mm SL), including the holotype of the species, from Japan and China] in having 13–14 gill rakers (*vs.* 8–13 in the latter) and 61 or 62 lateral-line scales [*vs.* 56–58; 56–60 in Shimada (2013)]. Moreover, the Indian specimens also differed from *P. ommatura* from the northwestern Pacific (Shinohara 1997; this study, Fig. 1C) in coloration, including bright orange stripes on the cheek (Ray *et al.* 2015: fig. 1) (*vs.* brownish in the latter) and a small, black spot on each membrane between the third and fifth dorsal-fin spines (*vs.* absent). Accordingly, the Indian specimens recorded by Ray *et al.* (2015) may represent a species distinct from *P. ommatura*.

Comparative material. *Parapercis diplospilus*: UPVMI 316, 57.5 mm SL, off Iloilo, Panay Island, Philippines (obtained at Central Market, Iloilo City) (photograph only). *Parapercis ommatura*: BSKU 81924, 84.6 mm SL, Tosa Bay, Kochi Prefecture, Japan, 30 m depth, RV *Toyohata-maru*.

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