

## Three New Pinguipedid Fishes of the Genus *Parapercis* from Japan

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**Abstract** The following 3 new species of *Parapercis* from Japan are described, all with a smooth preopercular margin, small cycloid scales on the cheek, and no palatine teeth: *P. basimaculata* from the Ryukyu Islands in 40–70 m, distinct in having 54 lateral-line scales, stout conical teeth on vomer, caudal fin with a narrow prolonged upper lobe, 5 triangular red bars across body with a narrow red bar between, and prominent dark brown spots basally in median fins; *P. katoi* from the Ogasawara Islands in 100–200 m, distinct in having 56–58 lateral-line scales, stout conical teeth on vomer, caudal fin with a prolonged upper lobe, and body with 5 broad red bars and a row of 10 small dark brown spots at level of origin of lateral line, 1 spot in first bar, 2 in each of remaining bars, and 1 at upper base of caudal fin; and *P. natator* in 15–45 m from Sagami Bay to the Ryukyu and Ogasawara Islands, distinct in having 59–61 lateral-line scales, 10–14 small conical teeth on vomer; very broad interorbital space (3.35–4.4 in head length), emarginate caudal fin in females, lunate in males, and unique in occurring in small aggregations above the bottom.

**Key words:** Pinguipedidae, *Parapercis*, new species, Japan.

The fishes of the genus *Parapercis* are particularly known as sandperch in the United States, grubfish in Australia, and sandsmelt in South Africa. The genus is much the largest of the Pinguipedidae, the family name that replaced Parapercidae and Mugiloididae (Rosa and Rosa, 1987).

*Parapercis* was described by Bleeker (1863: 236), who selected *Sciaena cylindrica* Bloch, 1792 as the type species. Cantwell (1964) was the first revisor of the genus, recognizing 27 species. Randall (1984) reviewed the genus, raising the number of species to 40. The number of newly discovered species of *Parapercis* is showing no sign of decline. With the description of 6 new species from the western Pacific (Randall, in press), the total number of valid species will be raised to 67, of which 2 are from the Atlantic, 1 from the eastern Pacific, and the rest from the Indo-Pacific region.

Australia has 24 described species of *Paraper-*

*cis*, the highest number for any country (Jeffrey W. Johnson, pers. comm.). Japan is second with 21 described species (Shimada in Nakabo, 2002: 1059; Imamura and Matsuura, 2003; Imamura and Yoshino, 2007a). There are four *Parapercis* name changes since this publication: *Parapercis mimaseana* (Kamohara, 1937) is a junior synonym of *Parapercis striolata* Weber, 1913; the name *Parapercis roseoviridis* (Gilbert, 1905) was replaced in Japan by *Parapercis phenax* Randall and Yamakawa, 2006; *Parapercis gushikeni* Yoshino, 1975 was reclassified as *Ryukyuperis gushikeni* by Imamura and Yoshino, (2007b); and *Parapercis somaliensis* Schultz, 1968 in Japan represents a new species (Randall, in press). We increase here the number of species of *Parapercis* in Japan to 24 with the description of 3 new species.

The species of *Parapercis* are surprisingly uniform in morphology with a near-cylindrical

body anteriorly, becoming well compressed posteriorly, the front of the jaws with a row of recurved canine teeth, followed by a band of villiform teeth, the opercle with a single sharp spine, a continuous dorsal fin with IV to V (rarely VI) spines and 19–25 soft rays, and the anal fin with a single spine and 16–20 soft rays. These fishes are typically found on sedimentary or rubble substrata, though some may be seen in the vicinity of coral reefs. They are usually at rest on the bottom, propped on their pelvic fins (one of our new species is a notable exception). They are carnivorous, feeding mainly on benthic crustaceans, but occasionally on small fishes. Several species have been reported as protogynous hermaphrodites (Marshall, 1950; Stroud, 1984; Nakazono *et al.*, 1985). Males are territorial and maintain a harem (Clark *et al.*, 1991).

### Materials and Methods

Type specimens for this study are housed at the following institutions: Bernice P. Bishop Museum, Honolulu (BPBM); Department of Fisheries, Kyoto University fish collection, Kyoto (FAKU); Kanagawa Prefectural Museum of Natural History, Odawara, Kanagawa (KPM-NI); Department of Zoology, National Museum of Nature and Science, Tokyo (NSMT-P); Department of Marine Sciences, University of the Ryukyus, Nishihara, Okinawa (URM-P), and United States National Museum of Natural History, Washington, D.C. (USNM).

IK, IOP, and KPM-NR mean Izu Kaiyo-koen (=Izu Oceanic Park), Izu Oceanic Park, and Image Database of Fishes of the Kanagawa Prefectural Museum of Natural History, respectively.

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 (HL) is taken from the front of the upper lip to the posterior end of the opercular membrane, and snout length from the same ante-

rior 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; 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; pelvic-fin length is measured from the base of the pelvic spine to the tip of the longest pelvic soft ray. The counts of lateral-line scales do not include three or four pored scales on the base of the caudal fin. The gill-raker counts include rudiments; the raker at the angle is included in the lower-limb count. Morphometric data presented in the tables are given as percentages of the SL. Proportional measurements in the text are rounded to the nearest 0.05. Data in parentheses refer to paratypes.

### *Parapercis basimaculata* sp. nov.

(New Japanese name: Sehoshi-toragisu)

(Figs. 1–3; Table 1)

**Holotype.** NSMT-P 78771, 77.5 mm SL, Sesoko Island, Okinawa, west side, 26°38'41"N, 127°51'18"E, sloping rubble bottom, 55 m depth, spear, J. E. Randall, 31 May 1975.

**Diagnosis.** Dorsal-fin rays V,21; anal-fin rays I,17; pectoral-fin rays 18; lateral-line scales 54; 4 pairs of canine teeth anteriorly in lower jaw; no palatine teeth; vomerine teeth stout, in a single row; scales on body ctenoid, becoming cycloid in prepectoral and prepelvic areas; scales on opercle cycloid except above spine; scales on cheek cycloid, very small, many nonimbricate; margin of preopercle smooth, with slight indentation at pore sites; body depth 5.75 in SL; head length 3.35 in SL; snout length 3.25 in HL; interorbital width 5.75 in HL; orbit diameter 3.8 in HL; fourth dorsal spine longest, 3.6 in HL; caudal fin slightly rounded on ventral half, truncate on dorsal half, with a prolonged upper lobe extending



Fig. 1. Holotype of *Parapercis basimaculata*, NSMT-P 78771, 77.5 mm SL, Sesoko Island, Okinawa. Photograph by John E. Randall.

about two-thirds orbit diameter posterior to central margin of fin; pectoral fins 4.4 in SL; pelvic fins just reaching anus, 4.75 in SL; color in alcohol pale yellowish with a large dark brown blotch above opercle; 3 pairs of small dark brown spots dorsally on postorbital head, the middle pair largest, the posterior pair within anterior scaled area of nape; base of soft portion of dorsal fin with a series of 8 dark brown spots; caudal fin with a vertical series of 4 dark spots; posterior part of anal fin with 3 basal dark spots. Color when fresh light reddish brown, grading to white ventrally, with 5 broad, triangular, dark reddish brown bars across body, and a narrow, uniformly wide, reddish brown bar between each pair of larger bars; 2 longitudinal rows of red spots within bars, 1 dorsal and 1 ventral, each red spot of dorsal row with a dark brown fleck or pair of flecks; postorbital head with dark brown spots as in preservative; an oblique red bar on cheek; dark spots on fins as described for preserved specimen.

**Description.** Dorsal-fin rays V,21; anal-fin rays I,17; all dorsal and anal soft rays branched, the last to base; pectoral-fin rays 18, branched except uppermost; pelvic-fin rays I,5; branched caudal-fin rays 15; upper procurrent caudal-fin rays 10, the posterior 3 segmented; lower procurrent caudal-fin rays 9, the posterior 3 segmented; lateral-line scales 54 (not including 3 smaller

Table 1. Measurements of the holotype of *Parapercis basimaculata* as proportions of the standard length.

NSMT-P 78771	
Sex	Male
Standard length (mm)	77.5
Body depth at anal fin origin	17.4
Body width	17.6
Head length	29.9
Snout length	9.2
Orbit diameter	7.9
Interorbital width	5.2
Upper-jaw length	13.3
Caudal-peduncle depth	8.9
Caudal-peduncle length	10.0
Predorsal length	29.7
Preanal length	48.0
Prepelvic length	24.5
Dorsal-fin base	62.1
First dorsal spine	3.6
Longest dorsal spine	8.3
Fifth dorsal spine	6.6
Longest dorsal ray	16.3
Anal-fin base	42.6
Anal spine	4.5
Longest anal ray	13.7
Caudal-fin length	25.7
Pectoral-fin length	22.8
Pelvic-spine length	8.2
Pelvic-fin length	21.0

pored scales on base of caudal fin); scales above first lateral-line scale to origin of dorsal fin 7; scales above highest part of lateral line to base of dorsal fin 3.5; scales below lateral line pos-

teroventrally to origin of anal fin about 11; median predorsal scales 9; circumpeduncular scales 24; gill rakers 5+11; pseudobranchial filaments 13; branchiostegal rays 6; vertebrae 10+20.

Greatest body depth 5.75 in SL; body nearly cylindrical anteriorly, the width 5.7 in SL, strongly compressed posteriorly; head length 3.35 in SL; ventral part of head, chest, and abdomen slightly convex; snout length 3.25 in HL; orbit diameter 3.8 in HL; interorbital space slightly concave, the least fleshy width 5.75 in HL; caudal-peduncle depth 3.35 in HL; caudal-peduncle length 3.0 in HL.

Mouth large, the maxilla nearly reaching a vertical through center of eye, the upper-jaw length 2.25 in HL; mouth oblique, forming an angle of about 20° to horizontal axis of body, the lower jaw projecting; front of upper jaw with 3 pairs of recurved canine teeth, the middle 1 on each side twice as large as other 2; side of upper jaw with a row of 15 slender conical teeth that curve medially and posteriorly, the anterior 8 increasing in length, the eighth approaching size of largest anterior canine; remaining 7 teeth in outer row on side of jaw decreasing in length; a broad band of villiform teeth in about 5 rows medial to canines at front of upper jaw, gradually narrowing posteriorly in jaw to a single row; front of lower jaw with 4 pairs of incurved canine teeth, increasing in length laterally, the fourth twice as large as second and strongly curving laterally as well as posteriorly; a band of about 5 rows of villiform teeth medial to canines at front of lower jaw, the medial row continuing laterally in jaw posterior to last canine as a row of 7 increasingly larger and more strongly recurved teeth, followed by a single row of small teeth to end of jaw; vomer with a chevron-shaped row of 9 stout conical teeth, the middle largest, the lateral teeth progressively smaller; a single small tooth in a second row laterally on one side; no palatine teeth; lips smooth, their inner surface with large fleshy papillae that interdigitate with anterior teeth; tongue broadly rounded, reaching forward to posterior 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. Nostrils small, the anterior in front of center of eye (as viewed from side), a little more than half way to groove at edge of upper lip, with a slight anterior rim and a pointed posterior flap that reaches three-fourths internarial distance when laid back; posterior nostril dorsoposterior to anterior nostril, the aperture ovate, with a slight rim. Pores of cephalic sensory system include a row of 4 pores on each side from front of snout, above nostrils, with a short branch between nostrils, to anterior third of interorbital space; 2 median pores in posterior interorbital space, followed by a median pore on occiput and 2 irregular transverse series of pores posteriorly on occiput (the second in anterior scaled part of nape) that continue to anterior end of lateral line on body; 11 pores from posterior to dorsal part of orbit to below anterior nostril, most with an additional pore in a branch, including 2 large pores above side of upper lip; a series of 9 pores in preopercular-mandibular series from upper free edge of preopercle to a median pair of pores at front of chin; 2 irregular series of small pores in naked area dorsal to free edge of preopercle.

Opercle with a single sharp spine at level of ventral edge of pupil (when viewed from side); margin of interopercle smooth except for 4 tiny, close-set serrae on a small bony prominence at upper edge; preopercle broadly rounded, its free edge smooth except for slight indentation at pore sites, extending from level of ventral edge of orbit to slightly anterior to a vertical at posterior edge of orbit.

Scales finely ctenoid on body, becoming cycloid anterior to a line from base of third dorsal spine to anterior end of lateral line, and on prepectoral and prepelvic areas; scales on opercle cycloid except above spine where a few are very weakly ctenoid; scales on cheek cycloid, small, mostly nonimbricate, in about 15 irregular horizontal rows, from below center of eye to posterior edge of preopercle, with 8 additional short rows of scales extending dorsally to behind ventral half of orbit; no scales on dorsal, anal, or

pelvic fins; progressively smaller scales extending out on caudal fin to at least one-half length of fin (many outer scales appear to be missing); base of pectoral fins with up to 4 rows of small cycloid scales; 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 to third lateral-line scales, the predorsal length 3.4 in SL; first dorsal spine 8.3 in HL; fourth dorsal spine longest, 3.6 in HL, the third spine nearly as long; fifth dorsal spine 4.55 in HL; membrane between fifth dorsal spine and first soft ray attached nearly one-half length of fifth spine above base of ray; penultimate dorsal soft ray longest, 1.85 in HL; origin of anal fin below base of fifth dorsal soft ray, the preanal length 2.1 in SL; anal spine 6.65 in HL; penultimate anal soft ray longest, 2.2 in HL; caudal fin slightly rounded on ventral half, truncate on dorsal half, with a prolonged upper lobe centered on third branched ray, extending about two-thirds orbit diameter posterior to central margin of fin, the total fin length 3.9 in SL; pectoral fins broadly rounded when spread, the tenth ray longest, 4.4 in SL; origin of pelvic fins below base of exposed part of opercular spine, the prepelvic length 4.1 in SL; pelvic spine slender, 3.65 in HL; pelvic fins just reaching anus, the fourth soft pelvic ray longest, 4.75 in SL.

Color of holotype in alcohol pale yellowish with a dark brown blotch larger than pupil above opercle; 3 pairs of small dark brown spots dorsally on postorbital head, the middle pair largest, the posterior pair within anterior scaled area of nape; 2 pairs of small dark brown flecks on scale edges below spinous portion of dorsal fin, 1 above and 1 just below lateral line; another pair of small flecks on lateral line below second to third dorsal soft rays; a single dark fleck on lateral line below base of sixth dorsal soft ray, followed by 6 similar flecks to base of caudal fin; fins translucent pale yellowish; soft portion of dorsal fin with a series of 8 dark brown spots of near-pupil size, each on base of a ray; anal fin with 3 similar but smaller spots basally on twelfth, fifteenth, and



Fig. 2. *Parapercis basimaculata*, Nakanose, near Ie-jima Island, Ryukyu Islands, 58 m. Photograph KPM-NR 36612 by Kyo Yunokawa.



Fig. 3. *Parapercis basimaculata*, Seragaki, Okinawa, 50 m. Photograph KPM-NR 80807 by Yasuaki Miyamoto.

last membranes; caudal fin with a curved vertical series of 4 dark spots a little before center of fin, the 2 middle spots largest; a single dark spot on lower base of pectoral fins.

Color when fresh as described in Diagnosis and shown in Fig. 1. Color in life shown in Figs. 2 and 3.

**Etymology.** This species is named *Parapercis basimaculata* from the Latin for basal and spotted, in reference to the prominent dark spots basally on the dorsal, anal, caudal, and pectoral fins.

**Remarks.** Although the description of this species is based on a single specimen from 55 m off Sesoko Island, Okinawa, we have underwater photographs taken of the species at the following localities in the Ryukyu Islands: Kume-jima (KPM-NR 11433, 11434) by Yusho Sakamoto;

Iriomote Island (KPM-NR 33808) by Korechika Yano; Nakanose, near Ie-jima (KPM-NR 36612) by Kyo Yunokawa; and Okinawa (KPM-NR 80807, 84973, and 85007) by Yasuaki Miyamoto and Takashi Kuwahata, all from the depth range of 40–70 m.

*Parapercis basimaculata* appears to be most closely related to *Parapercis flavolabiata* Johnson, 2006, described from 20 specimens collected in the Great Barrier Reef of Australia from 18°47'–23°55'S. The 2 species share the same meristic data, dentition, and similar coloration. *Parapercis basimaculata* differs in having a longer snout (9.2% SL, compared to 7.8–8.5% SL for *P. flavolabiata*), smaller eye (7.9%, compared to 8.4–9.6%), longer pectoral fins (22.8%, compared to 19.8–21.9%), and shorter pelvic fins (21.0%, compared to 23.4–26.9%). Also, the scales midventrally on the abdomen are ctenoid on *P. basimaculata*, instead of cycloid as on *P. flavolabiata*. In fresh coloration, *P. flavolabiata* has 6 instead of 5 triangular red bars on the body; it lacks the oblique red bar on the cheek, but has a horizontal red line on the side of the snout; in addition, the row of spots in the dorsal fin are small, more numerous, and distally in the fin.

***Parapercis katoi* sp. nov.**

(New Japanese name: Ogasawara-toragisu)

(Figs. 4, 5; Table 2)

**Holotype.** KPM-NI 19613, 166.8 mm, Chichi-jima, Ogasawara Islands, Japan, 27°07'N, 142°05'E, 200 m depth, hook and line, K. Kato, 27 Sept. 1991.

**Paratypes.** BPBM 40876, 167.3 mm, and USNM 384201, 161.8 mm, same data as holotype; KPM-NI 19545 (formerly IOP-3482), 176.8 mm, Amanohana, Chichi-jima, 100 m depth, hook and line, K. Sasaki, 1993; FAKU 64498, 127.4 mm, Futami Harbor, Chichi-jima, hook and line, H. Konishi, 23 May 1997; NSMT-P 78773 (formerly KPM-NI 82), 151.2 mm, Mago-jima, Ogasawara Islands, west side, 140 m depth, hook and line, K. Sasaki, 1 May 1994; KPM-NI 5387, 145.9 mm, Ototojima, Ogasawara Islands, 130 m depth, hook and line, 10 Sept. 1998.

**Diagnosis.** Dorsal-fin rays V,21; anal-fin rays I,17; pectoral-fin rays 18; lateral-line scales 56/58; 4 pairs of canine teeth anteriorly in lower

jaw; no palatine teeth; vomer with a row of about 9 stout conical teeth, usually followed by a few much smaller teeth; scales on body ctenoid, becoming cycloid on prepelvic but not prepectoral area; scales on opercle and cheek cycloid, those on cheek very small, mainly nonimbricate ventrally; margin of preopercle smooth; body depth 4.85–5.3 in SL; head length 3.15–3.25 in SL; snout length 2.5–2.9 in HL; orbit diameter 3.75–4.45 in HL; interorbital width 5.2–6.9 in HL; fourth dorsal spine longest, 4.5–5.35 in HL; caudal fin slightly rounded on ventral half, truncate on dorsal half, with a pointed upper lobe extending about an orbit diameter posterior to central margin of fin; pectoral fins 4.3–5.05 in SL; pelvic fins nearly or just reaching origin of anal fin, 4.7–5.0 in SL; color in alcohol pale yellowish gray with 5 square dusky bars from dark pigment on scale edges on about upper one-fourth of body, with a dark brown spot at each lower corner (except first bar with only 1); fins translucent pale yellowish with pale yellow rays, the caudal with a very small dusky spot dorsally on base; color when fresh pale orange dorsally, white ventrally, with 5 broad pink bars on body, becoming red ventrally, each with brown spots as described; a broad, oblique red bar on cheek; fins pale yellowish, the dorsal with a faint longitudinal yellow band about half way out in fin; caudal fin with a narrow magenta bar at base containing a small deep purple spot dorsally and a red spot ventrally; pectoral fins with a white bar at base containing an elongate magenta spot; pelvic fins nearly white.

**Description.** Dorsal-fin rays V,21; anal-fin rays I,17; all dorsal and anal soft rays branched, the last to base; pectoral-fin rays 18, branched except uppermost; pelvic-fin rays I,5; branched caudal-fin rays 15; upper and lower procurent caudal-fin rays 10–11, the posterior 3 segmented; lateral-line scales 57 (56–58 in paratypes); scales above origin of lateral-line scale to origin of dorsal fin 8; scales above lateral line to middle of dorsal fin 7.5; scales below lateral line obliquely anteroventral to origin of anal fin 15; median predorsal scales 10 (9–10); circumpeduncular scales



Fig. 4. Holotype of *Parapercis katoi*, KPM-NI 19613, 166.8 mm, Chichi-jima, Ogasawara Islands, 200 m. Photograph by Kenji Kato.



Fig. 5. Dorsal view of head of holotype of *Parapercis katoi*. Photograph by Kenji Kato.

29; gill rakers 4+12 (3–4+12–13); pseudo-branchial filaments 21 (19–23); branchiostegal rays 6; vertebrae 10+20.

Body depth at origin of anal fin 5.0 (4.85–5.3) in SL; body nearly cylindrical anteriorly, the width 5.15 (5.1–5.5) in SL, strongly compressed posteriorly; head length 3.15 (3.15–3.25) in SL; ventral part of head, chest, and abdomen nearly flat; snout length 2.7 (2.5–2.9) in HL; orbit diameter 4.15 (3.75–4.45) in HL; interorbital space slightly concave, the least fleshy width 6.1 (5.2–6.9) in HL; caudal-peduncle depth 3.2 (3.2–3.4) in HL; caudal-peduncle length 3.75 (3.35–3.7) in HL.

Mouth large, the maxilla nearly or just reaching a vertical through center of eye, the upper-

jaw length 2.2 (2.1–2.3) in HL; mouth oblique, forming an angle of about 20° to horizontal axis of body, the lower jaw projecting; front of upper jaw with 3 pairs of small recurved canine teeth, the middle tooth on each side largest; side of upper jaw with a row of 5 teeth of increasing size, the fifth nearly as long as largest anterior canine and curving medially as well as posteriorly; about 10 remaining teeth of decreasing size in jaw; a broad band of villiform teeth in about 6 rows medial to canines at front of upper jaw, gradually narrowing posteriorly in jaw to a single row; front of lower jaw with 3 pairs of strongly recurved canine teeth, increasing in size laterally; a band of about 6 rows of villiform teeth medial to canines at front of lower jaw, the medial row

Table 2. Measurements of the type specimens of *Parapercis katoi* as proportions of the standard length.

	Holotype		Paratypes				
	KPM-NI 19613	FAKU 64498	KPM-NI 5387	NSMT-P 78773	USNM 384201	BPBM 40876	KPM-NI 19545
Sex	male	intersex	?	male	male	male	male
Standard length (mm)	166.8	127.4	145.9	151.2	161.8	167.3	176.8
Body depth at anal-fin origin	20.6	18.9	19.4	19.0	20.6	20.4	20.3
Body width	20.1	18.4	19.4	18.1	19.6	19.4	19.1
Head length	31.8	31.8	31.6	31.6	31.0	31.0	30.7
Snout length	11.8	11.0	12.5	11.4	11.5	12.0	11.7
Orbit diameter	7.7	8.5	7.8	8.2	7.1	7.0	7.1
Interorbital width	5.2	4.6	5.3	5.4	6.0	5.6	5.7
Upper-jaw length	14.4	13.7	14.5	14.0	14.8	13.9	14.0
Caudal-peduncle depth	9.9	9.7	9.5	9.1	9.5	9.7	9.0
Caudal-peduncle length	8.5	8.9	9.4	9.2	9.3	8.4	8.6
Predorsal length	32.0	31.0	32.8	31.9	30.8	31.1	30.7
Preal length	48.5	48.1	49.3	48.5	49.0	48.2	48.5
Prepelvic length	26.4	26.1	29.4	27.8	27.6	26.0	29.2
Dorsal-fin base	62.2	60.6	61.6	60.9	60.4	62.2	62.4
First dorsal spine	1.3	3.3	3.2	3.1	2.7	2.9	2.2
Longest dorsal spine	6.2	7.1	6.5	6.4	5.8	6.6	broken
Fifth dorsal spine	6.0	6.6	6.3	6.2	5.4	5.3	broken
Longest dorsal ray	15.1	15.0	16.2	16.1	17.0	15.1	16.1
Anal-fin base	44.4	43.0	43.8	42.5	44.3	44.1	44.0
Anal spine	4.3	5.0	4.7	4.0	4.1	4.3	4.6
Longest anal ray	13.0	14.2	13.9	14.0	13.2	13.5	13.5
Caudal-fin length	28.8	27.2	28.4	26.9	25.0	24.4	27.7
Pectoral-fin length	19.8	20.9	23.4	22.0	21.0	21.2	23.1
Pelvic-spine length	8.2	7.4	7.3	7.1	7.5	8.3	7.9
Pelvic-fin length	21.1	20.8	20.7	21.4	20.3	20.0	19.2

continuing laterally in jaw posterior to last canine as a row of 5 increasingly larger and more strongly recurved teeth, followed by a single row of about 12 small teeth to end of jaw; vomer with a chevron-shaped row of 8 or 9 stout conical teeth (when all intact), the middle largest, the lateral teeth progressively smaller; a few much smaller teeth in a second row (none on smallest paratype); no palatine teeth; lips smooth, their inner surface with large fleshy papillae that extend between anterior teeth; tongue broadly rounded, reaching forward to posterior 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. Nostrils small, the anterior nostril at level of lower edge of pupil (as viewed from side), about half way to groove at edge of upper lip, with a slight rim anteriorly and a pointed

posterior flap that reaches rim of posterior nostril when laid back; posterior nostril dorsoposterior to anterior nostril, the aperture ovate, with a fleshy rim except posteriorly. Cephalic sensory system includes a dorsal row of 4 pores on each side from front of snout, passing above nostrils, with a short branch between nostrils, to above anterior edge of pupil; a median row of 6 small pores beginning in posterior interorbital space and merging with an irregular transverse double row of small pores posteriorly on occiput and anteriorly in scaled area of nape; a series of 15 pores or radiating branches of pores from dorsal edge of posterior part of orbit to below anterior nostril; 2 branches ending in a large pore above side of upper lip; a series of 11 pores in preopercular-mandibular series from upper free edge of preopercle to a median pair of pores at front of chin; 2 irregular series of small pores dorsal to free edge of preopercle.

Opercle with a single sharp spine at level of ventral edge of pupil (when viewed from side); margin of subopercle smooth, with or without a few tiny serrae on upper edge; margin of preopercle smooth and broadly rounded, extending from level of ventral edge of orbit to a vertical at posterior edge of pupil.

Scales finely ctenoid on body, including those midventrally on abdomen, becoming cycloid anterior to a line from base of fifth dorsal spine to second lateral-line scale; scales on prepectoral area mostly weakly ctenoid, those on prepelvic area cycloid; scales on opercle small and cycloid; scales on cheek cycloid, very small, mostly non-imbricate and partially embedded; cheek scales in about 18 irregular horizontal rows below lower edge of orbit to posterior end of maxilla, with 6 or 7 additional short rows extending dorsally behind ventral half of orbit; no scales on dorsal, anal, or pelvic fins; scales extending out on caudal fin at least two-thirds distance to posterior margin of fin (many outer scales missing); base of pectoral fins with a maximum of 4 rows of small cycloid scales; 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 3.1 (3.05–3.25) in SL; first dorsal spine very short, 24.5, probably aberrant in holotype (9.65–14.0) in HL; fourth dorsal spine longest, 5.15 (4.5–5.35) in HL; fifth dorsal spine 5.3 (4.8–5.85) in HL; membrane between fifth dorsal spine and first soft ray attached two-thirds length of fifth spine above base of ray; penultimate dorsal soft ray longest, 2.1 (1.95–2.1) in HL; origin of anal fin below base of fifth dorsal soft ray, the preanal length 2.05 (2.0–2.1) in SL; anal spine 7.4 (4.6–7.9) in HL; fifteenth to seventeenth anal soft rays longest, subequal, 2.45 (2.25–2.35) in HL; caudal fin slightly rounded on ventral half, truncate on dorsal half with a prolonged upper lobe centered on third branched ray that extends about an orbit diameter posterior to central margin of fin, the total fin length 3.5 (3.5–4.1) in SL; pectoral fins broadly rounded when

spread, the ninth ray longest, 5.05 (4.3–4.8) in SL; origin of pelvic fins below base of exposed part of opercular spine, the prepelvic length 3.8 (3.4–3.85) in SL; pelvic spine slender, 3.9 (3.75–4.45) in HL; fourth pelvic soft ray longest, reaching from anus to origin of anal fin, 4.75 (4.7–5.2) in SL.

Color of holotype in alcohol pale yellowish gray with 5 near-square, dusky bars from dark pigment on scale edges on about upper one-fourth of body; a dark brown spot at each lower corner of bars, except first with only 1; no dark markings on head; fins translucent pale yellowish with pale yellow rays, the caudal with a very small dusky spot dorsally on base in line with row of dark spots on body. Color when fresh as described in Diagnosis and Figs. 4 and 5.

**Etymology.** We name this fish in honor of Kenji Kato, who caught the holotype, 2 of the paratypes, and provided the color photographs of the holotype.

**Remarks.** All of the type specimens have been collected in the Ogasawara Islands by fishing with hook and line at depths of 100–200 m. The 5 largest specimens, 151.2–176.8 mm SL, are males. The gonad of the smallest paratype, 127.4 mm SL, appears to contain both ovarian and testicular tissue, indicating sex change from female to male. The gonad of the seventh specimen, 145.9 mm SL, was not found. The lack of females is probably due to the larger males being able to take a larger baited hook.

*Parapercis katoi* is similar to *P. somaliensis* from the coast of Somalia and the Gulf of Aqaba, Red Sea, having the same dentition, small cycloid scales on the cheek, a prolonged upper lobe of the caudal fin, and short dusky bars dorsally on the body containing small black spots (illustrated in color by Khalaf and Disi, 1997: 176, lower fig.). *Parapercis somaliensis* differs in having a serrate instead of smooth preopercular margin, 17 instead of 18 pectoral rays, 51–55 instead of 56–58 lateral-line scales, and in some features of color such as a large white area in the pectoral region, prominent dark markings on the head, a row of black spots at the base of dorsal fin, and

vertical rows of small black spots in the caudal fin (meristic data from Schultz, 1968). Also, it appears to be a smaller species; the largest of 7 known specimens measures 135 mm SL.

*Parapercis katoi* seems to be more closely related to a new species from Taiwan and southern Japan (Randall, in press) collected from depths of 80 to perhaps 400 m. It has essentially the same dentition and pattern of scales, a smooth preopercular margin, and is closer in coloration (Masuda *et al.*, 1984: pl. 261, fig. B, as *P. somaliensis*). It differs from *P. katoi* in having 52–53 lateral-line scales, usually 17 pectoral rays, lacking a prolonged upper lobe to the caudal fin (total caudal-fin length 19.0–22.8% SL, compared to 24.4–28.8% for *P. katoi*), and having a shorter snout (9.6–10.3% SL, compared to 11.0–12.5% for *P. katoi*).

***Parapercis natator* sp. nov.**

(Japanese name: Oyogi-toragisu)

(Figs. 6–10; Table 3)

*Parapercis* sp. 2 Yoshino in Masuda *et al.*, 1984: 292, pl. 261, fig. J (Sagami Bay).

*Parapercis* sp. 1 Masuda and Kobayashi, 1994: 306, upper left fig. (Izu Peninsula); Shimada in Nakabo, 2002: 1059, line drawing (Sagami Bay); Senou *et al.* 2006a: 83, listed (Ie-jima, Ryukyu Islands); Senou *et al.*, 2006b: 486, listed (Sagami Bay).

*Parapercis* sp. Randall *et al.*, 1997: 51 (Ani-jima, Ogasawara Islands); Senou *et al.*, 1977: 96 (Suruga Bay).

**Holotype.** URM-P 4177 (formerly IK 361), 88.6 mm, Izu Oceanic Park, Sagami Bay, 40 m depth, hand net, M. Takahashi, 3 Oct. 1975.

**Paratypes.** BPBM 35226, 54.4 mm, Ani-jima, Ogasawara Islands, off Mansakunohana Point, 45 m depth, quinaldine, J. E. Randall and J. L. Earle, 27 July 1991; KPM-NI 29, 41.4 mm, Nakanose, near Ie-jima, Ryukyu Islands, 15 m, hand net, K. Yunokawa, 12 Nov. 1994; KPM-NI 5357, 66.8 mm, and NSMT-P 78772 (formerly KPM-NI 5358), 67.7 mm, Ani-jima, 30 m depth, hand net, Y. Morita, 29 Nov. 1997.

**Diagnosis.** Dorsal-fin rays V,22 (one with VI); anal-fin rays I,18; pectoral-fin rays 17 or 18 (usually 17); lateral-line scales 59–61; median predorsal scales 10–11; gill rakers 3–5+10–13; lower jaw projecting; 3 pairs of canine teeth ante-

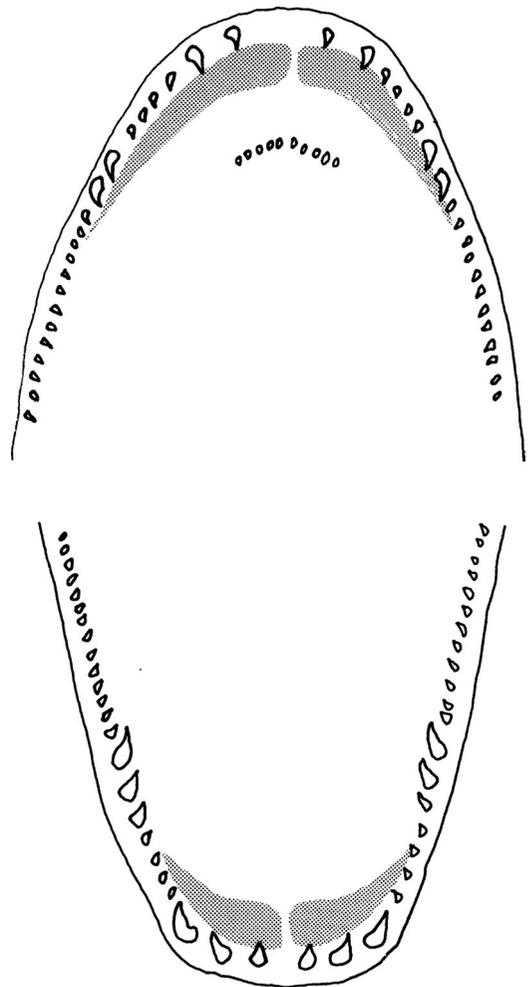


Fig. 6. Dentition of holotype of *Parapercis natator*. Drawing by Tetsuo Yoshino.

riorly in lower jaw; no palatine teeth; vomer with a row of 10–14 small conical teeth; scales on body finely ctenoid, becoming cycloid ventrally on abdomen, prepelvic area, nape, and below spinous portion of dorsal fin; an isolated round patch of small cycloid scales above posterior margin of preopercle at level of dorsal edge of orbit; scales on opercle and cheek small, cycloid, and partially embedded; margin of preopercle smooth; body depth 5.0–6.1 in SL; head length 3.3–3.6 in SL; snout length 3.65–4.5 in HL; orbit diameter 3.1–3.4 in HL; interorbital space very broad, 3.35–4.4 in HL; third or fourth dorsal spine longest, 3.25–3.65 in HL; caudal fin emar-



Fig. 7. Paratype of *Parapercis natator*, BPBM 35226, female, 54.4 mm, Ani-jima, Ogasawara Islands, 45 m. Photograph by John E. Randall.

ginate in females, lunate in males; pectoral fins slightly emarginate, 4.2–4.7 in SL; pelvic fins reaching or extending slightly posterior to origin of anal fin, 3.8–4.75 in SL; color of males in alcohol pale yellowish with a slightly oblique, broad, purplish gray bar anteriorly on body, bordered by a pale bar and a narrow purplish gray bar; color of females in alcohol pale yellowish; base of membranes of spinous portion of dorsal fin dark brown; color of males in life red to violet-red dorsally, grading to lavender-pink ventrally, with a yellow bar beneath anterior fourth of soft portion of dorsal fin, bordered by a pale-edged bright red bar; spinous portion of dorsal fin orange-red, the soft portion with many yellow spots; lobes of caudal fin deep red; a bright red spot at base and axil of pectoral fins; color of females in life light red dorsally on body with 10 darker red bars on about upper one-fourth that are narrower posteriorly; a series of 14 orangish pink bars of unequal width on lower side of body; spinous portion of dorsal fin bright orange-red, deep red to blackish at base except last membrane white; soft portion of dorsal fin with many red spots; lobes of caudal fin red; base and axil of pectoral fins in a bright red spot bordered by white; juveniles with a narrow orange stripe, bordered by white, from behind eye to upper base of caudal fin, the anterior third showing paler lateral line; ventral half of body pink; spinous portion of

dorsal fin red with a black spot near base of membranes, except white first and last membranes; soft portion of fin translucent with many dark reddish brown spots.

**Description.** Dorsal-fin rays  $\text{V}, 22$  (1 paratype with VI); anal-fin rays I, 18; all dorsal and anal soft rays branched, the last to base; pectoral-fin rays 18, branched except uppermost; pelvic-fin rays I, 5; branched caudal-fin rays 15; upper and lower procurrent caudal-fin rays 10, the posterior 3 segmented; lateral-line scales 59 (60–61 in paratypes); scales above origin of lateral-line to origin of dorsal fin 8; scales above lateral line to middle of dorsal fin 7.5; scales below lateral line obliquely posteroventral to origin of anal fin 22; median predorsal scales 10 (10–11); circumpectuncular scales 30; gill rakers 3+10 (3–5+10–11); pseudobranchial filaments 14 (12–15); branchiostegal rays 6; vertebrae 10+20.

Body depth at origin of anal fin 6.1 (5.0–5.7) in SL; body nearly cylindrical anteriorly, the width 5.3 (5.5–5.8) in SL, strongly compressed posteriorly; head length 3.3 (3.4–3.6) in SL; ventral part of head, chest, and abdomen slightly convex; snout length 4.5 (3.65–4.2) in HL; orbit diameter 3.4 (3.1–3.3) in HL; interorbital space slightly concave and very broad, the least fleshy width 3.35 (3.95–4.4) in HL; caudal-peduncle depth 3.3 (2.9–3.5) in HL; caudal-peduncle length 4.2 (3.6–3.75) in HL.

Mouth large, the maxilla reaching a vertical through anterior edge of pupil, the upper-jaw length 2.9 (2.55–2.7) in HL; mouth terminal or with lower jaw slightly projecting, and oblique, forming an angle of about  $45^\circ$  to horizontal axis of body; front of upper jaw with 2 pairs of recurved canine teeth of moderate size, the median pair distinctly largest; side of upper jaw with a row of 6 teeth of increasing size, the sixth nearly as large as largest anterior canine of jaw and curving medially as well as posteriorly; 12–14 remaining incurved conical teeth of decreasing size in jaw; a band of villiform teeth in 3 irregular rows medial to canines at front of upper jaw, gradually narrowing posteriorly in jaw to a single row; front of lower jaw with 3 pairs of strongly recurved canine teeth, increasing in size laterally, the third pair twice as large as second and curving laterally as well as posteriorly; 3 rows of villiform teeth medial to canines at front of lower jaw, the medial row continuing laterally in jaw posterior to last canine as a row of 7 increasingly larger teeth, the seventh very strongly recurved and nearly as large as largest anterior canine; remainder of jaw with a single row of about 12–14 small teeth; vomer with a broadly chevron-shaped row of 10–14 slender incurved conical teeth; no palatine teeth; lips smooth, their inner surface with large fleshy papillae that extend between anterior teeth; tongue very broadly rounded, reaching forward to vomerine teeth.

Gill membranes free from isthmus, with a broad free fold across. Gill rakers short and spinous, the longest nearly one-half length of longest gill filaments. Nostrils small, the anterior at level of dorsal edge of pupil (as viewed from side), about half way to groove at edge of upper lip, with a slight rim anteriorly and a posterior flap that reaches about half way to posterior nostril when laid back; posterior nostril dorsoposterior to anterior nostril, the aperture ovate, with a fleshy rim that is largest anteriorly. Cephalic sensory system includes a dorsal series of 6 pores on each side: first at front of snout before anterior nostril, the second a tiny pore above anterior nostril, the third between nostrils, and the fourth to



Fig. 8. Male of *Parapercis natator*, Yaku-shima Island, 30 m. Photograph KPM-NR 88527 by Shigeru Harazaki.



Fig. 9. Female of *Parapercis natator*, Yaku-shima Island, 30 m. Photograph KPM-NR 88528 by Shigeru Harazaki.



Fig. 10. Juvenile of *Parapercis natator*, Osezaki, Suruga Bay. Photograph KPM-NR 21994A by Yukihiko Otsuka.

sixth in anterior half of interorbital space, the sixth with a paired medial pore; 2 to 4 small pores medially in posterior interorbital space; a triangular patch of 7 or 8 small pores middorsally on posterior part of occiput; an irregular transverse double row of small pores posteriorly on occiput, with ventral branches onto opercle and

extending to origin of lateral line; a series of 13–15 pores on or at end of radiating branches of sensory canal from dorsal edge of posterior part of orbit to below anterior nostril, 2 branches ending in a large pore above side of upper lip; a series of 16 pores in preopercular-mandibular series from upper free edge of preopercle to a median pore at front of chin; irregular series of small pores dorsal to free edge of preopercle.

Opercle with a single sharp spine at level of ventral edge of pupil (when viewed from side); ventral margin of subopercle and dorsal margin of interopercle with a few tiny serrae; margin of preopercle broadly rounded, extending from level of ventral edge of pupil to below middle of eye, the margin smooth with some slight indentations at pore sites.

Scales on body finely ctenoid, becoming cycloid ventrally on abdomen, prepelvic area, nape, and below spinous portion of dorsal fin; an isolated round patch of about 20 small cycloid

scales above posterior margin of preopercle at level of dorsal edge of orbit; scales on opercle and cheek small, cycloid, partially embedded, mostly nonimbricate; about 27 rows of small scales from behind dorsal edge of orbit to posterior end of maxilla (rows horizontal dorsally, becoming more oblique ventrally), 13 of these behind eye above ventral edge of orbit; no scales on dorsal, anal, or pelvic fins; scales extending out on caudal fin about two-thirds distance to central posterior margin of fin (many outer scales missing); base of pectoral fins with a maximum of 8 or 9 rows of small cycloid scales; 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 first to second lateral-line scales and upper base of pectoral fins, the predorsal length 3.4 (3.45–3.55) in SL; first dorsal spine short, 8.45 (7.15–14.5) in HL; third and fourth dorsal spines subequal, the third usually

Table 3. Measurements of the type specimens of *Parapercis natator* as proportions of the standard length.

	Holotype		Paratypes			
	URM-P 4177	KPM-NI 29	BPBM 35226	KPM-NI 5357	NSMT-P 78772	
Sex	male	female	female	male	male	
Standard length (mm)	88.6	41.4	54.4	66.8	67.7	
Body depth at anal-fin origin	16.4	20.0	18.8	18.4	17.6	
Body width	18.9	17.3	17.5	18.3	17.4	
Head length	30.4	29.0	27.8	29.6	29.3	
Snout length	6.8	7.8	6.6	8.1	7.7	
Orbit diameter	8.9	9.3	8.8	9.0	9.0	
Interorbital width	9.1	6.6	6.3	7.2	7.4	
Upper-jaw length	10.5	11.0	10.3	11.4	11.4	
Caudal-peduncle depth	9.2	10.0	8.8	8.5	8.6	
Caudal-peduncle length	7.2	8.0	7.7	8.1	7.8	
Predorsal length	29.3	29.0	28.1	28.1	29.0	
Preanal length	47.6	47.9	46.0	48.4	47.9	
Prepelvic length	26.2	25.1	24.3	28.0	27.0	
Dorsal-fin base	65.6	65.2	65.6	65.4	65.0	
First dorsal spine	3.6	2.0	3.9	2.3	4.1	
Longest dorsal spine	8.3	broken	7.7	8.5	9.0	
Fifth dorsal spine	4.4	4.6	3.5	8.2	4.2	
Longest dorsal ray	13.5	13.9	13.8	13.0	13.6	
Anal-fin base	46.5	46.2	45.6	42.5	45.9	
Anal spine	5.1	5.4	4.0	5.1	5.2	
Longest anal ray	12.5	12.7	11.8	11.1	11.2	
Caudal-fin length	37.4	27.3	27.6	45.1	39.0	
Pectoral-fin length	23.8	23.6	23.9	22.6	21.4	
Pelvic-spine length	6.1	9.5	9.7	8.5	8.6	
Pelvic-fin length	23.6	26.5	24.3	21.9	21.1	

longest, 3.65 (3.25–3.6) in HL; fifth dorsal spine 6.9 (3.6–7.0) in HL; membrane between fifth dorsal spine and first soft ray attached at or very slightly above base of first dorsal soft ray; seventh to nineteenth dorsal soft rays nearly uniform in length, 2.25 (2.0–2.3) in HL; origin of anal fin below base of fifth dorsal soft ray, the preanal length 2.1 (2.05–2.1) in SL; anal spine 7.4 (5.4–7.2) in HL; seventh to sixteenth anal soft rays of near-equal length, 2.4 (2.3–2.65) in HL; caudal fin emarginate in females, lunate with filamentous lobes in male, the total fin length 2.7 (2.2–3.65) in SL; pectoral fins slightly emarginate, 4.2 (4.2–4.7) in SL; origin of pelvic fins below base of exposed part of opercular spine, the prepelvic length 3.8 (3.7–4.1) in SL; pelvic spine slender, 5.0 (2.85–3.45) in HL; fourth pelvic soft ray longest, reaching from anus to origin of anal fin, 4.25 (3.8–4.75) in SL.

Color of holotype in alcohol pale yellowish with a slightly oblique, purplish gray bar on body, the pigment mainly on scale edges, from below third dorsal spine to fifth dorsal soft ray, bordered on each side by a pale bar of about 3 scales in width, and a purplish gray bar of about 3 scales in width dorsally, narrowing to a single scale width ventrally; membranes of fins translucent yellowish gray, the rays pale yellowish.

Color of holotype when fresh from a photograph taken by Hajime Masuda, published in Masuda *et al.* (1984, pl. 261, fig. J). Color of holotype in life from an aquarium photograph in Masuda and Kobayashi (1994: 306, upper left fig.): body red dorsally, grading to pink with red-edged scales ventrally, with a broad yellow bar, grading to pink at edges, below anterior third of second dorsal fin, the bar bordered in pale blue and deep red, more evident posteriorly; head dark orange-red dorsally, grading to deep red on nape and pectoral-fin axil; lobes of caudal fin red, the broad centroposterior part yellow. An underwater photograph of another male shown in Fig. 8.

Color of females in alcohol pale yellowish; base of membranes of spinous portion of dorsal fin dark purplish brown, except last membrane.

Color of 54.4-mm SL female paratype when

fresh (Fig. 7), showing the usual red-barred pattern. Figure 9 is an underwater photograph of a female with the red-barred pattern subdued.

**Etymology.** We name this species *Parapercis natator* from the Latin meaning swimmer, for its habit of swimming in small aggregations above the bottom.

**Remarks.** Yoshino in Masuda *et al.* (1984: 292) reported this fish as *Parapercis* sp. 2, noting it as an active swimmer and known only from Sagami Bay. Randall *et al.* (1997: 51) published the record from Ani-jima in the Ogasawara Islands as *Parapercis* sp. from one female specimen, adding that it is unusual for a species of *Parapercis* to occur in a small aggregation hovering a short distance above the substratum. About 6 individuals were observed in the group from which the 54.5-mm SL female was collected; the fish were only 10–20 cm above the bottom and held their body at an angle with the head end upward (as in Figs. 8 and 9). Two additional specimens from Ani-jima and 1 from the Ryukyu Islands provided for the description of the species. The type specimens were collected from the depth range of 15–45 m. In addition to the localities from the underwater photographs of Figs. 8–10, we have photographic records from Izu-oshima in the Izu Islands (KPM-NR 39035) and Kume-jima in the Ryukyu Islands (KPM-NR 80584).

Using the key to the species of *Parapercis* in Cantwell (1964), *P. natator* would be identified as *Parapercis schauinslandii* (Steindachner, 1900) by the following succession of steps: no palatine teeth, 6 teeth in outer row at front of lower jaw, spinous dorsal connected by membrane near base of first soft ray, anal soft rays 18, and upper and lower caudal rays greatly elongate. Only 21 instead of 22 dorsal soft rays would provide a difference from *P. schauinslandii* in the key. Other shared characters with this species are a smooth preopercular margin, upper edge of the subopercle with spinules, scales on the cheek small, cycloid, and embedded; and a color pattern of 2 longitudinal rows of red bars that are not in vertical alignment. The character that pro-

vides the most positive separation is the very broad interorbital space of *P. natator* (3.35–4.4 in HL), which is correlated with swimming above the bottom. *Parapercis schauinslandii* is a benthic species; with a much narrower interorbital space (5.6–7.6 in HL over the same size range as the type specimens of *P. natator*); its eyes are directed upward as well as laterally. Because of the broad interorbital, the eyes of *P. natator* are lateral, in keeping with the need to be alert for predators both above and below. Meristic differences, in addition to 22 instead of 21 dorsal soft rays: *P. natator* has modally 1 more pectoral-fin rays (18) and 59–61 lateral-line scales, compared to 56–58 for *P. schauinslandii*.

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