

SIX NEW SANDPERCHES OF THE GENUS *PARAPERCSIS* FROM THE WESTERN PACIFIC, WITH DESCRIPTION OF A NEOTYPE FOR *P. MACULATA* (BLOCH & SCHNEIDER)

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ABSTRACT. – A review of the literature of the pinguipedid fish genus *Parapercis* is followed by the description of six new species of the genus from the western Pacific: *P. albipinnis*, one specimen from 100 m off New Caledonia, most similar to *P. somaliensis* Schultz, differing in having only small nodular instead of sharp serrae on the preopercle, lacking elongate upper caudal rays, and in colour; *P. compressa*, one specimen trawled in 40–60 m off Sumbawa, Indonesia, first identified as *P. somaliensis* from which it differs in having a more compressed body and ctenoid scales ventrally on the abdomen, prepelvic area, and cheek; *P. diagonalis*, four specimens (including three juveniles as nontypes) from Bali and Solor, Indonesia in 0.5–11.0 m, similar to *P. maculata*, differing in a higher gill-raker count, shorter pectoral fins, and in colour; *P. flavolineata* from 34 m off Sulawesi, Indonesia, most similar to *P. schauinslandii* (Steindachner), differing in fewer lateral-line scales, stouter vomerine teeth, and in colour; *P. shaoi* from about 80–400 m off Taiwan and southern Japan, previously identified as *P. somaliensis*, differing in lacking distinct serrae on the preopercular margin, having a larger eye, a broader interorbital space, and in colour; *P. vittafrons*, four specimens from New Britain in 19–22 m, closely related to *P. pulchella*, differing in having larger canine teeth on the side of the jaws, shorter pectoral fins, and in colour. *Parapercis maculata* (Bloch & Schneider) from the western Indian Ocean (type locality Tranquebar, India), is recognized as a valid species and distinguished from *P. pulchella* (Temminck & Schlegel) from Japan, Taiwan and Hong Kong. A neotype of *P. maculata* from Tuticorin in southeast India is described.

KEY WORDS. – Taxonomy, Pinguipedidae, *Parapercis*, new species, western Pacific.

INTRODUCTION

The perciform fish family Pinguipedidae was known as the Parapercidae or Mugiloididae until Rosa & Rosa (1987) showed that the oldest valid genus for the family is *Pinguipes* Cuvier, type species *P. brasiliensis* Cuvier. The family consists of seven genera: *Pinguipes*, *Parapercis* Bleeker, *Prolatilus* Gill, *Pseudopercis* Miranda Ribeiro, *Kochichthys* Kamohara, *Simipercis* Johnson & Randall, and *Ryukyuperis* Imamura & Yoshino. *Cheimarrichthys fosteri* Haast from rivers of New Zealand is included in the family Pinguipedidae by some authors, but regarded as a monotypic family by others (Nelson, 2006).

The genus *Parapercis* is much the largest of the family. Cantwell (1964) wrote in his revision of the genus: “Over 80 nominal species have been described in or placed in the genus *Parapercis*, but no previous attempt has been made to compare the species on a world-wide base or to determine the value of morphological characters in the identification of them.” He recognized 27 species, including *P. okamurai*

Kamohara, the description of which arrived too late to be treated in detail in his study.

In a brief review of the genus, Randall (1984) raised the total number of species to 40. He noted that Cantwell overlooked *P. striolata* (Weber), of which *P. mimaseana* Kamohara is a synonym, erred in placing the Hawaiian *P. roseoviridis* (Gilbert) in the synonymy of *P. multifasciata* Steindachner & Döderlein, and failed to record *P. polyophtalma* (Cuvier) as a synonym of *P. hexophtalma* (Cuvier), as shown by Marshall (1950), who was the first to present evidence that this species is a protogynous hermaphrodite (probably true of the species of *Parapercis*, in general). He discussed the new species of *Parapercis* of Schultz (1966; 1968), Fourmanoir (1967), McCosker (1971), Yoshino (1975), Allen (1976), Kotthaus (1977), Fourmanoir & Rivaton (1979), and Gomon (1980), and described *P. multiplicata* and *P. signata*.

More recent papers describing valid new species of *Parapercis* include Fourmanoir (1985), Anderson (1992), Randall & Francis (1993), Randall & McCosker (2002),

Randall (2003), Randall & Yamakawa (2006), Johnson (2006), Johnson & Randall (2006), and Imamura & Yoshino (2007). The last-mentioned authors named three new species of *Parapercis* from the Pacific that were formerly identified as *P. hexophthalma* (Rüppell). Some authors, including the present author, would prefer to regard two of these as subspecies. Obtaining tissue from fresh specimens for DNA analysis would seem advisable.

In addition to their description of *Simipercis trispinosa*, Johnson & Randall (2006) noted that *Parapercis naevosa* Serventy and *P. stricticeps* DeVis, regarded by Cantwell (1964) as junior synonyms of *P. allporti* (Günther) and *P. xanthozona* (Bleeker), respectively, are instead valid species. This brings to 56 the number of recognized species of the genus.

Cantwell (1964) did not believe that *Percis maculata* Bloch & Schneider was a valid name. He recognized *Percis pulchella* Temminck & Schlegel as a species of *Parapercis* and gave the distribution as east coast of Africa to Hong Kong and Japan. Heemstra in Smith & Heemstra (1986) followed Cantwell and used Temminck & Schlegel's figure of *P. pulchella* to illustrate the species for East Africa. Randall (1995: 305, Fig. 861) and Randall in Carpenter & Liem (2001: 3505) adopted the earlier name *P. maculata* for the species. However, this study will show that *P. maculata* and *P. pulchella* are distinct species, the former from the western Indian Ocean, the latter from Japan, China and Taiwan.

Randall in Carpenter & Niem (2001) listed 22 species of *Parapercis* for the central and western Pacific and provided a key. Six more new species are described in the present paper from the western Pacific, one from New Caledonia, three from Indonesia, and one from New Britain, Papua New Guinea. In addition, a neotype is described for *P. maculata* (Bloch & Schneider) from a specimen collected by the author near the type locality of Tranquebar, India.

MATERIALS AND METHODS

Specimens for this study are housed at the following institutions: Research Center for Biodiversity, Academia Sinica, Taipei (ASIZP); Bernice P. Bishop Museum, Honolulu (BPBM); Department of Biology, Kochi University (BSKU); California Academy of Sciences, San Francisco (CAS, SU); Museums and Art Galleries of the Northern Territory, Darwin (NTM); United States National Museum of Natural History, Washington, D.C. (USNM); and the Western Australian Museum, Perth (WAM).

Lengths of specimens are given as standard length (SL), measured from the median anterior point of the upper lip to the base of the caudal fin (posterior end of the hypural plate); body depth is measured vertically from the origin of the anal fin, and body width at the base of the pectoral fins; head length is taken from the front of the upper lip to the posterior end of the opercular membrane, and snout length from the same anterior point to the nearest fleshy edge of

the orbit; orbit diameter is the greatest fleshy diameter, and interorbital width the least fleshy width; upper-jaw length is taken from the front of the upper lip to the fleshy end of the maxilla; cheek depth is the least depth perpendicular from the ventral edge of the suborbital to the fleshy edge of the orbit; caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; lengths of spines and rays are measured from the point where they depart from the contour of the body; caudal- and pectoral-fin lengths are the length of the longest ray; caudal concavity is the horizontal distance between verticals at the tips of the longest and shortest caudal rays; pelvic-fin length is measured from the base of the pelvic spine to the tip of the longest pelvic soft ray. Gill-raker counts include rudiments. Morphometric data presented in Table 1 are given as percentages of the standard length. Proportional measurements in the text are rounded to the nearest 0.05.

TAXONOMY

Parapercis albinna, new species

(Fig. 1; Table 1)

Material examined. – Holotype – BPBM 26841, female, 142 mm, New Caledonia, Bulari Pass (south of Nouméa), 100 m, P. Fourmanoir, 18 Dec.1978.

Diagnosis. – Dorsal rays V,21; anal rays I,17; pectoral rays 17; lateral-line scales 54; gill rakers 5 + 11; lower jaw projecting; three pairs of canine teeth anteriorly in jaws; no palatine teeth; vomerine teeth stout, in a single row; scales on body ctenoid, becoming cycloid ventrally on abdomen and prepectoral area; scales on cheek cycloid, small, progressively smaller ventrally, the most ventral nonimbricate and partially embedded; margin of preopercle without distinct sharp serrae; greatest body depth 4.45 in SL; head length 3.1 in SL; orbit diameter 4.2 in head length; fourth dorsal spine longest, 3.95 in head length; caudal fin truncate, slightly rounded on ventral half; pectoral fins 5.25 in SL; pelvic fins just reaching anus, 5.1 in SL; colour when fresh light reddish-brown dorsally with eight faint, U-shaped brown bars with dark brown dots on about dorsal fourth of body, the upper ends of each U terminating in a dark brown spot at base of a dorsal ray; side of body white with eight faint yellow and pale pink bars in alignment with dark bars above, ending in a pale purplish grey band ventrally on body; a narrow orange bar curving ventrally from below eye across cheek; spinous portion of dorsal fin, pelvic fins, and basal half of caudal fin white.

Description. – Dorsal rays V,21; anal rays I,17; all dorsal and anal rays branched, the last to base; pectoral rays 17, branched except uppermost; caudal rays 34 (including 5 upper and lower procurent rays), the principal rays 15, all branched; lateral-line scales 54 (not including 3 smaller pored scales on base of caudal fin); scales above lateral line to middle of dorsal fin 6.5; scales below lateral line to origin of anal fin 14; median predorsal scales 9; circumpeduncular

Table 1. Proportional measurements of the holotypes of *Parapercis albipinna*, *P. compressa*, *P. diagonalis* and *P. flavolineata*, and the neotype of *P. maculata* as percentages of the standard length

	<i>P. albipinna</i> BPBM 26841	<i>P. compressa</i> NTM S.10746	<i>P. diagonalis</i> BPBM 38811	<i>P. flavolineata</i> BPBM 38810	<i>P. maculata</i> BPBM 20453
Sex	female	male	male	male	male
Standard length (mm)	142.0	87.0	128.0	85.0	121.0
Greatest body depth	22.4	19.0	20.9	20.0	19.8
Body depth at A origin	19.8	18.4	20.1	19.3	19.1
Body width	19.4	14.8	19.3	16.6	14.1
Head length	32.3	29.9	27.3	30.8	25.7
Snout length	9.1	9.3	7.8	9.6	8.5
Orbit diameter	7.7	7.5	6.2	8.1	6.6
Cheek depth	4.9	3.7	4.2	4.7	4.2
Interorbital width	4.2	3.3	3.9	4.5	4.0
Upper-jaw length	13.8	11.8	11.7	13.2	10.9
Caudal-peduncle depth	10.2	10.1	9.9	9.2	9.4
Caudal-peduncle length	8.0	10.2	9.8	9.6	10.1
Predorsal length	32.3	31.0	26.1	28.4	25.2
Preanal length	51.3	48.2	44.5	46.1	42.2
Prepelvic length	28.2	24.8	23.4	26.1	21.2
Dorsal-fin base	62.2	62.0	65.0	61.2	65.2
First dorsal spine	3.2	broken	2.4	3.8	1.7
Fourth dorsal spine	8.2	broken	7.4	9.3	6.8
Fifth dorsal spine	7.6	5.8	5.5	7.1	4.4
Longest dorsal ray	13.2	14.9	16.8	15.0	15.6
Anal-fin base	41.5	42.5	47.0	42.6	47.3
Anal spine	4.2	4.6	4.7	4.6	4.0
Longest anal ray	12.9	12.6	13.1	13.0	11.3
Caudal-fin length	19.9	19.7	21.9	22.5	20.1
Pectoral-fin length	19.1	19.6	17.8	19.8	19.8
Pelvic-spine length	7.4	9.4	7.9	7.8	7.5
Pelvic-fin length	19.7	21.4	19.8	25.3	18.4

scales 25; gill rakers 5 + 11; pseudobranchial filaments 20; branchiostegal rays 6; vertebrae 10 + 20.

Greatest body depth 4.45 in SL; body depth at origin of anal fin 5.05 in SL; body nearly cylindrical anteriorly, the width 5.15 in SL; head length 3.1 in SL; ventral part of head, chest, and abdomen slightly convex; snout length 3.55 in head length; orbit diameter 4.2 in head length; interorbital space slightly concave, the least width 7.7 in head length; caudal-peduncle depth 3.15 in head length; caudal-peduncle length 4.05 in head length.

Mouth large, the maxilla nearly reaching a vertical at anterior edge of pupil, the upper-jaw length 2.35 in head length; mouth oblique, forming an angle of about 30° to horizontal axis of body, the lower jaw projecting; front of upper jaw with three incurved canine teeth on each side, the middle one largest; side of jaw with a row of conical teeth, the anterior six or seven of canine proportions (largest about three-fourths length of longest anterior canine), the remaining teeth progressively smaller; a broad band of villiform teeth medial to canines

at front of upper jaw, gradually narrowing posteriorly to a single row; front of lower jaw with three incurved canine teeth on each side, the third much the largest; side of lower jaw with an outer row of 18 canine teeth, progressively larger to sixth, the remaining teeth small; a broad dense band of villiform teeth medial to anterior canines, narrowing and ending about one-third back in jaw; vomer with a row of six stout conical teeth in a broad arc, the middle two largest; no palatine teeth; lips smooth, their inner surface with large fleshy papillae that interdigitate with anterior teeth; tongue tapering to a rounded tip that nearly reaches median vomerine teeth.

Gill membranes free from isthmus, with a broad free fold across. Gill rakers short and spinous, the longest about one-third length of longest gill filaments. Anterior nostril in front of centre of eye (as viewed from side), a little more than half way to edge of upper lip, with a slight rim anteriorly, developing into a posterior flap nearly twice nostril diameter in length; posterior nostril dorsoposterior to anterior nostril, the internarial distance about twice nostril diameter, the

aperture nearly circular, with a slight rim. Pores of cephalic sensory system mostly small, seven in a row from front of snout, above nostrils, with a short branch between nostrils, nearly to above middle of eye; 16 in a row from behind upper part of eye to below posterior nostril, including two large pores above side of upper lip (but not counting pores on short posterior or ventral branches when there is a pore over main sensory canal); 12 pores in preopercular-mandibular series from upper free edge of preopercle to front of chin (not including tiny pores associated with nodular serrae on preopercular margin).

Opercle with a single sharp spine at level of centre of eye (when viewed from side); subopercle with 18 small serrae, close-spaced dorsally, widely spaced ventrally; preopercle broadly rounded, its free edge extending from behind centre of eye to below posterior edge of pupil, the posterior margin with 17 well-spaced, small nodular bumps instead of serrae.

Scales finely ctenoid on body, becoming cycloid anterior to a line from base of fifth dorsal spine to upper end of gill opening; scales on prepectoral area large and ctenoid anteriorly, becoming cycloid and smaller posteriorly, extending still smaller onto base of pectoral fin; scales on abdomen and prepelvic area cycloid; no scales on snout, interorbital or ventrally on head; scales on opercle and dorsally on subopercle mostly cycloid (the larger scales on opercle mainly ctenoid); scales on cheek cycloid, small, becoming progressively smaller ventrally, the most ventral nonimbricate and partially embedded; no scales on dorsal, anal, or pelvic fins; progressively smaller scales extending out on caudal fin about three-fourths length of fin (though many outer scales missing); lateral line broadly arched over pectoral fin, then gradually declining to straight midlateral portion on about posterior fourth of body.

Origin of dorsal fin over second lateral-line scale, the predorsal length 3.1 in SL; first dorsal spine short, 10.1 in head length; fourth dorsal spine longest, 3.95 in head length; fifth dorsal spine 4.25 in head length; membrane between fifth dorsal spine and first soft ray attached one-half of fifth spine length above base of ray; eighteenth and nineteenth dorsal soft rays longest, 2.45 in head length; origin of anal fin below base of fourth dorsal soft ray, the preanal length 1.95 in SL; anal spine 7.7 in head length; fourteenth and fifteenth anal soft rays longest, 2.5 in head length; upper half of caudal fin truncate, the lower half slightly rounded, the fin length 5.0 in SL; pectoral fins moderately pointed, the ninth and tenth rays longest, 5.25 in SL; origin of pelvic fins below base of opercular spine, the prepelvic length 3.55 in SL; pelvic spine slender, 4.35 in head length; pelvic fins just reaching anus, the fourth soft pelvic ray longest, 5.1 in SL.

Colour in alcohol: body pale orangish brown with eight, indistinct, U-shaped brown bars dorsally on body, progressively smaller posteriorly, the upper ends of each U a small dark brown spot at base of a dorsal ray; head pale violet grey with a median butterfly-shaped violet mark on occiput; soft portion of dorsal and anal fins with pale

yellowish rays and translucent membranes; remaining fins pale yellowish.

Colour when fresh as shown in Fig. 1.

Etymology. – This species is named *Parapercis albipinna* from the Latin in reference to the white of the fins, most pronounced in the spinous portion of the dorsal fin, basal half of the caudal fin, and the pelvic fins.

Remarks. – The holotype of *Parapercis albipinna* was taken by hook and line off New Caledonia at a depth of 100 m in Dec.1978. Unfortunately, no additional specimens have been collected.

This species is similar to *Parapercis somaliensis* Schultz (1968: 10, pl. 2) described from three specimens, 81–120 mm SL, taken by trawl in 50–72 m off the coast of Somalia with no information on fresh colouration. In 1986, the author photographed *P. somaliensis* in colour after thawing a frozen specimen taken off Eilat in the Gulf of Aqaba, Red Sea (Fig. 2); no information was available on the depth of capture. Baranes & Golani (1993: 309, pl. 14, fig. 46) and Khalaf & Disi (1997: 176, lower fig.) also illustrated the species from the Gulf of Aqaba.

Parapercis albipinna shares with *P. somaliensis* the same meristic data, essentially the same proportional measurements (it is a little deeper bodied, but this is not conclusive from a single specimen), the same dentition (especially the single row of stout teeth on the vomer), and the same small cycloid scales on the cheek that are nonimbricate ventrally. It differs in having only small nodules instead of distinct serrae on the edge of the preopercle and in lacking a prolonged upper



Fig. 1. Holotype of *Parapercis albipinna*, BPBM 26841, 142 mm, New Caledonia.

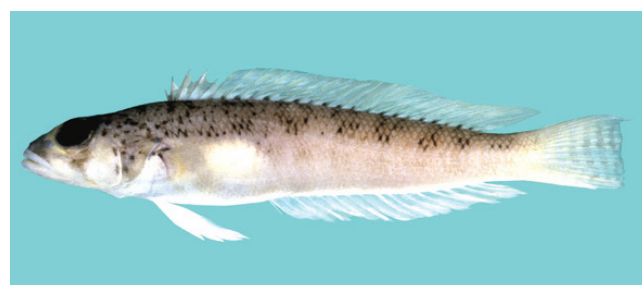


Fig. 2. *P. somaliensis*, BPBM 31813, 124 mm, Gulf of Aqaba, Red Sea.

part of the caudal fin. In his description of *P. somaliensis*, Schultz reported the upper caudal-fin rays projecting as much as an eye diameter behind the rear edge of the fin. There are also differences in fresh colouration from *P. somaliensis*, as may be seen by comparing Fig. 1 with Fig. 2. The most obvious are the absence in *P. albipinna* of the large white area beneath the outer half of the pectoral fin, the dark comma-shaped bar below the eye (only a narrow curving orange-yellow bar in *P. albipinna*), and the narrow dark bars in the caudal fin as seen on *P. somaliensis*. The dark bar below the eye and the dark bars in the caudal fin of *P. somaliensis* persist in preserved specimens.

Parapercis albipinna is also similar to *P. shaoi*, described below. See Remarks for the latter species for differences.

Comparative material of *Parapercis somaliensis*. – Red Sea, Gulf of Aqaba, Eilat, BPBM 31813, 124 mm.

***Parapercis compressa*, new species**

(Fig. 3; Table 1)

Parapercis somaliensis (non Schultz) Gloerfelt-Tarp & Kailola, 1984: 245, 351, fig. on p. 244 (southern Indonesia).

Material examined. – Holotype – NTM S.10746-004, 87 mm, Indonesia, Sumbawa, south side, 8°3'S 110°5'E, 40–60 m, trawl, T. Gloerfelt-Tarp, Jul.1981.

Diagnosis. – Dorsal rays V,21; anal rays I,17; pectoral rays 17; lateral-line scales 51; gill rakers 3 + 9; mouth terminal; no palatine teeth; teeth on vomer in a single row; scales on body finely ctenoid, including those on abdomen, prepelvic area, and cheek; margin of preopercle strongly serrate except ventrally; greatest body depth 5.25 in SL; body compressed, the width 1.3 in depth; head length 3.35 in SL; orbit diameter 4.0 in head length; fourth dorsal spine longest; caudal fin slightly rounded, with a narrow protruding posterior upper lobe; pectoral fins 5.1 in SL; pelvic fins just reaching anus, 4.7 in SL; colour when fresh purplish-brown dorsally, grading to pale purplish-grey ventrally, with seven faint dark bars on upper two-thirds to three-fourths of body, the last four broadly paler in middle where lateral line passes through; a dark purplish-brown spot as large as eye on upper half of caudal-fin base and continuing narrowly onto dorsal edge of caudal fin; a slightly diagonal, narrow, dark purplish brown bar on lower half of cheek directly below eye; median fins purplish-grey, darker distally.

Description. – Dorsal rays V,21; anal rays I,17; all dorsal and anal rays branched, the last to base; pectoral rays 17, branched except uppermost; caudal rays 37 (including small upper and lower procurrent rays), the principal rays 15, all branched; lateral-line scales 51 (not including 5 progressively smaller pored scales on base of caudal fin); scales above lateral line to middle of dorsal fin 5.5; scales below lateral line to origin of anal fin 10; median predorsal scales 7; circumpeduncular scales 23; gill rakers 3 + 9; pseudobranchial filaments 19; branchiostegal rays 6; vertebrae 10 + 20.

Greatest body depth 5.25 in SL; body depth at origin of anal fin 5.45 in SL; body compressed for the genus, the width 1.3 in depth; head length 3.35 in SL; ventral part of head, chest, and abdomen slightly convex; snout length 3.2 in head length; orbit diameter 4.0 in head length; interorbital space flat, the least width 9.1 in head length; both caudal-peduncle depth and length 2.95 in head length.

Mouth moderately large, the maxilla reaching slightly posterior to a vertical at anterior edge of orbit, the upper-jaw length 2.55 in head length; mouth terminal and oblique, forming an angle of about 45° to horizontal axis of body; only two pairs of broadly separated canine teeth anteriorly in jaws (but medial teeth may be missing), the most lateral in lower jaw much the largest and very strongly recurved; side of upper jaw with a row of about 30 progressively smaller, slender, conical teeth (counting teeth where they appear to be missing); a broad band of villiform teeth medial to canines at front of upper jaw, gradually narrowing posteriorly to a single row medial to larger teeth at side of jaw; a broad band of villiform teeth medial to canines at front of lower jaw, ending a short distance posterior to large curved canine; side of lower jaw with an outer row of 10 small but progressively larger teeth, ending in two very large canines, the first strongly recurved, the second recumbent, with a third smaller tooth behind, and a single row of small teeth continuing to end of jaw; vomer with a chevron-shaped row of eight teeth that are smaller laterally; no palatine teeth; lips smooth, their inner surface with large fleshy papillae that interdigitate with anterior teeth; tongue narrow, the anterior end rounded.

Gill membranes free from isthmus, with a broad free fold across. Gill rakers short and spinous, the longest about one-fifth length of longest gill filaments. Anterior nostril a short membranous tube with a long posterior flap, in a shallow round depression in front of centre of eye (as viewed from side), a little more than half way to edge of upper lip; posterior nostril dorsoposterior to anterior nostril, the internarial distance about twice nostril diameter, the aperture ovate with a slight rim. Pores of cephalic sensory system mostly small, five in a row from front of snout, above nostrils, the second on a short branch between nostrils, the fifth above anterior edge of pupil; 12 pores in a row from behind upper part of eye to below posterior nostril, the tenth and eleventh at end of branches to above upper lip; a series of 11 principal pores in preopercular-mandibular series from upper end of free margin of preopercle to tip of chin.

Opercle with a single sharp spine at level of middle of eye, centred on opercular flap that extends a spine length posterior to spine tip (operculum badly damaged on left side); subopercle with nine close-spaced, sharp serrae; preopercle broadly rounded, its free edge extending from behind centre of eye to below anterior edge of pupil; upper two-fifths of posterior margin of preopercle with 19 serrae that are sharp except the short upper three.

Scales on body ctenoid, including ventrally on abdomen, prepectoral, and prepelvic areas; no scales on snout,

interorbital or ventrally on head; scales on opercle finely ctenoid and nearly as large as those on body; scales on cheek ctenoid, about half size of scales on body, smaller ventrally; no scales on dorsal, anal, or pelvic fins; progressively smaller scales extending out on caudal fin about half way to posterior margin centrally in fin, but about three-fourths length of fin on lobes (many outer scales missing); lateral line slightly arched over pectoral fin, then gradually declining to straight midlateral portion on about posterior fourth of body.

Origin of dorsal fin over second lateral-line scale, the predorsal length 3.2 in SL; first and fourth dorsal spines broken, but fourth clearly longest in photograph; fifth dorsal spine 5.15 in head length; membrane between fifth dorsal spine and first soft ray attached one-half of fifth spine length above base of ray; nineteenth dorsal soft ray longest, 2.0 in head length; origin of anal fin below base of fifth dorsal soft ray, the preanal length 1.95 in SL; anal spine 6.5 in head length; fifteenth anal soft ray longest, 2.4 in head length; upper half of caudal fin slightly rounded with a protruding upper lobe, the fin length 4.85 in SL; pectoral fins moderately pointed, the tenth ray longest, 5.1 in SL; origin of pelvic fins below base of opercular spine, the prepelvic length 4.05 in SL; pelvic spine slender, 3.2 in head length; pelvic fins nearly reaching origin of anal fin, the fourth soft pelvic ray longest, 4.7 in SL.

Colour of holotype in alcohol light brown, the edges of scales darker, with seven faint brown bars on body that are interrupted midlaterally; a slightly oblique, narrow, dark brown bar on lower half of cheek below posterior half of eye; median fins pale yellowish, the dorsal and anal spines and rays with a small brown spot at base; upper half of caudal fin with dark brown spot as large as eye that continues narrowly onto basal upper margin of fin; pectoral fins pale yellowish with an oblique dark brown bar at base; pelvic fins dusky at base, especially on membranes, pale yellowish distally.

Colour of holotype when fresh shown in Fig. 3.

Etymology. – This species is named *compressa* from the Latin, in reference to the strongly compressed body for the genus.

Remarks. – The one specimen of *Parapercis compressa* was taken by trawl in 40–60 m off the south coast of Sumbawa, Indonesia. The sex could not be determined. The specimen



Fig. 3. Holotype of *P. compressa*, NTM S.10746-004, 86.5 mm, Sumbawa, Indonesia (T. Gloerfelt-Tarp).

was illustrated in colour and first identified as *P. somaliensis* Schultz by Gloerfelt-Tarp & Kailola (1984). It shares the same fin-ray and scale counts as *P. somaliensis*, the same structure of the dorsal and caudal fins, and most body and fin proportions. It differs in having a more compressed body (width 1.3 in body depth, compared to about 1.1 for *P. somaliensis*), ctenoid scales ventrally on the abdomen, prepelvic area, and cheek (cycloid in *P. somaliensis*, those on the cheek nonimbricate and partially embedded ventrally). Also, it has 12 instead of 14–16 gill rakers. Differences in colour are apparent from comparing Figs. 2 and 3.

Parapercis diagonalis, new species

(Figs. 4–7; Tables 1, 2)

Material examined. – Holotype – BPBM 38811, female, 128 mm, Indonesia, Bali, west end, Gilimanuk, silty sand, 3 m, quinaldine, J. E. Randall, 8 Oct.2000.

Nontype specimens. – BPBM 36657, 57 mm, Solor, Indonesia; BPBM 40588, 2: 23–59 mm, Bali.

Diagnosis. – Dorsal rays V,21; anal rays I,17; pectoral rays 16; lateral-line scales 57; gill rakers 7 + 11; lower jaw projecting; three pairs of canine teeth anteriorly in jaws; no palatine teeth; teeth on vomer in a narrow, chevron-shaped patch of three to four rows; greatest body depth 4.8 in SL; head length 3.65 in SL; orbit diameter 4.4 in head length; scales dorsally on opercle ctenoid, becoming cycloid, progressively smaller, and nonimbricate ventrally on cheek; fourth dorsal spine longest, 3.7 in head length; caudal fin emarginate on upper half with a narrow protruding upper lobe, and rounded on ventral half; pectoral fins 5.75 in SL; pelvic fins just reaching anus, 5.05 in SL; upper third of body in life greenish brown with a series of six large, quadrangular, blackish spots, progressively shorter posteriorly; lower two-thirds of body white, faintly blotched with pink and dotted with black, the lower third with six large, quadrangular, dark reddish spots, dotted with black dorsally; head bluish grey with an oblique black line on cheek below eye, ending in a small black spot, followed by two broad reddish bands; dorsal fin with a large black spot centred on base of spinous portion, and a row of small black spots in soft portion; anal fin with a row of black spots at base; caudal fin with two broad blackish stripes.

Description. – Dorsal rays V,21; anal rays I,17; all dorsal and anal rays branched, the last to base; pectoral rays 17, branched except uppermost; caudal rays 34, including small procurent rays, the principal rays 15, all branched; lateral-line scales 57 (3 smaller pored scales on base of caudal fin not included); scales above lateral line to first dorsal soft ray 4.5; scales above lateral line to middle of dorsal fin 7; scales below lateral line to origin of anal fin 18; median predorsal scales 8; circumpeduncular scales 32; gill rakers 7 + 11; pseudobranchial filaments 17; branchiostegal rays 6; vertebrae 10 + 20.

Greatest body depth 4.8 in SL; body depth at origin of anal

fin 5.0 in SL; body nearly cylindrical anteriorly, the width 5.2 in SL; head length 3.65 in SL; ventral part of head, chest, and abdomen slightly convex; snout length 3.5 in head length; dorsal profile of snout forming an angle of about 35° to horizontal axis of body; orbit diameter 4.4 in head length; interorbital space nearly flat, the least width 7.0 in head length; caudal-peduncle depth 2.75 in head length; caudal-peduncle length 2.8 in head length.

Mouth large, the maxilla nearly reaching a vertical at anterior edge of pupil, the upper-jaw length 2.35 in head length; mouth oblique, forming an angle of about 30° to horizontal axis of body, the lower jaw projecting; front of upper jaw with three incurved canine teeth on each side, the medial ones largest, followed by a gap (where the largest canine of the lower jaw fits when mouth closed), then three recurved canines, the first larger than canines at front of jaw, and 14 slender conical teeth to end of jaw; a broad band of villiform teeth medial to canines at front of jaw; front of lower jaw with three incurved canine teeth on each side, the third much the largest; a broad band of villiform teeth medial to anterior canines; side of jaw with an anterior row of five strongly recurved canine teeth, the fourth and fifth largest, followed by a row of 11 slender conical teeth; vomer with a broad chevron-shaped patch of small, incurved, conical teeth in three to four rows, with 14 teeth in the anterior row; no palatine teeth; lips smooth, their inner surface with large fleshy papillae that interdigitate with anterior teeth; tongue tapering, the anterior end broadly rounded, just reaching posterior ends of vomerine teeth.

Gill membranes free from isthmus, with a broad free fold across. Gill rakers short and finely spinous, the longest about one-third length of longest gill filaments. Anterior nostril in front of centre of eye (as viewed from side), a little more than half way to groove at edge of upper lip, with a slight rim anteriorly and a triangular posterior flap with a small ovate flap at its tip (not present on right side); nasal flap of left side nearly reaching edge of posterior nostril when laid back; posterior nostril dorsoposterior to anterior nostril, ovate, with a prominent fleshy rim; internarial distance about 1.5 times posterior nostril diameter. Pores of cephalic sensory system small, six in a row from front of snout, above nostrils (with a short branch between nostrils), to a pair of pores above middle of eyes; 15 pores in a row from behind dorsal part of eye to below anterior edge of orbit, some on ventral branches, continuing to two ventral branches leading to a cluster of pores above upper lip; 12 principal pores in preopercular-mandibular series from upper end of free margin of preopercle to a median pore on chin; scattered small pores on opercle and in occipital region.

Opercle with a single sharp spine at level of lower fourth of eye (when viewed from side); margin of subopercle with 12 tiny serrae dorsally and four slightly larger ones near ventral end (none on right side); preopercle broadly rounded, its free edge extending from a level slightly dorsal to lower edge of orbit to below posterior third of eye.

Scales present on body and on head except snout, occiput, and ventrally; scales finely ctenoid on body, including abdomen and prepelvic area; scales dorsally on opercle finely ctenoid, becoming cycloid and progressively smaller; scales dorsally on preopercle small and finely ctenoid, becoming smaller and cycloid on rest of cheek, and nonimbricate ventrally; no scales on dorsal, anal, or pelvic fins; small scales basally on pectoral fins at most one-third distance to margin; progressively smaller scales extending out on caudal fin about three-fourths length of fin (though many outer scales missing); lateral line broadly arched over pectoral fin, then gradually declining to straight midlateral portion on about posterior third of body.

Origin of dorsal fin over second lateral-line scale, the predorsal length 3.85 in SL; first dorsal spine very short, 13.5 in head length; fourth dorsal spine longest, 3.7 in head length; fifth dorsal spine 4.95 in head length; membrane between fifth dorsal spine and first soft ray attached one-third of fifth spine length above base of ray; nineteenth dorsal soft ray longest, 1.65 in head length; origin of anal fin below base of fifth dorsal soft ray, the preanal length 2.25 in SL; anal spine 5.95 in head length; fifteenth anal soft ray longest, 2.15 in head length; upper half of caudal fin truncate except for a slender posterior upper lobe mainly from third branched ray, the fin length 5.0 in SL; pectoral fins rounded when spread, the ninth and tenth rays longest, 5.6 in SL; origin of pelvic fins below base of opercular spine, the prepelvic length 4.3 in SL; pelvic spine slender, 3.45 in head length; pelvic fins just reaching anus, the fourth soft pelvic ray longest, 5.05 in SL.

Colour in alcohol: upper third of body greyish-brown with six large, quadrangular, dark brown spots, progressively shorter posteriorly; lower two-thirds of body whitish with a second series of quadrangular dark brown spots in approximate alignment with dorsal series; scattered black dots along side of body, some in whitish stripe separating two series of spots, but most in upper part of lower series of spots; head grey-brown with a black line passing ventroposteriorly from below eye across cheek, ending in a small black spot; opercle with scattered black dots; side of upper lip with a broad dark brown cross band; front of lower lip and adjacent chin with a U-shaped dark brown mark (when viewed from front); no black spots ventrally on head; dorsal and anal fins with yellowish rays and translucent membranes; spinous portion of dorsal fin with a large black spot at base of middle three membranes, larger and more heavily pigmented on third and fourth membranes; soft portion of dorsal fin with a row of small grey spots, one per membrane, in an increasingly higher position posteriorly, the first near base of fin and the last near distal end; anal fin with a basal row of grey spots, one per membrane, the margin purplish grey; caudal fin with two broad blackish stripes in alignment with two series of large dark spots on body, the stripes containing longitudinal rows of black dots; paired fins pale yellowish, the pelvics with a narrow dark streak along the third and fourth rays.

Colour in life as shown by the underwater photographs of Figs. 4 and 5.

Table 2. Gill-raker counts of *Parapercis diagonalis*, *P. maculata*, *P. pulchella* and *P. vittafrons*

<i>Parapercis</i> species	12	13	14	15	16	17	18
<i>P. diagonalis</i>					1	2	1
<i>P. maculata</i>		2	5	2	1		
<i>P. pulchella</i>	2	3	6				
<i>P. vittafrons</i>		1	2	1			

Etymology. – This species is named *Parapercis diagonalis* from the Latin, in reference to the diagonal black line on the cheek.

Remarks. – The holotype of *P. diagonalis* was collected by the author in the nearly enclosed bay of Gilimanuk at the west end of Bali at a depth of 3 m on a silty sand substratum. The fish was using a piece of partially buried plastic tubing as a refuge. No other individuals were observed in the bay. The specimen has a well-developed testis, but a small strip of ovarian tissue was also found, indicating the fish had nearly completed sex change from female to male.

Two other lots of small Indonesian specimens are identified as *P. diagonalis* but not designated as paratypes: BPBM 40588, 2: 23–59 mm, Bali, southeast side, Nusa Dua, calm section of reef flat at low tide (where algae is cultured), 0.5–1 m, rotenone, J. E. Randall and U. Lohmeyer, 10 Nov.1982 (Fig. 6); and BPBM 36657, 57 mm, Lesser Sunda Islands, Solor, sand, 11 m, hand net, J. L. Earle, 4 Nov.1990 (Fig. 7). The specimens differ meristically from the holotype of *P. diagonalis* in having 17 pectoral rays and 6-7 + 10-11 gill rakers. These counts, combined with those of the holotype, are within the expected range of variation for a species of *Parapercis*. The principal reason for not designating the two

specimens as paratypes is the difference in colour, which can be seen by comparing Figs. 4 and 5 with Figs. 6 and 7. The variation in colour is probably due to their much smaller size. The holotype has ctenoid prepelvic scales, in contrast to cycloid scales on the two small specimens, but this also is probably related to the different size of the specimens.

Parapercis diagonalis is most similar to *P. maculata* Bloch & Schneider, type locality Tranquebar, India, and *P. pulchella* (Temminck & Schlegel), type locality, Nagasaki, Japan. These three species have V,21 dorsal rays, I,17 anal soft rays, 16 or 17 pectoral rays, and 57 or 58 lateral-line scales. They usually have three pairs of canine teeth anteriorly in the lower jaw (Cantwell's revision of *Parapercis* gave a count of four pairs, but this is an unusual number for these species). Other shared characters are the lack of palatine teeth, a chevron- or broadly triangular-shaped patch of sharp conical teeth in two to four rows on the vomer, small cycloid scales on the cheek, fourth dorsal spine longest, ventral half of caudal fin slightly rounded, the dorsal half truncate with a pointed upper lobe, and similarity in colour pattern.

Parapercis diagonalis differs from *P. maculata* and *P. pulchella* in its higher average gill-raker count (Table 2), and in having shorter pectoral fins. The pectoral fins of the 128-



Fig. 4. Underwater photograph of holotype of *P. diagonalis*, BPBM 38811, 128 mm, Bali, Indonesia.



Fig. 6. Nontype of *P. diagonalis*, BPBM 40588, 59 mm, Bali.



Fig. 5. Another underwater view of holotype of *P. diagonalis*, BPBM 38811, 128 mm, Bali, Indonesia.



Fig. 7. Nontype of *P. diagonalis*, BPBM 36657, 57 mm, Solor, Indonesia.

mm holotype of *P. diagonalis* measure 17.8% SL, compared to 18.6–21.0% SL for five specimens of *P. maculata* and six of *P. pulchella* over the range of 98–131 mm SL. Also there are colour differences, as may be seen by comparing Figs. 4–7 of *P. diagonalis* with Figs. 10–12 of *P. maculata* and Figs. 14 and 15 of *P. pulchella*. Specimens of *P. maculata* and *P. pulchella* that were examined for this study are listed in the account below of *P. maculata*.

***Parapercis flavolineata*, new species**

(Figs. 8, 9; Table 1)

Material examined. – Holotype – BPBM 38810, male, 85 mm, Indonesia, Sulawesi, off Manado, sand and rubble next to wreck of Dutch ship, 34 m, spear, J. E. Randall, 6 Oct.2000.

Diagnosis. – Dorsal rays V,21; anal rays I,17; pectoral rays 17 (15 on right side); lateral-line scales 55; gill rakers 4 + 10; lower jaw projecting; three pairs of canine teeth anteriorly in jaws; no palatine teeth; vomerine teeth in a chevron-shaped patch of two rows, the anterior teeth stout and conical; margin of preopercle not serrate; greatest body depth 4.45 in SL; head length 3.1 in SL; orbit diameter 4.2 in head length; fourth dorsal spine longest, 3.95 in head length; caudal fin truncate, becoming slightly rounded on ventral half; pectoral fins 5.05 in SL; pelvic fins just reaching anus, 3.95 in SL. Colour of body in life whitish to pinkish white, the edges of scales brown to reddish brown, with 10 brown bars containing dark brown scale edges on body, the first on nape, the odd-numbered bars narrower and more irregular, the last on caudal peduncle broadest; an irregular midlateral yellow line from edge of preopercle to caudal-fin base; dark bars below yellow line on body pink with dark red edges; head pink, becoming dark reddish dorsally on snout, with a narrow oblique orange bar below eye, and an arc of small dark brown spots from occiput to above opercle; lips pink, the upper with a large red blotch; median fins translucent pinkish-grey; soft portion of dorsal fin with rows of small reddish and white spots; anal fin white basally; central part of caudal fin with reddish dots; pectoral fins transparent with pale pink rays; pelvic fins white.

Description. – Dorsal rays V,21, all soft rays branched, the last to base; anal rays I,17; all soft rays branched, the last not to base; pectoral rays 17 (15 on right side), branched except uppermost; caudal rays 35, including 8-9 upper and lower procurent rays, the principal rays 15, all branched; lateral-line scales 55 (not including 3 pored scales on base of caudal fin); scales above lateral line to first dorsal soft ray 3.5; scales above lateral line to middle of dorsal fin 6; scales below lateral line to origin of anal fin 11; median predorsal scales 7; circumpeduncular scales 23; gill rakers 4 + 10; pseudobranchial filaments 15; branchiostegal rays 6; vertebrae 10 + 20.

Greatest body depth 5.0 in SL; body depth at origin of anal fin 5.2 in SL; body slightly compressed anteriorly, the width 6.05 in SL; head length 3.25 in SL; ventral part of head and chest nearly flat; snout moderately long, 3.2 in head length;

eye moderately large, the orbit diameter 3.8 in head length; interorbital space slightly concave, the least width 6.85 in head length; caudal-peduncle depth 3.35 in head length; caudal-peduncle length 3.2 in head length.

Mouth large, the maxilla just reaching a vertical through centre of eye, the upper-jaw length 2.35 in head length; mouth oblique, forming an angle of about 25° to horizontal axis of body, the lower jaw projecting; front of upper jaw with three incurved canine teeth on each side, the middle ones twice as large as medial teeth, the lateral teeth larger than medial; a short gap following three anterior canines, then a row of five curved canines, the fifth nearly as large as middle canine at front of jaw, and 15 slender conical teeth to end of jaw; a broad band of villiform teeth medial to canines at front of jaw; front of lower jaw with three incurved canine teeth on each side, the third much the largest; a broad dense band of villiform teeth medial to anterior canines; side of jaw with an anterior row of seven conical teeth, the fourth to seventh progressively larger, the seventh strongly recurved and nearly as large as largest anterior canine; a row of 10 slender conical teeth following curved canine to end of jaw; vomer with a broad narrow triangular patch of nodular teeth in three to four irregular rows medially, the eight teeth in anterior row largest, especially the medial ones; no palatine teeth; lips smooth, their inner surface with large fleshy papillae that interdigitate with anterior teeth; tongue slightly tapering, the broadly rounded anterior end reaching vomerine teeth.

Gill membranes free from isthmus, with a broad free fold across. Gill rakers short and finely spinous, the longest at angle about one-half length of longest gill filaments. Anterior nostril in front of centre of eye (as viewed from side), a little more than half way to groove at edge of upper lip, with a slight rim anteriorly and a pointed posterior flap that nearly reaches posterior nostril when laid back; posterior nostril dorsoposterior to anterior nostril, oval, with a well-developed rim. Pores of cephalic sensory system small, five in a row from front of snout, above nostrils (with a short branch between nostrils), to a pore in interorbital space above front of pupil; two median pores posteriorly in interorbital space; 13 pores in series from behind dorsal part of eye to a point ventroposterior to anterior nostril, plus two ventral branches, each leading to a pore above upper lip; 12 pores in preopercular-mandibular series beginning at upper end of preopercular margin; a series of pores in irregular rows passing from posteriorly on occiput to upper edge of opercle, joining anteriorly with a vertical series of three pairs of pores extending above upper end of preopercular margin.

Opercle with a single sharp spine at level of ventral edge of pupil (when viewed from side); seven small serrae on protruding upper part of subopercular margin; preopercle broadly rounded, its free edge extending from level of lower edge of eye to below posterior end of pupil and slightly ventroposterior to end of maxilla; margin of preopercle broadly scalloped, the indentations at pore locations; no serrate on preopercular margin (four well-separated, tiny nodules detected on one side); protruding dorsal margin

of subopercle with nine very small, close-spaced, serrae, diminishing in size ventrally.

Scales on body finely ctenoid, becoming cycloid anterior to a line from base of fourth dorsal spine to opercular flap; scales on prepectoral area mainly cycloid, those on prepelvic area and ventrally on anterior part of abdomen cycloid; scales on opercle cycloid except those above spine; scales on cheek small, cycloid, some posteriorly and ventrally nonimbricate; no scales on dorsal, anal, or pelvic fins; small scales in three rows on basal part of pectoral fins; progressively smaller scales extending out on caudal fin about three-fourths length of fin; lateral line broadly arched over pectoral fin, then gradually declining to straight midlateral part on about posterior third of body.

Origin of dorsal fin over second lateral-line scale, the predorsal length 3.5 in SL; first dorsal spine short, 8.1 in head length; fourth dorsal spine longest, 3.3 in head length; fifth dorsal spine 4.35 in head length; membrane between fifth dorsal spine and first soft ray attached one-half of fifth spine length above base of ray; penultimate dorsal soft ray longest, 2.05 in head length; origin of anal fin below base of third dorsal soft ray, the preanal length 2.15 in SL; anal spine 6.7 in head length; penultimate anal soft ray longest, 2.35 in head length; caudal fin emarginate, the upper lobe longer than lower, the caudal concavity 7.7 in head length; pectoral fins rounded when spread, the ninth ray longest, 5.05 in SL; origin of pelvic fins below middle of opercular spine, the prepelvic length 3.85 in SL; pelvic spine slender, 3.95 in head length; pelvic fins reaching base of first anal soft ray, the fourth soft pelvic ray longest, 3.95 in SL.

Colour in alcohol pale yellowish with 10 faint dark bars on about upper half of body, most apparent from dark edges of scales within bars; first dark bar on nape; third, fifth, seventh, and ninth bars narrower and more irregular than adjacent bars; tenth bar on caudal peduncle broadest; a narrow curving brown band containing dark brown spots following series of sensory pores posteriorly on occiput to above opercle and extending anteriorly to behind middle of eye; dorsal and anal fins with yellowish rays and translucent membranes, the dorsal with two longitudinal rows of small brown spots, generally one per membrane (with a few on rays), one row near base of fin, and the other submarginal; caudal and paired fins pale yellowish, the caudal with faint narrow vertical bands in outer central part of fin, and a group of about 10 dark dots centrally in lower half of fin.

Colour in life as in Fig. 8 (holotype) and Fig. 9 (fish not collected).

Etymology. – This species is named *Parapercis flavolineata* from the Latin for the midlateral yellow line on the body.

Remarks. – The holotype was collected in 34 m from sand and rubble adjacent to the wreck of a Dutch ship off Manado at the north end of Sulawesi. A larger fish of the same species was photographed (Fig. 9) on the deck of the wreck.

Parapercis flavolineata shares the characters of three pairs of canine teeth anteriorly in the lower jaw, no palatine teeth, counts of V,21 dorsal rays; I,17 anal rays; 15–17 pectoral rays; and within one count of 55 lateral-line scales with the following species: *P. albipinna* Randall, *P. flavolabiata* Johnson, *P. multiplicata* Randall, *P. punctulata* (Cuvier), *P. schauinslandii* (Steindachner), *P. signata* Randall, and *P. xanthozona* (Bleeker). Only one of these, *P. schauinslandii*, has an emarginate caudal fin as an adult with both the upper and lower lobes pointed. This species also has similar proportional measurements to *P. flavolineata*, the fourth dorsal spine usually longest, the pelvic fins reaching slightly posterior to the origin of the anal fin, and it is the most similar in colour, having large, quadrangular, red to brown spots on the back. It differs in having 56–59 lateral-line scales (55 for *P. flavolineata*), the vomerine teeth more conical, the membrane from the fifth dorsal spine attached nearly to the base of the first dorsal soft ray, and in having two series of spots on the body not in vertical alignment.

Parapercis schauinslandii ranges from the Hawaiian Islands (type locality) and Pitcairn Islands to the east coast of Africa; in the western Pacific from southern Japan to the Great Barrier Reef and New Caledonia. It varies in life colour with locality and may eventually be treated as a complex of similar species.

Comparative material of *Parapercis schauinslandii*.

– **Hawaiian Islands**, Moloka'i, BPBM 28618, 2: 37–51 mm. Maui, BPBM 32845, 4: 35–78 mm. O'ahu, BPBM 7313, 14: 41–78 mm; BPBM 23914, 68 mm; BPBM 23937, 3: 33–68 mm; BPBM 33452, 58 mm. Midway, BPBM 34778, 51 mm. **Pitcairn Island**, BPBM 16453, 71 mm. **Marquesas Islands**,



Fig. 8. Holotype of *P. flavolineata*, BPBM 38810, 85 mm, Manado, Sulawesi.



Fig. 9. Underwater photograph of *Parapercis flavolineata*, Manado, Sulawesi.

Fatu Hiva, BPBM 11832, 7: 33–73 mm; BPBM 37172, 45 mm. Nuku Hiva, BPBM 12828, 4: 13–77 mm; BPBM 38505, 2: 57–68 mm. **Society Islands**, Tahiti, BPBM 8349, 6: 45–61 mm. Moorea, BPBM 8322, 64 mm; BPBM 35739, 3: 43–61 mm. Huahine, BPBM 11525, 2: 49 mm. **Line Islands**, Kiritimati (Christmas Island), BPBM 31950, 2: 34–41 mm; BPBM 37590, 3: 42–80 mm. **American Samoa**, Tutuila, BPBM 24127, 6: 38–77 mm. **New Caledonia**, BPBM 19901, 64 mm. **Coral Sea**, Chesterfield Islands, BPBM 33649, 2: 65–67 mm. Osprey Reef, BPBM 31747, 2: 43–71 mm. **The Philippines**, Luzon, BPBM 22229, 16: 27–48 mm; BPBM 22466, 17: 29–56 mm; BPBM 28470, 14: 24–72 mm. Cebu, BPBM 22179, 54 mm. Negros, BPBM 28551, 4: 25–93 mm. **Papua New Guinea**, Madang Province, BPBM 32611, 2: 45–54 mm. D'Entrecasteaux Islands, BPBM 36949, 2: 58–68 mm. **Indonesia**, Bali, BPBM 31556, 73 mm; BPBM 32245, 3: 29–62 mm. **Western Australia**, Rowley Shoals, BPBM 32019, 3: 48–63 mm. **Maldives**, North Malé Atoll, BPBM 27209, 41 mm; BPBM 34742, 48 mm. Ari Atoll, BPBM 32867, 38 mm. **Seychelles**, Alphonse Atoll, BPBM 35610, 5: 44–92 mm. **Kenya**, Shimoni, BPBM 27255, 2: 55–88 mm.

***Parapercis maculata* (Bloch & Schneider)**

(Figs. 10–12; Tables 1, 2)

Percis maculata Bloch & Schneider, 1801: 179, Pl. 38 (type locality, Tranquebar, India).

Percis pulchella non Temminck & Schlegel, Day, 1878: 263, Pl. 58, Fig. 2 (figure from Madras).

Parapercis pulchella (Temminck & Schlegel), in part, Cantwell, 1964: 265 (Zanzibar).

Material examined. – **India**, Tuticorin, BPBM 20453, 121 mm (neotype); BPBM 40663, 4: 106–116 mm. **Sri Lanka**, Hikkaduwa, BPBM 27177, 70 mm. **Oman**, Musandam, BPBM 34459, 84 mm. **Madagascar**, Baie d'Ambodi-Vahibe, WAM P.32849.003, 2: 63–70 mm.

Neotype. – BPBM 20453, 121 mm, India, southwest coast, Tuticorin, from fisherman, J. E. Randall and K. Rama Rao, 1 Mar.1975.

Diagnosis. – Dorsal rays V,21; anal rays I,17; pectoral rays 16 or 17; lateral-line scales 57–58; gill rakers 4–6 + 8–10; lower jaw projecting; three pairs of canine teeth anteriorly in jaws; no palatine teeth; teeth on vomer in a narrow chevron-shaped patch of three to four rows; greatest body depth 5.05–6.00 in SL; head length 3.5–3.9 in SL; orbit diameter 3.6–4.4 in head length; posterior margin of preopercle with widely spaced, small, blunt serrae; scales on opercle ctenoid; scales on cheek weakly ctenoid dorsally, becoming cycloid, progressively smaller, and nonimbricate ventrally; fourth dorsal spine longest, 3.1–3.8 in head length; caudal fin emarginate on dorsal half, usually with a protruding upper lobe, and rounded on ventral half; pectoral fins 5.1–5.4 in SL; pelvic fins just reaching anus; body when fresh light brown dorsally, the scale centres whitish, with six irregular, semicircular brown blotches along back that link narrowly to large dark brown spots on about lower two-thirds of body, the spots vertically elongate anteriorly, horizontally elongate

and darker posteriorly; head orangish brown with small dark brown spots dorsally on snout and nape, and seven narrow bluish white bars (three on opercle and preopercle, and four radiating from ventral and anterior part of eye); dorsal and anal fins translucent whitish, the spinous dorsal with a large black basal spot mainly between the third and fifth spines; soft dorsal fin with rows of round orange spots, and the anal with small irregular white spots; about lower third of caudal fin dark brown with small whitish spots along rays, the rest of fin light grey with small white and orange spots along rays. Largest specimen examined, the neotype, 121 mm.

Description of neotype. – Dorsal rays V,21; anal rays I,17; all dorsal and anal rays branched, the last to base; pectoral rays 17, branched except uppermost; caudal rays 34, including 8 upper and lower procurent rays, the principal rays 15, all branched; lateral-line scales 57 (4 on base of caudal fin not included); scales above lateral line to first dorsal soft ray 4; scales above lateral line to middle of dorsal fin 5.5; scales below lateral line to origin of anal fin 14.5; median predorsal scales 8; circumpeduncular scales 30; gill rakers 4 + 10; pseudobranchial filaments damaged (16 on 84-mm specimen); branchiostegal rays 6; vertebrae 10 + 20.

Greatest body depth 5.05 in SL; body depth at origin of anal fin 5.25 in SL; body slightly compressed anteriorly, the width 1.35 in maximum depth; head length 3.9 in SL; ventral part of head, chest, and abdomen very slightly convex; snout length 3.0 in head length; dorsal profile of snout forming an angle of about 40° to horizontal axis of body; orbit diameter 3.9 in head length; interorbital space slightly concave, the least width 6.4 in head length; caudal-peduncle depth 2.75 in head length; caudal-peduncle length 2.55 in head length.

Mouth large, the maxilla nearly reaching a vertical through centre of eye, the upper-jaw length 2.35 in head length; mouth oblique, forming an angle of about 20° to horizontal axis of body, the lower jaw projecting; front of upper jaw with three incurved canine teeth on each side, the medial ones largest, followed by a gap (where largest canine of lower jaw fits when mouth closed), then three curved canines, the first larger than those of front of jaw, followed by a row of 13 slender conical teeth that are slightly incurved; front of lower jaw with three incurved canine teeth on each side, the third much the largest; side of jaw with an anterior row of five strongly recurved canine teeth, the fourth and fifth largest, followed by a row of 11 slender conical teeth; front of jaws with a broad band of villiform teeth medial to anterior canines, narrowing to a single row posteriorly; vomer with a chevron-shaped patch of small incurved conical teeth in three to four rows, with 14 teeth in the anterior row; no palatine teeth; lips smooth, their inner surface with large fleshy papillae that interdigitate with anterior teeth; tongue tapering to a rounded tip that just reaches median vomerine teeth.

Gill membranes free from isthmus, with a broad free fold across. Gill rakers short and finely spinous, the longest about one-third length of longest gill filaments. Anterior

nostril in front of centre of eye (as viewed from side) a little more than half way to groove at edge of upper lip, with a slight rim anteriorly and a slender posterior flap that reaches posterior-nostril rim; posterior nostril dorsoposterior to anterior nostril, the internarial distance about 1.5 times posterior-nostril diameter. Pores of cephalic sensory system small, six in a row from front of snout, above nostrils (with a short branch between nostrils), to a pair of pores above middle of eye; 15 pores in a row from behind dorsal part of eye to below anterior edge of orbit, some on ventral branches, continuing to two ventral branches that lead to a cluster of pores above upper lip; 20 pores in preopercular-mandibular series; scattered small pores on opercle and in occipital region.

Opercle with a single sharp spine at level of lower fourth of eye (when viewed from side); margin of subopercle with 12 tiny serrae dorsally and four slightly larger ones near ventral end (none on other side); preopercle broadly rounded, its free edge extending from just above level of lower edge of orbit to below posterior third of eye, the posterior margin with nine widely spaced, blunt serrae.

Scales present on body and on head except snout, occiput, and ventrally; scales finely ctenoid on body, including abdomen and prepelvic area; scales dorsally on opercle finely ctenoid, becoming cycloid and progressively smaller ventrally on cheek; no scales on dorsal, anal, or pelvic fins; small scales basally on pectoral fins at most one-third distance to margin; progressively smaller scales extending out on caudal fin about three-fourths length of fin (though many outer scales missing); lateral line broadly arched over pectoral fin, then gradually declining to straight midlateral portion on about posterior third of body.

Origin of dorsal fin over second lateral-line scale, the predorsal length 3.85 in SL; first dorsal spine very short, 13.5 in head length; fourth dorsal spine longest, 3.7 in head length; fifth dorsal spine 4.95 in head length; membrane between fifth dorsal spine and first soft ray attached nearly one-half fifth spine length above base of ray; nineteenth dorsal soft ray longest, 1.65 in head length; origin of anal fin below base of fifth dorsal soft ray, the preanal length 2.25 in SL; anal spine 5.95 in head length; fifteenth anal soft rays longest, 2.15 in head length; upper half of caudal fin truncate except for a slender posterior upper lobe from the second to fourth branched rays (third ray longest), 5.0 in SL; pectoral fins rounded when spread, the ninth and tenth rays longest, 5.6 in SL; origin of pelvic fins below base of opercular spine, the prepelvic length 4.3 in SL; pelvic spine slender, 3.45 in head length; pelvic fins just reaching anus, the fourth soft pelvic ray longest, 5.05 in SL.

Colour of neotype in alcohol light brown, paler ventrally, with six hourglass-shaped brown bars on body that are darker ventrally and posteriorly; an indistinct broad brown bar from nape to dorsal part of opercle; another containing a few small dark brown spots from behind eye to ventral part of cheek behind maxilla; naked part of posterior interorbital and occiput with three pairs of very small dark brown spots;

indistinct small dark blotches dorsally on snout and anteriorly on upper lip; spinous portion of dorsal fin with a large basal black spot on second to fourth membranes; soft portion of dorsal fin translucent with rows of faint dusky spots in outer part of fin, the spots in distal rows small and faint; anal fin pale yellowish, the membranes translucent; caudal fin with a broad dark brown band covering ventral four branched rays and adjacent membranes; rest of fin pale yellowish with a row of very small dusky spots on each ray; paired fins pale yellowish, the pectorals with a faint dark bar at base.

Colour of neotype when fresh shown in Fig. 10. The photograph of Fig. 11 was taken of a specimen from Sri Lanka, and Fig. 12 is an underwater photograph taken in Madagascar. Randall (1995: 305, Fig. 861) illustrated the species from an underwater photograph taken at Musandam, Oman.

Remarks. – Bloch & Schneider (1801: 179, pl. 38) briefly described *Percis maculata* from Tranquebar on the southeast coast of India at 11° N, clearly a species of *Parapercis*.



Fig. 10. Neotype of *P. maculata*, BPBM 20453, 121 mm, Tuticorin, India.



Fig. 11. Specimen photograph of *P. maculata*, BPBM 27177, 70 mm, Hikkaduwa, Sri Lanka.



Fig. 12. Underwater photograph of *P. maculata*, Baie d'Ambodi-Vahibe, Madagascar (G.R. Allen).

No type specimen is extant (Eschmeyer, 1998: 988). Their illustration is poor, but it shows two longitudinal rows of six large black spots in vertical alignment, and a broad black lower part of the caudal fin; these are diagnostic features for *P. maculata*. Day (1876: 263, pl. 58, fig. 2) identified one of three species of *Parapercis* from India as *Percis pulchella* Temminck & Schlegel, but he placed *P. maculata* Bl. Schn. with a questionmark at the head of his synonymy.

The author and the late Kaza Rama Rao obtained five specimens of *Parapercis maculata* in 1975 from a fisherman at Tuticorin, 300 km in direct distance south of Tranquebar. The largest was photographed and is here designated as the neotype of *Parapercis maculata*. The sex could not be determined from examination of the viscera.

As mentioned, Cantwell (1964: 265) did not regard *Parapercis maculata* (Bloch & Schneider) as a valid name. He used *P. pulchella*, listing specimens examined from Zanzibar, Bali, Hong Kong, and Japan. Randall (1995: 305, Fig. 861) and Randall in Carpenter & Niem (2001: 3505) resurrected the name *P. maculata* and gave the distribution as southern Japan to the Persian Gulf. However, prominent black spots ventrally on the head of specimens of *P. maculata* from Japan, Taiwan, and Hong Kong are not found on *P. maculata* of the western Indian Ocean. There are three midventral black spots, the largest at tip of the lower jaw, followed by a close-set median pair of small elongate black spots on the gill membranes, and two pairs of black spots, the first larger than the spot at the tip of lower jaw and extending dorsally across the side of the lower lip. These black spots persist as brown spots even on old museum specimens.

The colour difference between Indian Ocean and Pacific specimens initiated a search for morphological differences. There is modal shift of one in gill-raker counts (Table 2), but more convincing is the larger size of the paired fins



Fig. 13. Underwater photograph of *P. pulchella*, Izu, Japan.



Fig. 14. Underwater photograph of *P. pulchella*, Hong Kong.

of northwestern Pacific specimens. Five Indian Ocean specimens, 109–121 mm SL, have pectoral fins 18.2–19.7% SL, compared to 20.2–21.0% SL for seven Pacific specimens, 99–128 mm SL. The same five Indian Ocean specimens have pelvic fins that range from 19.8–21.3% SL vs. 22.1–23.5% SL for the seven Pacific specimens. The name *Parapercis maculata* is here restricted to the fish examined from the western Indian Ocean, and *P. pulchella* for specimens from Japan, Taiwan, and Hong Kong. Differences in life colour are apparent from a comparison of Figs. 10–12 of *P. maculata* with Figs. 13–14 of *P. pulchella*.

Comparative material of *Parapercis pulchella*. – Japan, Wakanura, SU 7011, 119 mm. Idzu Sea, SU 23862, 67 mm. Nagasaki, SU 7062, 6: 81–160 mm. Taiwan, Yeh Liu, BPBM 23112. Tashi market, CAS 224523, 104 mm. Formosa Banks, CAS 15247, 127 mm; CAS 15900, 116 mm. China, Hong Kong, SU 28006, 97 mm; SU 30239, 134 mm.

Parapercis shaoi, new species

(Fig. 15; Table 3)

Parapercis somaliensis (non Schultz) Masuda et al., 1975: pl. 81 K; Masuda et al., 1984: 291, Pl. 261 B (southern Japan).

Parapercis somaliensis (non Schultz) Shao & Ho, 1991: 132 (Taiwan).

Parapercis somaliensis (non Schultz) Shen, 1993: 489, Pl. 164, Fig. 9 (Taiwan).

Material examined. – Holotype – ASIZP 65966, male, 126 mm, Taiwan, I-Lan County, off Nanfangao, 24.5818°N 121.8668°E, maximum 400 m, commercial bottom trawl, P.-F. Lee, 8 Mar.2005.

Paratypes. – BSKU 91321, 153 mm, Japan, Kagoshima Prefecture, Amami Oshima, Koniya, Setouchi, fish market, T. Yamakawa, Dec.1968; BPBM 40667, 138 mm, Taiwan, Pingtung County, off Hengchun, no depth data, commercial bottom trawl, K.-T. Shao, 26 May 1975; BMNH 2007.9.13.1, 123 mm, Taiwan, Pingtung County, off Donggang, no depth data, 22.47°N 120.43°E, commercial bottom trawl, K.-T. Shao, 10 Sep.1980; USNM 391495, 139 mm, same locality as preceding, no depth data, P.-L. Lin, 5 Jul.1993; ASIZP 66064, 147 mm, Taiwan, Taitung County, off Chenggong, 23.1°N 121.37°E, 80–150 m, commercial longline, P.-F. Lee, 9 Mar.2005.

Diagnosis. – Dorsal rays V,21; anal rays I,17; pectoral rays 16–18 (nearly all with 17); lower jaw slightly projecting; three pairs of incurved canine teeth anteriorly in lower jaw, the most lateral largest; no palatine teeth; vomer with a row of stout conical teeth, followed by a row of very small teeth; scales on body ctenoid, becoming cycloid on nape, ventrally on abdomen, and prepelvic area; scales on cheek cycloid, small, progressively smaller and a few nonimbricate ventrally; margin of preopercle without distinct sharp serrae; greatest body depth 4.7–5.1 in SL; head length 3.2–3.3 in SL; snout length 3.0–3.2 in head length; orbit diameter 3.7–4.05 in head length; interorbital width 6.25–7.35 in head length; fourth dorsal spine longest, 3.85–4.5 in head length; caudal fin slightly rounded without a distinct posterior prolongation centred on third branched ray; pectoral fins 3.85–4.50 in SL;

pelvic fins reaching origin of anal fin, 4.35–4.85 in SL; body red dorsally when fresh, white ventrally, with nine brown bars on upper third, darkest on edges, especially ventrally; orange-red bars on ventral two-thirds in alignment with dorsal dark bars; head light red with a large curved red band extending ventrally from eye; snout with a dark orangish band along edge of upper lip; fins without dark markings except a dark spot at base of dorsal soft rays.

Description. – Dorsal rays V,21; anal rays I,17; all dorsal and anal rays branched, the last to base; pectoral rays 17 (holotype with 18 on one side; paratypes with 17, except one with 16); all pectoral rays branched except uppermost; caudal rays 35 (including small procurrent rays), the principal rays 15, all branched; lateral-line scales 52 (52–53), plus 5–7 small pored scales on caudal-fin base; scales above lateral line to middle of dorsal fin 6.5; scales below lateral line to origin of anal fin 15; median predorsal scales 8 (8–9; circumpeduncular scales 25; gill rakers 5 + 11 (5–7 + 10–12); pseudobranchial filaments 21(21–23); branchiostegal rays 6; vertebrae 10 + 20.

Greatest body depth 5.10 (4.70–4.95) in SL; body depth at origin of anal fin 5.30 (4.95–5.3) in SL; body nearly cylindrical anteriorly, the width 5.15 (5.00–6.60) in SL; head length 3.3 (3.2–3.3) in SL; ventral part of head, chest, and abdomen slightly convex; snout length 3.0 (3.0–3.2) in head length; orbit diameter 3.80 (3.70–4.05) in head length; interorbital space slightly concave, the least width 7.15 (6.25–7.35) in head length; caudal-peduncle depth 3.0 (3.0–3.3) in head length; caudal-peduncle length 3.60 (3.40–3.85) in head length.

Mouth large, the maxilla nearly reaching a vertical through centre of eye, the upper-jaw length 2.25 (2.20–2.30) in head length; mouth slightly oblique, forming an angle of about 15° to horizontal axis of body, the lower jaw slightly projecting; anterior half of upper jaw with 15 teeth in outer row on each side, the anterior teeth as strongly incurved canines, the first largest on one side on holotype and the second on other (canine teeth variously enlarged on paratypes); teeth in outer row on posterior half of jaw about half as large as anterior teeth, diminishing slightly in size posteriorly; a broad band of villiform teeth medial to canines at front of upper jaw, gradually narrowing posteriorly to a single row; front of lower jaw with three progressively larger, incurved canine teeth on each side, the third as large as largest anterior canine of upper jaw; a dense band of villiform teeth medial to anterior canines, ending medially in a row of increasingly longer teeth to a large strongly recurved canine half way back in jaw, followed by 11 lesser incurved conical teeth; vomer with a row of four stout conical teeth in a broad chevron shape (some missing in holotype, up to seven stout teeth in paratypes), followed by a single row of very small teeth; no palatine teeth; lips smooth, their inner surface with large fleshy papillae that interdigitate with anterior teeth; tongue tapering to rounded tip that reaches vomerine teeth.

Gill membranes free from isthmus, with a broad free fold across. Gill rakers short and spinous, the longest about one-

third length of longest gill filaments. Anterior nostril in front of centre of eye (as viewed from side) half way to edge of upper lip, with a slight rim anteriorly, developing into a posterior flap nearly reaching posterior-nostril rim; posterior nostril dorsoposterior to anterior nostril, the internarial distance greater than nostril diameter, the aperture ovate. Pores of cephalic sensory system small, five in a row on each side from front of snout to midinterorbital space, including one between nostrils; posterior half of interorbital space with a median row of four small pores, the third as a double pore; 18 pores in a row from behind upper part of eye to below posterior nostril, including two large pores above side of upper lip (but counting only one pore for posterior or ventral branches), and 12 pores in preopercular-mandibular series from upper free edge of preopercle to front of chin (including midventral pore on chin, but not tiny pores associated with nodular serrae on preopercular margin).

Opercle with a single sharp spine at level of centre of eye (when viewed from side); posterior end of subopercle with eight very small, close-spaced serrae, and a few small obtuse ones ventrally; preopercle broadly rounded, its free edge extending from behind lower edge of pupil nearly to a vertical through centre of eye, the posterior margin with 11 well-spaced, small, obtuse bumps instead of serrae.

Scales finely ctenoid on body, becoming cycloid anterior to a line from base of fifth dorsal spine to opercular spine; scales on abdomen and prepelvic area cycloid; scales on prepectoral mostly weakly ctenoid, about half size of those on body, becoming cycloid and smaller posteriorly, extending still smaller onto base of pectoral fins; no scales on snout, interorbital or ventrally on head; scales on opercle and dorsally on subopercle mostly cycloid (the larger scales on opercle mainly ctenoid); scales on cheek cycloid and small, becoming progressively smaller ventrally, a few nonimbricate; no scales on dorsal, anal, or pelvic fins; progressively smaller scales extending out on caudal fin about two-third length of fin; lateral line broadly arched over pectoral fin, then gradually declining to straight midlateral portion on about posterior third of body.

Origin of dorsal fin over second lateral-line scale, the predorsal length 3.3 (3.1–3.45) in SL; first dorsal spine short, 11.8 (9.9–11.9) in head length; fourth dorsal spine longest, 3.90 (3.85–4.50) in head length; fifth dorsal spine 4.35 (4.70–5.65) in head length; membrane between fifth dorsal spine and first soft ray attached about one-half fifth spine length above base of ray; penultimate dorsal soft ray longest, 2.05 (1.95–2.20) in head length; origin of anal fin below base of fifth dorsal soft ray, the preanal length 2.05 (2.00–2.10) in SL; anal spine 5.55 (5.80–7.00) in head length; fifteenth (fourteenth or fifteenth) anal soft ray longest, 2.35 (2.30–2.50) in head length; caudal fin slightly rounded (two paratypes with a slightly prolonged third branched ray), the fin length 5.25 (4.40–5.15) in SL; pectoral fins moderately pointed, the ninth ray longest, 5.15 (4.90–5.20) in SL; origin of pelvic fins below base of opercular spine, the prepelvic length 3.80 (3.55–3.70) in SL; pelvic spine slender, 3.3 (3.2–3.7) in head length; pelvic fins reaching

Table 3. Proportional measurements of type specimens of *Parapercis shaoi* as percentages of the standard length.

	Holotype		Paratypes			
	ASIZP 65966	BMNH 07.9.13.1	BPBM 40667	USNM 391495	ASIZP 66064	BSKU 91321
Standard length (mm)	126.0	123.0	138.0	139.0	147.0	153.0
Greatest body depth	19.6	20.5	21.2	21.2	20.3	20.7
Body depth at A origin	18.8	18.8	19.7	19.8	20.2	19.3
Body width	19.4	18.1	20.1	18.7	19.8	15.1
Head length	30.6	30.8	30.5	31.6	30.7	30.5
Snout length	10.3	9.6	10.2	10.3	9.7	9.6
Orbit diameter	8.1	8.3	7.5	8.5	8.2	7.9
Cheek depth	5.4	4.9	5.3	5.4	5.4	4.6
Interorbital width	4.3	4.2	4.9	4.8	4.3	4.3
Upper-jaw length	13.5	13.4	13.8	13.8	13.7	13.4
Caudal-peduncle depth	10.3	9.0	10.1	9.6	9.8	9.2
Caudal-peduncle length	8.5	8.1	8.9	8.9	8.6	7.9
Predorsal length	30.6	29.8	31.4	31.4	30.8	29.0
Preanal length	48.5	49.7	49.8	48.8	49.6	48.1
Prepelvic length	26.4	26.9	27.0	28.1	28.0	26.9
Dorsal-fin base	61.2	60.4	62.5	60.3	62.0	62.3
First dorsal spine	2.6	2.8	broken	2.9	3.1	2.9
Fourth dorsal spine	7.9	7.3	7.9	7.3	6.8	7.5
Fifth dorsal spine	6.2	5.5	6.5	5.7	5.5	5.4
Longest dorsal ray	14.9	13.9	15.5	15.0	15.6	14.4
Anal-fin base	44.5	42.6	43.3	43.1	43.5	44.2
Anal spine	5.5	5.3	broken	5.0	4.4	5.1
Longest anal ray	12.9	12.4	13.2	12.9	12.9	13.3
Caudal-fin length	19.0	19.4	20.3	22.8	20.1	20.0
Pectoral-fin length	19.5	19.2	20.1	20.2	20.4	19.3
Pelvic-spine length	9.3	8.3	9.1	9.9	8.4	9.0
Pelvic-fin length	23.1	22.2	22.8	23.0	22.9	20.6

origin of anal fin, the fourth soft pelvic ray longest, 4.35 (4.35–4.85) in SL.

Colour of holotype in alcohol: pale grey dorsally, the edges of the scales a little darker, yellowish-white ventrally, with eight dark bars on upper one-third of body, mainly from dark brown pigment on scale edges, most pronounced ventrally; first dark bar on body below spinous portion of dorsal fin, and last on caudal peduncle; a small ninth dark bar dorsally



Fig. 15. Holotype of *Parapercis shaoi*, ASIZP 65966, 126 mm, Nanfangao, Taiwan (P-F. Lee).

on base of caudal fin; nape with an oblique dark bar of same level of pigmentation as first bar on body; a horizontally elongate dark brown spot above dorsal part of opercle; scaled part of opercle dusky, becoming darker anteriorly; snout and interorbital dusky; median fins with translucent grey membranes and yellowish rays, the soft portion of dorsal fin with a small dark spot at base of most rays; caudal fin with eight irregularly vertical, grey bands, the pigment mainly on membranes; paired fins pale yellowish, the pelvics dusky on about basal half of membranes.

Etymology. – This species is named *Parapercis shaoi* in honour of Kwang-Tsao Shao, my good friend and colleague of many years, who collected the first specimen from Taiwan in 1975.

Remarks. – The first specimen of *Parapercis shaoi* from Japan was obtained in a fish market in Amami Oshima by Takeshi Yamakawa in 1968, included here as the paratype of BSKU 91321 (formerly housed at Kochi City High School as KCHC 8910). Hiromitsu Endo of Kochi University determined from an angler's website that one fish from Amami Oshima was caught from rocky bottom in 160 m.

This species was apparently first recorded in the literature as *P. somaliensis* Schultz by Masuda et al. (1975: 259, Pl. 81 K) from "Southwest Kii peninsula, Ryukyu Is." It was reported as "Rare, caught by hand line from fairly deep water." No specimens from Masuda et al. (1975) have been located.

The holotype from Taiwan was taken by bottom trawl from uncertain depth, but said not to exceed 400 m. The paratype of ASIZP 66064 was caught by longline in 80–150 m.

Difficulty was experienced in determining the sex of the type specimens, but not for the lack of adequate preservation. The holotype was found to be male from examination of the very small gonad.

A sample of muscle tissue was taken from the back of the holotype and the paratype of ASIZP 66064 when fresh; these samples are in the tissue collection of Academia Sinica, Taipei.

Parapercis shaoi is closely related to *P. somaliensis*, sharing the same fin-ray and scale counts, dentition, scale morphology, and a similar colour pattern. It differs from *P. somaliensis* in lacking a strongly serrate preopercle and a posteriorly protruding lobe to the upper part of the caudal fin, having a smaller eye (7.5–8.5% SL, compared to 8.3–9.4% SL for *P. somaliensis*), a broader interorbital space (4.2–4.9% SL, compared to 3.3–4.3%), and in colour. Compare Fig. 2 and the figure from Khalaf & Disi (1997: 176) of *P. somaliensis* with Fig. 15 of *P. shaoi*.

Parapercis shaoi is also very similar to *P. albipinna*, described above from one specimen from New Caledonia, differing in a having a more slender body, smaller head, longer snout, shorter dorsal spines, and longer pelvic fins (compare morphometrics of column 1 of Table 1 of *P. albipinna* with those of *P. shaoi* of Table 3). Differences in colour may be seen from a comparison of Figs. 1 and 15

Comparative material of *Parapercis somaliensis*. – Red Sea, Gulf of Aqaba, Eilat, BPBM 31813, 124 mm.

***Parapercis vittafrons*, new species**

(Fig. 16, Table 4)

Material examined. – Holotype – BPBM 39076, female, 81.0 mm, Papua New Guinea, New Britain, Matalau Beach (east of Rabaul), 4°11.295'S 152°12.213'E, silty sand with occasional small rock or debris, 19–22 m, spear, J. E. Randall, 9 Aug.2002.

Paratypes. – BPBM 40664, 59.5 mm; USNM 391130, 90 mm; WAM P.32895.001, 73.5 mm, all with same data as holotype.

Diagnosis. – Dorsal rays V,21; anal rays I,17; pectoral rays 17; lateral-line scales 57–58; gill rakers 4–6 + 8–10; lower jaw projecting; two or three pairs of canine teeth anteriorly in upper jaw, and three in lower; no palatine teeth; vomer with a narrow chevron-shaped patch of two irregular rows of small pointed incurved teeth; greatest body depth 4.90–5.25 in SL; head length 3.45–3.55 in SL; orbit diameter 3.65–4.05

in head length; scales on cheek small and cycloid (except a few ctenoid dorsally), progressively smaller, nonimbricate, and partially embedded ventrally; fourth dorsal spine longest, 3.4–4.25 in head length; caudal fin rounded ventrally, truncate dorsally, except for a protruding pointed posterior lobe formed mainly by second and third branched rays; pectoral fins 5.3–5.55 in SL; pelvic fins just reaching anus, 4.15–4.5 in SL; colour of body in life light brown dorsally with six U-shaped, dark brown bars, interrupted by a lateral pinkish white stripe from large roundish dark brown spots below; nape coloured like body; head whitish, the operculum with four close-set, dark-edged, orange bars; three blackish bands extending below and anterior to eye, the first two crossing upper lip; ventral part of head with blackish spots; spinous portion of dorsal fin orange-yellow with a large basal black spot, a white margin, and submarginal reddish line; blackish streaks extending into base of soft portion of dorsal fin above dark bars on back, with rows of small dark spots above; caudal fin with two broad blackish stripes; pectoral fins with a black bar at base, followed by a pale-edged brown spot; pelvic fins whitish. Largest specimen, 90 mm.

Description. – Dorsal rays V,21; anal rays I,17; all dorsal and anal rays branched, the last to base; pectoral rays 17, branched except uppermost; caudal rays about 35 (including small procurrent rays), the principal rays 15, all branched; lateral-line scales 57 (57–58), 3 or 4 progressively smaller pored scales on base of caudal fin; scales above lateral line to first dorsal soft ray 5; scales above lateral line to middle of dorsal fin 7.5; scales below lateral line to origin of anal fin 14.5; median predorsal scales 10 (9–10); circumpeduncular scales 26; gill rakers 5 + 9 (4–6 + 8–10); pseudobranchial filaments 11 (10–13); branchiostegal rays 6; vertebrae 10 + 20.

Greatest body depth 4.90 (5.00–5.25) in SL; body depth at origin of anal fin 3.45 (3.45–3.55) in SL; body moderately compressed anteriorly, the width 1.20 (1.10–1.15) in maximum depth; head length 3.45 (3.45–3.55) in SL; ventral part of head, chest, and abdomen slightly convex; snout length 3.45 (3.4–3.5) in head length; dorsal profile of snout forming an angle of about 40° to horizontal axis of body; orbit diameter 3.95 (3.65–4.05) in head length; interorbital space slightly concave, the least width 7.45 (7.30–7.90) in head length; caudal-peduncle depth 3.35 (3.10–3.40) in head length; caudal-peduncle length 3.3 (3.2–3.5) in head length.

Mouth large, the maxilla nearly reaching a vertical through centre of eye, the upper-jaw length 2.45 (2.30–2.40) in head length; mouth oblique, forming an angle of about 20° to horizontal axis of body, the lower jaw projecting; front of upper jaw with three (two or three) incurved canine teeth on each side, the medial ones largest, followed by three smaller teeth, then two or three recurved canines, and 14 small teeth to end of jaw; a broad band of villiform teeth medial to canines at front of upper jaw, narrowing posteriorly on side of jaw to a single medial row; front of lower jaw with three incurved canine teeth on each side, the third much the largest and most strongly recurved, followed by

Table 4. Proportional measurements of type specimens of *Parapercis vittafrons* as percentages of the standard length.

	Holotype BPBM 39076	BPBM 40664	Paratypes WAM P.32895	USNM 391130
Sex	female	female	female	female
Standard length (mm)	81.0	59.5	73.5	90.0
Greatest body depth	20.4	19.2	19.0	20.0
Body depth at A origin	18.7	18.4	17.8	18.9
Body width	16.8	16.7	16.6	17.1
Head length	29.0	29.1	28.0	28.4
Snout length	8.4	8.3	8.2	8.4
Orbit diameter	7.4	8.0	7.6	7.0
Cheek depth	3.8	3.8	4.0	3.9
Interorbital width	3.9	3.7	3.7	3.9
Upper-jaw length	11.8	12.0	12.2	12.3
Caudal-peduncle depth	8.7	8.6	9.1	8.9
Caudal-peduncle length	8.8	8.3	8.8	8.6
Predorsal length	28.3	28.2	28.5	27.4
Preanal length	47.8	48.2	48.4	48.5
Prepelvic length	23.4	24.8	24.4	24.1
Dorsal-fin base	65.4	62.1	62.5	63.5
First dorsal spine	2.2	1.8	1.8	1.3
Fourth dorsal spine	7.3	7.2	8.1	6.7
Fifth dorsal spine	5.0	5.1	5.4	4.5
Longest dorsal ray	13.7	13.6	16.8	14.4
Anal-fin base	45.6	42.6	47.0	44.1
Anal spine	4.9	5.3	4.7	4.6
Longest anal ray	11.4	11.7	13.5	12.2

a gap and four or five larger teeth half way back in jaw, a middle one largest and strongly recurved; rest of jaw with 14 slender conical teeth that incline posteriorly; a broad band of villiform teeth medial to anterior canines of lower jaw; vomer with a chevron-shaped patch of small incurved teeth in two irregular rows, the anterior row largest; no palatine teeth; lips smooth, their inner surface with large fleshy papillae that interdigitate with anterior teeth; tongue tapering to a rounded tip that extends slightly anterior to vomerine teeth.

Gill membranes free from isthmus, with a broad free fold across. Gill rakers short and finely spinous, the longest about one-fifth length of longest gill filaments. Anterior nostril a small membranous tubule in front of centre of eye (as viewed from side) about one-half way to groove at edge of upper lip, with a pointed posterior flap that reaches edge of posterior nostril when laid back; posterior nostril dorsoposterior to anterior nostril, ovate, with a prominent fleshy rim; internarial space slightly greater than greatest diameter of posterior nostril; two pairs of sensory pores in anterior half of interorbital space, leading anteriorly on each side to a large pore above posterior nostril, a small pore between nostrils, and one near front of snout; a single small median pore in posterior interorbital space; 11 pores in a row from behind dorsal part of eye to below nostrils,

including two just above upper lip at end of ventral branches; 13 pores in preopercular-mandibular series from upper end of preopercular margin to front of chin; scattered small pores dorsal to preopercle and opercle, and in occipital region.

Opercle with a single sharp spine at level of lower edge of orbit (when viewed from side); margin of subopercle with 0 (0–14) tiny adjacent serrae; preopercle broadly rounded, its free edge extending from behind lower edge of orbit to below posterior edge of pupil, with 2 (0–6) very small, usually blunt serrae.

Scales present on body and on head except occiput, snout, and ventrally; scales finely ctenoid on body, becoming cycloid ventrally on abdomen and prepelvic area; scales on opercle

Fig. 16. Underwater photograph of *P. vittafrons*, New Britain.

finely ctenoid; scales on cheek small and cycloid (except a few ctenoid dorsally), progressively smaller, nonimbricate, and partially embedded ventrally; no scales on dorsal, anal, or pelvic fins; small scales basally on about basal fifth of pectoral fins; progressively smaller scales extending out on caudal fin about two-thirds length of fin; lateral line broadly arched over pectoral fin, then gradually declining to straight midlateral portion on about posterior third of body.

Origin of dorsal fin over second to third lateral-line scale, the predorsal length 3.55 (3.50–3.65) in SL; first dorsal spine very short, 13.2 (15.6–21.9) in head length; fourth dorsal spine longest, 4.00 (3.40–4.25) in head length; fifth dorsal spine 5.8 (5.2–6.3) in head length; membrane between fifth dorsal spine and first soft ray attached one-third of fifth spine length above base of ray; nineteenth dorsal soft ray longest, 1.65 in head length; origin of anal fin below base of fifth to sixth dorsal soft rays, the preanal length 2.10 (2.05) in SL; anal spine 5.9 (5.2–6.3) in head length; twelfth anal soft ray longest (but adjacent rays subequal), 2.55 (2.10–2.50) in head length; caudal fin rounded ventrally, truncate dorsally, except for a protruding pointed posterior lobe formed by second and third branched rays, the total fin length 4.25 (4.00–4.45), the pointed lobe extending an eye diameter beyond middle caudal rays; pectoral fins rounded when spread, the tenth and eleventh rays longest, 4.25 (4.00–4.45) in SL; origin of pelvic fins below base of opercular spine, the prepelvic length 4.3 in SL; pelvic spine slender, 3.45 in head length; pelvic fins just reaching anus, the fourth soft pelvic ray longest, 4.50 (4.15–4.50) in SL.

Colour of holotype in alcohol: light yellowish brown dorsally, the edges of the scales darker than centres, shading to pale yellowish ventrally; a series of six faint, broadly U-shaped, brown bars on dorsal third of body; six approximately quadrangular, dark brown spots two scale rows below and in alignment with dorsal series of bars, except the first which is obliquely posterior and continues onto ventral part of abdomen; head whitish, the opercle largely covered with a brown bar; preopercle with three dark-edged orangish-brown bars that continue ventrally, the first below middle of eye and ending behind end of jaws; two blackish bands extending obliquely anteroventral from eye across upper lip, the anterior band partially interrupted at nostrils; three close-set pairs of dark brown spots across interorbital, and a pair of larger spots on occiput; tip of chin with a large black spot; side of lower lip with a black spot that continues ventrally across mandible; a pair of smaller black spots ventrally on mandibles below posterior end of jaws; another pair of black spots ventrally on gill membranes below posterior edge of preopercle; spinous portion of dorsal fin translucent dusky with a large black spot basally on third and fourth membranes; soft portion of dorsal fin translucent pale yellowish with a small black spot at base of every second or third ray, and two rows of small black spots beginning anteriorly in middle of fin and ending posteriorly in outer half of fin, the distal row smaller; anal fin translucent pale yellowish; caudal fin light grey, the rays with a row of small blackish spots or dashes, and two broad blackish stripes separated by a pale zone in middle of fin as broad as dark stripes (small spots

and dashes on rays darker within blackish stripes); paired fins pale yellowish, the pectorals with a broad blackish bar at base, the pelvics with a narrow blackish streak nearly as long as eye diameter near base of membrane between fourth and fifth rays.

Etymology. – This species is named *Parapercis vittafrons* from the Latin *vitta* referring to bands, and *frons* meaning face, in reference to the four dark brown bands that pass ventrally and anteriorly from the eye across the front of the head.

Remarks. – The author collected four small specimens of this species near Rabaul, New Britain in 2002 and photographed one underwater estimated to be 75 mm total length (Fig. 16). The fish were first identified as *P. maculata*, but reidentified as *P. pulchella* when noting the resemblance in colour to fish of this species from Hong Kong, Taiwan and Japan, in particular the prominent black spots ventrally on the head. Closer examination revealed differences in the pattern of the black spots and of the dark bands on the snout. The second pair of black spots ventrally on the head of *P. vittafrons* is much smaller, and there is no third posterior pair of elongate black spots on the gill membranes. *P. pulchella* has a dark band that crosses the snout from the front of the orbit; in *P. vittafrons* a band from the same point of the orbit crosses the upper lip, leaving the front of the lip pale; by contrast, the tip of the upper lip of *P. pulchella* is a black spot. Another colour difference that remains on preserved specimens of *P. vittafrons* is the double row of small black spots in the outer part of the soft portion of the dorsal fin.

Finding morphological differences to link with the colour was difficult, but finally it was noted that the curved canine teeth on the side of the jaws are larger in *P. vittafrons*, there is a single median pore posteriorly in the interorbital space instead of two, and the pectoral fins are shorter. The pectoral-fin lengths for the four type specimens of *P. vittafrons* range from 17.9 to 18.9% SL, compared to 20.3 to 21.2% SL for 10 specimens of *P. pulchella* from 67–128 mm SL.

No specimens of *P. pulchella* were found in the broad distributional gap from Hong Kong to New Britain. If specimens were found in the intermediate area, it is possible that they would show that *P. pulchella* and *P. vittafrons* are the ends of a cline.

Parapercis vittafrons forms a complex of four species with *P. maculata*, *P. diagonalis*, and *P. pulchella* which share the same fin-ray and lateral-line scale counts, essentially the same dentition and squamation of the head, and similar colour pattern.

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Randall: Six new *Parapercis* from the Western Pacific

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