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## **Preliminary review of the pempherid fish genus *Parapriacanthus* of the western Indian Ocean, with descriptions of five new species**

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### **Abstract**

The pempherid fish genus *Parapriacanthus* Steindachner, 1870 is represented in the western Indian Ocean by seven species: *P. guentheri* (Klunzinger, 1871), a Red Sea endemic long mistakenly considered a synonym of *P. ransonneti* Steindachner, 1870 from Japan; *P. argenteus* (von Bonde, 1923), described from South Africa, also falsely regarded as a synonym of *P. ransonneti*; and the following five new species: *P. darros* n. sp., type locality D'Arros Island, Seychelles; *P. kwazulu*, n. sp., type locality Park Rynie, KwaZulu-Natal, South Africa; *P. punctulatus* n. sp., type locality Sodwana Bay, KwaZulu-Natal, South Africa; *P. rahah* n. sp., type locality Rahah Bay, south coast of Oman; and *P. sharm* n. sp., type locality Gulf of Aqaba, Sinai Peninsula, the second Red Sea endemic species. The syntypes of *P. argenteus* have been lost; a neotype is designated, described, and deposited in the collection of the South African Institute for Aquatic Biodiversity, Grahamstown, South Africa.

**Key words:** taxonomy, ichthyology, systematics, coral-reef fishes, Pygmy Sweeper, Red Sea.

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## Introduction

*Parapriacanthus* Steindachner, 1870 (with synonyms of *Pempherichthys* Klunzinger, 1871 and *Parapempheris* von Bonde, 1923), is one of two genera of the marine fish family Pempheridae, popularly called sweepers. Like the fishes of the much larger genus *Pempheris*, the Pygmy Sweepers of *Parapriacanthus* have a compressed body, large eyes, short snout, steeply oblique mouth with small, recurved, conical teeth, well-developed gill rakers, 10 + 15 vertebrae, a single short-based dorsal fin near the center of the body, a long-based anal fin, a forked caudal fin, and small pelvic fins with I spine and 5 soft rays. Unlike the species of the genus *Pempheris*, those of *Parapriacanthus* are more elongate, with a symmetrical body; their chest is not sharply keeled; their scales are adherent, in one layer, ctenoid, except for one to four rows of cycloid scales at the base of the pectoral fins; the scales of the lateral-line extend only to the middle of the caudal fin (to the end of the fin in *Pempheris*). Pygmy Sweepers may be seen by day in dense aggregations in caves or beneath overhangs in reefs. They disperse at night to feed individually in the vicinity of the home reef on zooplankton, chiefly crustacean larvae and polychaetes. They, in turn, are preyed upon by resident predatory fishes, chiefly groupers. Shpigel & Fishelson (1989) reported *Parapriacanthus guentheri* in the Red Sea as prey of the groupers *Cephalopholis hemistiktos* and *C. miniata*.

Haneda (1958) and Haneda & Johnson (1958) described the bioluminescent organs that are found ventrally on the body of species of *Parapriacanthus*. They reported that the light that is produced by the luciferin-luciferase reaction passes through the thin, semitransparent wall of the abdomen. There are two light organs that can be faintly seen when a specimen is viewed ventrally. The first is a closed tube beginning in the isthmus, soon bifurcating and passing to each side of the chest and the base of the pelvic fins. The second is midventral, ending in the anal chamber. Pressure on the posterior light organ may result in a discharge to the anal chamber.

The genus is presently reported from the western Indian Ocean as the single species, *Parapriacanthus ransonneti* Steindachner, 1870, type locality Japan. We provide descriptions for seven additional species in the region, none of which is *P. ransonneti*. More remain to be described that are presently known only from underwater photographs.

## Materials and Methods

The specimens examined for this study are from the fish collections of the Bishop Museum, Honolulu (BPBM); Royal Ontario Museum, Toronto (ROM); South African Institute for Aquatic Biodiversity, Grahamstown, South Africa (SAIAB); and the United States National Museum of Natural History, Washington, D.C. (USNM).

In the descriptions, data for the holotype or neotype is given first, followed in parentheses by data for paratypes. Lengths of specimens are given as standard length (SL), measured from the median anterior end of the upper lip to the base of the caudal fin (posterior end of hypural plate); head length is measured from the same anterior point to the posterior end of the opercular flap; body depth is the greatest vertical measurement from the base of the dorsal fin to the ventral edge of the abdomen; body width is the greatest measurement just posterior to the opercular flap; snout length is measured, when snout is not protruded, from the most anterior point of the upper lip to the fleshy edge of the orbit; orbit diameter is the horizontal bony diameter, and interorbital width the least bony width; caudal-peduncle depth is the least depth; caudal-peduncle length was not recorded (not reproducible with enough accuracy); predorsal, prepelvic, and preanal lengths are taken from the tip of the snout to the base of the first spine of these fins; lengths of spines and rays of median fins are measured to their extreme bases; caudal-fin length is measured horizontally from the base to a perpendicular at the end of the longest ray; paired fins are measured from the anterior end of the bony base of the fin (from the upper connection of the pectoral-fin base to

the body and the anteriormost end of the pelvic-spine base) to the tip of the longest ray. Counts of the soft rays of the anal and pectoral fins, lateral-line scales, and gill-rakers for the species of *Parapriacanthus* of the western Indian Ocean are presented in Table 1. Counts of pectoral-fin rays include the rudimentary upper ray; these are counted for the fins of both sides. Lateral-line scale counts are made to the base of the caudal fin. Gill-raker counts include rudiments. Proportional measurements are rounded to the nearest 0.05.

### Status of *Parapriacanthus ransonneti* Steindachner, 1870

*Parapriacanthus ransonneti* was described by Steindachner (1870) from three specimens taken off Nagasaki, Japan. Tominaga (1963) published a revision of the family Pempheridae of Japan. He recognized four species of *Pempheris*, but only one of *Parapriacanthus*, *P. ransonneti*. Five years later he produced an excellent detailed morphological study of the family Pempheridae; in it he recognized a second species of *Parapriacanthus*, *P. dispar* (Herre 1935), type locality, Solomon Islands (Tominaga 1968).

Two syntypes were inspected, NMW 37101 (1, 58.1 mm SL) and 38606 (1, 60.3 mm SL), by the second author. The first author of the present paper collected eight specimens of *P. ransonneti*, 48–62 mm SL, from 3 m at Miyake-Jima in the Izu Islands, 75 km southeast of Honshu; i.e. BPBM 18999, Izu Islands, May 22, 1975. A specimen of 58 mm SL is illustrated in Fig. 1. One specimen from this lot was sent on Oct. 1992 as a gift to Randall Mooi, then of the Milwaukee Public Museum.

The specimens of *P. ransonneti* from that collection can be distinguished from the western Indian Ocean species. They have a characteristic distinct black line, shaped like a pin, within a white band, midventrally just before the anus. Three species in the western Indian Ocean share this mark: *P. guentheri* (Klunzinger, 1871) from the Red Sea, *P. argenteus* (von Bonde, 1923) from southern Africa, and a new species described herein from the Republic of South Africa. Two other new species from the western Indian Ocean, without this pin-like mark, are described below; both were previously identified as *P. ransonneti*.

In addition to the preanal pin-like mark, *P. ransonneti* is distinct in having 19–23 anal soft rays, modally 16 pectoral rays, modally 26 gill rakers, body depth 2.9–3.3 in SL, head length 2.9–3.1 in SL, eye diameter 6.6–7.4 in SL, predorsal length 2.3–2.4 in SL, pectoral-fin length of 3.3–3.45 in SL, and the fresh specimen color of Fig. 1; noteworthy are the gold and green color of the iris and the horizontal blackish streak beginning dorsally on the opercle and disappearing below the posterior end of the dorsal fin, not present on the western Indian Ocean species.

A curious mark of three narrow bands, red, white, and blue, may be seen across the base of the pectoral fin, reminiscent of the color pattern of the flag of the Netherlands. We have noted this marking on color photographs of all western Indian Ocean species of *Parapriacanthus*.



**Figure 1.** *Parapriacanthus ransonneti*, fresh specimen, 58 mm SL, BPBM 18999, Izu Islands, Japan (J.E. Randall).

## Key to the Species of the Genus *Parapriacanthus* of the western Indian Ocean

- 1a. A midventral, black, pin-like mark, about half length of pelvic fins, within a white band that encircles head of pin just anterior to anus (as in Fig. 2A), not present in juveniles .....2
- 1b. No midventral, black, pin-like mark anterior to anus (as in Fig. 2B) .....4
- 2a. Pectoral-fin length 3.3–3.45 in SL; preanal length 1.45–1.55 in SL; dorsal profile of head and nape nearly straight; iris in alcohol silvery white (Mozambique, KwaZulu-Natal, South Africa and Oman) .....*P. argenteus*
- 2b. Pectoral-fin length 3.05–3.3 in SL; preanal length 1.6–1.7 in SL; dorsal profile of head and nape moderately convex; iris in alcohol golden or dark bluish gray .....3
- 3a. Preanal length 1.6 in SL; predorsal length 2.45–2.55 in SL; eye relatively large, the orbit diameter 6.25–7.0 in SL (in 4 specimens 40–47 mm SL); iris in alcohol golden; pectoral-fin rays modally 16 (Red Sea) ..  
.....*P. guentheri*
- 3b. Preanal length 1.7 in SL; predorsal length 2.3–2.45 in SL; eye relatively small, the orbit diameter 7.8–8.0 in SL (in 4 specimens 37–41.5 mm SL); iris in alcohol dark bluish gray; pectoral-fin rays modally 17 (4 specimens; KwaZulu-Natal, South Africa) .....*P. kwazulu*, n. sp.



**Figure 2.** A: *Parapriacanthus argenteus*, with pin-like black line before anus. B: *Parapriacanthus punctulatus*, n. sp. without line (H.A. Randall).

- 4a. Predorsal length 2.3–2.4 in SL; body depth 3.2–3.35 in SL; iris in alcohol dark bluish gray, some with a faint light gray ring; dark dots on scales below lateral line extend posteriorly well onto caudal peduncle (102 specimens; KwaZulu-Natal, South Africa, Mozambique, and islands of western Indian Ocean) ..... *P. punctulatus*, n. sp.
- 4b. Predorsal length 2.4–2.5 in SL; body depth 3.1–3.2 in SL; iris in alcohol golden or black; dark dots on scales below lateral line not extending onto caudal peduncle .....5
- 5a. Pectoral-fin length 3.45–3.55 in SL; orbit diameter 7.5–7.8 in SL (in specimens 50–54 mm SL); iris in alcohol and when fresh mainly golden (6 specimens; Rahah Bay, south coast of Oman) ..... *P. rahah*, n. sp.
- 5b. Pectoral-fin length 3.1–3.4 in SL; orbit diameter 6.7–6.9 in SL (in specimens 49.5–61.5 mm SL); iris in alcohol black .....6
- 6a. Caudal-peduncle depth 8.35 in SL; body width 2.0 in body depth; anal-fin soft rays 21; lateral-line scales 71 (one specimen; D'Arros Island, Amirante Group, Seychelles) ..... *P. darros*, n. sp.
- 6b. Caudal-peduncle depth 9.5–10.1 in SL; body width 2.2–2.35 in body depth; anal-fin soft rays 22 or 23; lateral-line scales 64–68 (4 specimens; southern end of Sinai Peninsula, Red Sea) ..... *P. sharm*, n. sp.

TABLE 1

Frequency distribution of anal-fin rays, pectoral-fin rays, gill rakers, and lateral-line scales for *Parapriacanthus* species of the western Indian Ocean (pectoral-fin rays of both sides counted)

Species	Soft anal-fin rays				Pectoral-fin rays				Gill rakers				
	20	21	22	23	15	16	17	18	23	24	25	26	27
<i>P. argenteus</i>	1	13	15	3		19	44	1		8	14	8	2
<i>P. darros</i>		1				2						1	
<i>P. guentheri</i>		1	5	3		12	6				6	3	
<i>P. kwazulu</i>	1	4	3			7	9			2	4	1	1
<i>P. punctulatus</i>	3	12	15	2		6	24	21	1	6	15	10	
<i>P. rahah</i>	1	2	3			1	11			1	3	2	
<i>P. sharm</i>			2	2		2	6			1	1	2	

Species	Lateral-line scales											
	63	64	65	66	67	68	69	70	71	72	73	74
<i>P. argenteus</i>		1	1	3	3	5	7	5	2	3	1	1
<i>P. darros</i>									1			
<i>P. guentheri</i>			2	2	1		2	1			1	
<i>P. kwazulu</i>		1	1	2		1	2		1			
<i>P. punctulatus</i>	1	4	3	4	8	5	1	2	3	1		
<i>P. rahah</i>		1	3	1			1					
<i>P. sharm</i>		1		1	1	1						

## *Parapriacanthus argenteus* (von Bonde, 1923)

Figures 2A, 3–5; Table 1.

*Parapempheris argenteus* von Bonde 1923: 11, pl. 2, fig. 2 (KwaZulu-Natal, South Africa).

*Parapriacanthus guentheri* (non Klunzinger) Smith 1949: 247 (KwaZulu-Natal).

*Parapriacanthus argenteus* (von Bonde, 1923) Winterbottom 1976: 62 (Eastern Cape, South Africa, 32° S).

*Parapriacanthus ransonneti* [non Steindachner] Heemstra in Smith & Heemstra 1986: 669 (south to Eastern Cape); Heemstra & Heemstra 2004: 326, fig. (Oman to Eastern Cape, South Africa); King & Fraser 2014: 146 (KwaZulu-Natal).

**Neotype.** SAIAB 50530, male, 65.5 mm SL, Mozambique, Ponta Malongane, 26.7666° S, 32.9000° E, ichthyocide, P. Heemstra, T. Andrew, & R. Tilney, Nov. 1, 1995.

**Other Material Examined.** SAIAB 201698, 77: 37–66 mm SL, same data as neotype; ROM 72964, 11 of 66 specimens, 57–66 mm SL, South Africa, KwaZulu-Natal, Sodwana Bay, 27.44806° S, 32.71722° E, R. Winterbottom *et al.*, May 1, 2001.



**Figure 3.** *Parapriacanthus argenteus*, neotype, fresh (upper), preserved (lower), SAIAB 50530, 65.5 mm SL, Ponta Malongane, Mozambique (upper P.C. Heemstra; lower H.A. Randall).

**Description.** Dorsal-fin rays VI,9; anal-fin rays III, 22 (20–23); pectoral-fin rays 16 (16 or 17, one with 18); lateral-line scales 66 (64–74); gill rakers 24 (24–27); body depth 3.05 (3.0–3.15) in SL; body width 2.1 (2.1–2.25) in body depth; caudal-peduncle depth 9.35 (9.3–9.8) in SL; head length 2.9 (2.8–2.9) in SL; snout length 11.3 (11.5–12.2) in SL; dorsal profile of head nearly straight, except for rounded front of snout; eye relatively small, the orbit diameter 7.65 (7.6–8.2) in SL; interorbital width 11.9 (12.1–13.9) in SL; mouth forming an angle of about 60° to horizontal axis of body; sharply conical teeth in two irregular rows in upper jaw, those of upper row forward-projecting, those of second row strongly recurved; similar smaller teeth in lower jaw, well-spaced, in a single row; very small, incurved, sharply conical teeth in a single irregular row on vomer and palatines; lips thin densely covered with adjacent papillae; tongue broadly triangular with a small, rounded, flexible, terminal flap; predorsal length 2.3 (2.3–2.4) in SL; first dorsal-fin soft ray longest, 5.4 (4.5–5.35) in SL; caudal-fin forked, fin length 4.5 (3.6–4.3) in SL; pectoral-fin length 3.3 (3.3–3.45) in SL; prepelvic length 2.55 (2.5–2.6) in SL; pelvic fins not reaching anus, the fin length 5.45 (5.35–5.75) in SL; preanal length 1.5 (1.45–1.55) in SL. Prominent pin-like black line anterior to anus. Iris in preserved fish silvery to white. Color when fresh as in Fig. 3 upper; color in alcohol as in Fig. 3 lower; color in life as in Fig. 4.

**Remarks.** *Parapriacanthus argenteus* was described from specimens collected in 58.5 m from R/V *Pickle* Station 188, off KwaZulu-Natal, South Africa. The type specimens have been lost (Gon & Skelton in Pietsch & Anderson 1997). We describe here and illustrate a neotype from a lot of 78 specimens collected in southern Mozambique; selected for matching the characters of the original description, being in good condition, having a fresh photograph and from a location near to the type location (about 80 km north). As noted in the synonymy above, Smith (1949: 247, fig. 640) regarded *P. argenteus* as a synonym of *P. guentheri*, type locality Red Sea. For the time, that would be a reasonable conclusion. Both species have the pin-like black mark anterior to the anus, and the color in life is very similar (compare Fig. 4 with Fig. 9 of *P. guentheri*). The two species are most easily distinguished by the much larger eyes of *P. guentheri*. Four specimens of *P. argenteus* 40–50 mm SL have a range in eye diameter from 7.6–7.7 in SL, compared to 6.25–7.4 in SL for five specimens of *P. guentheri* 40–53 mm SL.

Winterbottom (1976: 62) reported six specimens of *Parapriacanthus guentheri*, 32.8–39.2 mm SL, from the vicinity of the town of Coffee Bay, Eastern Cape Province, South Africa. Ofer Gon examined these specimens with our key in hand and reidentified them as *P. argenteus*, the southernmost record for the species. The northernmost collection of the species is southern Mozambique at 26.7° S. Most surprising is the photograph of part of an



**Figure 4.** *Parapriacanthus argenteus*, KwaZulu-Natal, South Africa (D. King).



**Figure 5.** *Parapriacanthus argenteus*, south coast of Oman off Rahah Bay (J.P. Hoover).

aggregation of *P. argenteus* taken by John P. Hoover far to the north on the south coast of Oman off Rahah Bay (Fig. 5). During summer, the southwest monsoon wind drives the surface water from the coast, resulting in cold water rising from the depths. Temperate sea kelp may be found growing on coral reefs, along with those tropical and subtropical fishes and invertebrates with a wide range of temperature tolerance. During the Pleistocene, when seas were cooler, species of fishes such as *P. argenteus* were likely in continuous distribution from southern Africa to Oman. As the seas warmed, only those fishes with a wide range in temperature tolerance remained on the southern Oman coast. Randall (1995: 4) listed five such species; *P. argenteus* is the sixth. These species might also be expected on the northern coast of Somalia where strong, monsoon-driven, upwelling occurs.

### ***Parapriacanthus darros*, n. sp.**

Figures 6 & 7; Table 1.

*Parapriacanthus ransonneti* [non Steindachner] Randall & van Egmond 1994: 55, fig. 30 (D'Arros Island, Amirante Islands, Seychelles).



**Figure 6.** *Parapriacanthus darros*, holotype, preserved, BPBM 35551, male, 49.5 mm SL, D'Arros Island, Amirante Islands, Seychelles (H.A. Randall).



**Figure 7.** *Parapriacanthus darros*, St. Joseph Atoll, Seychelles (J.E. Randall).

**Holotype.** BPBM 35551, male, 49.5 mm SL, Seychelles, Amirante Islands, D'Arros Island, 5°29' S, 53°18' E, 50–55 m, bottom mainly coral, soft coral, and sponges, 2.3 m Agassiz trawl, R/V *Tyro*, Station 764, J. van der Land, J.E. Randall *et al.*, Dec. 28, 1992.

**Description.** Dorsal-fin rays VI,9; anal-fin rays III,21; pectoral-fin rays 16 (both sides); lateral-line scales 71; rows of scales above lateral line to base of dorsal fin 5.5; gill rakers 26; body depth 3.1 in SL; body width 2.0 in body depth; caudal-peduncle depth 8.35 in SL. The step-in measurements of the depth of the caudal peduncle of individuals in Fig. 7 are less than 9.0 in the standard length, thus following the key for this character; head length 2.75 in SL; snout length 12.5 in SL; eye relatively large, the orbit diameter 6.9 in SL; interorbital width 12.5 in SL; mouth forming an angle of about 45° to horizontal axis of body; sharply conical, recurved teeth in two irregular rows in upper jaw, those of upper row more forward-projecting, those of second row more strongly recurved; similar smaller teeth in lower jaw, well-spaced, in a single row; very small, incurved, sharply conical teeth in a single irregular row on vomer and palatines; lips thin, densely covered with adjacent papillae; tongue broadly triangular with a small, rounded, flexible, terminal flap; predorsal length 2.45 in SL; first dorsal-fin soft ray longest, 5.0 in SL; caudal fin forked (too damaged for measurement); pectoral-fin length 3.3 in SL; prepelvic length 2.7 in SL; pelvic fins not reaching anus, fin length 5.3 in SL. No pin-like dark line anterior to anus. Iris in preserved holotype black. Color in alcohol as in Fig. 6; color in life as in Fig. 7.

**Etymology.** This species is named for the type locality as a noun in apposition.

**Remarks.** The first author was invited as a diver to participate in a Dutch expedition to the Seychelles aboard the R/V *Tyro* from Dec. 11, 1992 to Jan. 9, 1993. Fishes were collected by diving with SCUBA, by fishing, and by trawling. One hundred and eight new records of fishes for the Seychelles were reported by Randall & van Egmond (1994), of which eight were collected earlier by the first author, Helen A. Randall, and David J. Woodland. The holotype of *P. darros* is the only specimen of the genus that was collected during the expedition. It was taken, along with other fishes and benthic invertebrates, from a trawl haul in 50–55 m at an outer-reef locality (D'Arros is not an atoll). It was illustrated in life in that publication by our Fig. 7, but was printed inverted.

Figure 7 was taken at St. Joseph Atoll. It is not wise to illustrate a species of fish of unknown life color from a live photograph taken of fish from another locality for which there is no corresponding specimen. However, only 2 km separate D'Arros from the northern part of St. Joseph Atoll. Also, the fish of the aggregation on St. Joseph and the holotype share two important features: neither has the black-tipped caudal-fin lobes seen on most species of the genus, and both have unusually large eyes. The eye diameter of the holotype is contained 6.9 times in SL. The eye diameter of the five individuals in the photograph of the St. Joseph aggregation that are in perfect side-view range from 6.3–7.15 in SL. The apparent deeper body of the live fish may be the result of relatively greater vertical shrinkage of a fish in alcohol, compared to that lengthwise, because of the vertebral column.

## *Parapriacanthus guentheri* (Klunzinger, 1871)

Figures 8–11; Table 1.

*Pempherichtys Güntheri* Klunzinger 1871: 470 (Al-Qusair, Egypt, Red Sea).

*Parapriacanthus Güntheri* Klunzinger 1884: 81, pl. 5, fig. 4 (Red Sea).

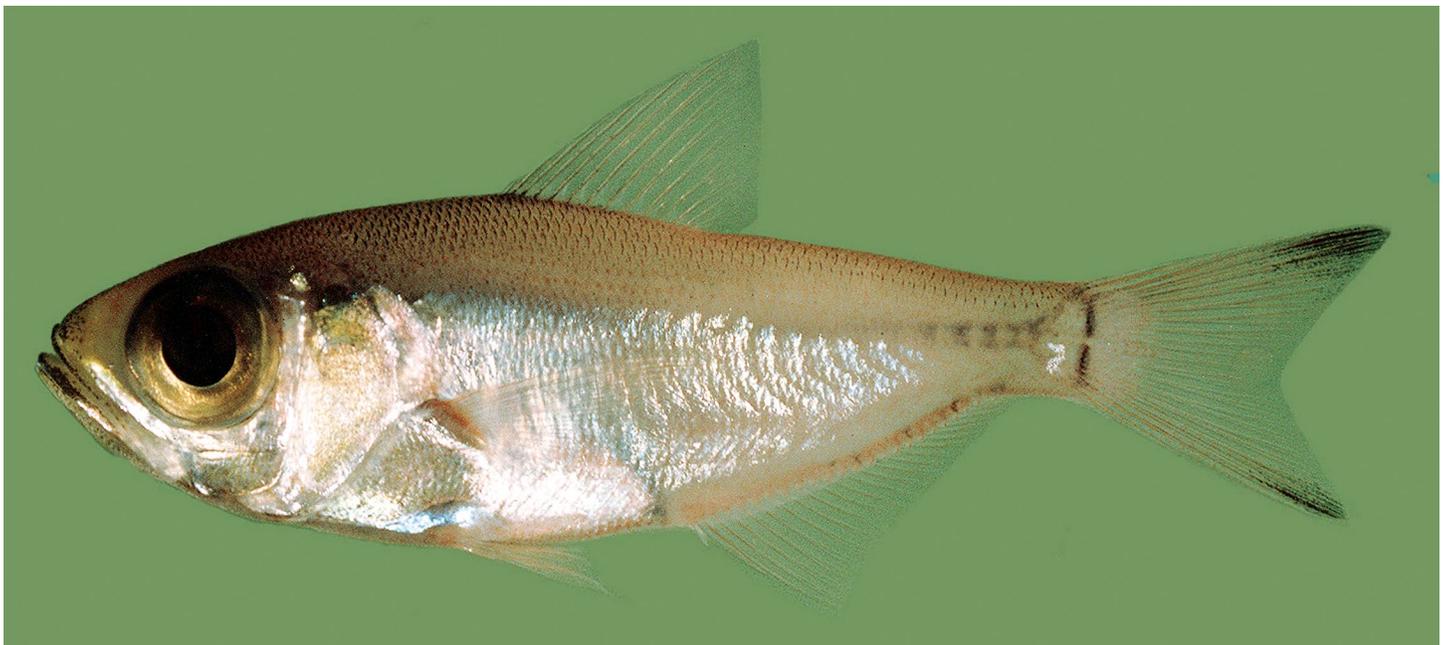
*Parapriacanthus guentheri* Randall 1983: 85, fig. (Red Sea); Dor 1984: 165 (Red Sea; checklist); Shpigel & Fishelson 1991: 133 (Gulf of Aqaba); Shpigel 1997: 82, fig. (Red Sea); Field & Field 1998: 137, lower fig; Golani & Bogorodsky 2010: 36 (Red Sea; checklist).

*Parapriacanthus ransonnari* [non Steindachner] (misspelling) Goren & Dor 1994: 46 (Red Sea; checklist).

*Parapriacanthus ransonneti* [non Steindachner] Lieske & Myers 2004: 124, fig (Red Sea).

**Material Examined.** BPBM 17889, 6: 41.5–47 mm SL, Red Sea, Egypt, Gulf of Aqaba, Sinai Peninsula, Ras Muhammed; BPBM 31879, 2: 53 & 56 mm SL, Red Sea, Egypt, Gulf of Aqaba, Sinai Peninsula, Taba; BPBM 30378, 40 mm SL, Red Sea, Saudi Arabia, Yanbu.

**Description.** Dorsal-fin rays VI,9; anal-fin rays III,21–23; pectoral-fin rays 16 or 17 (mainly 16); lateral-line scales 65–73; rows of scales between lateral-line and origin of dorsal fin 5.5; gill rakers 24 or 25 (modally 25); body depth 3.1–3.25 in SL; body width 2.15–2.3 in body depth; caudal-peduncle depth 8.9–9.6 in SL; head length 2.6–2.7 in SL; snout length 10.5–11.7 in SL; eye relatively large, the orbit diameter 6.25–7.4 in SL; interorbital width 12.5–13.3 in SL; mouth forming an angle of about 60° to horizontal axis of body; sharply conical, recurved teeth in two irregular rows in upper jaw, those of upper row more forward-projecting, those of second row more strongly recurved; similar smaller teeth in lower jaw, well-spaced, in a single row; very small, incurved, sharply conical teeth in a single irregular row on vomer and palatines; lips thin, covered with closely adjacent papillae; tongue broadly triangular with a small, rounded, flexible, terminal flap; predorsal length 2.45–2.55 in SL; first dorsal-fin soft ray longest, 4.0–4.6 in SL; caudal fin damaged; pectoral-fin length 3.15–3.3 in SL; prepelvic length 2.45–2.7 in SL; pelvic fins not reaching anus, the fin length 5.45 (5.35–5.75) in SL; preanal length 1.6 in SL. A pin-like dark line anterior to anus. Iris in preserved specimens golden. Color when fresh as in Fig. 8; color in life as in Figs. 9 and 10.



**Figure 8.** *Parapriacanthus guentheri*, fresh specimen, BPBM 17889, immature male, 44 mm SL, Ras Muhammed, southern end of Sinai Peninsula, Red Sea (J.E. Randall).



**Figure 9.** *Parapriacanthus guentheri*, Ras Um Sid, Sharm el Sheikh, Egypt, Red Sea (S.V. Bogorodsky).



**Figure 10.** *Parapriacanthus guentheri*, subadult aggregation, Sharm el Naga, 35 km south of Hurghada, Egypt (A. Ryanskiy).

**Remarks.** *Parapriacanthus guentheri* was described from three specimens from Al-Qusair, a small city about midway on the Red Sea coast of Egypt.

Each of the syntypes is in a different museum in Europe: the Natural History Museum in London (BMNH 1871.7.15.35), the Staatliches Museum für Naturkunde, Stuttgart (SMNS 1752), and the Museum für Naturkunde, Berlin (ZMB 8007). James Maclaine in London, Stefan Merker for Ronald Fricke in Stuttgart, and Peter Bartsch in Berlin all confirmed the presence of the diagnostic pin-like dark line anterior to the anus for the syntype specimen in their care. We hereby designate BMNH 1871.7.15.35 as the lectotype (illustrated below as Fig. 11) based on the photograph showing the specimen in generally good condition and with characters that positively link it to the species as here described; the pin-like mark is present as a series of black dots. It is clearer when wet (James Maclaine, pers. comm.).



**Figure 11.** *Parapriacanthus guentheri*, lectotype, BMNH 1871.7.15.35, with a black line before anus made up of dark spots (K. Webb).

*Parapriacanthus kwazulu*, n. sp.

Figure 12; Table 1.

**Holotype.** BPBM 41244, immature male, 37.0 mm SL, South Africa, KwaZulu-Natal, Park Rynie, 30° 18.074' S, 30° 49.254' E, large cave, 38 m, hand net, A.D. Connell, with aid of M. & V. Fraser, Jan. 19, 2016.

**Paratypes.** SAIAB 190113, 40 mm, and USNM 437530, 2: 39 & 42 mm SL, same locality and cave as holotype, multiprong spear, A.D. Connell, March 27, 2008; BPBM 41245, 2: 27.5 & 33 mm SL and SAIAB 202154: 4: 28–31 mm SL, same data as holotype.

**Description.** Dorsal-fin rays VI,9; anal-fin rays III,21 (20–22); pectoral-fin rays 16 (16 or 17, mainly 17); lateral-line scales 66 (64–71); rows of scales between lateral-line and origin of dorsal fin 5.5; gill rakers 24 (24–27, modally 25); body depth 3.2 (3.1–3.2) in SL; body width 2.0 (1.95–2.15) in body depth; caudal-peduncle depth 9.25. (9.5–9.8) in SL; head length 2.85 (2.7–2.85) in SL; snout length 11.5 (11.7–13.0) in SL; eye relatively small, the orbit diameter 7.9 (7.8–8.0) in SL; interorbital width 11.6 (11.7–12.3) in SL; mouth forming an angle of an average of 65° to horizontal axis of body; upper jaw with an outer well-spaced row of slender, sharply conical, recurved teeth, those of upper row more forward-projecting, those of second row more strongly recurved; similar smaller teeth in lower jaw; vomer and palatines with very small, incurved, sharply conical teeth in a single irregular row; lips thin, covered small greenish spots and larger scattered low purple papillae; tongue broadly triangular, indented slightly near tip; predorsal length 2.3 (2.3–2.45) in SL; first dorsal-fin soft ray longest, 4.0 (4.1–4.65) in SL; caudal-fin forked, fin length 4.05 (broken in paratypes) in SL; pectoral-fin length 3.1 (3.05–3.2) in SL; prepelvic length 2.7 (2.5–2.7) in SL; pelvic fins not or just reaching anus, the fin length 5.3 (4.55–5.7) in SL; preanal length 1.7 (1.7; two too damaged for measurement) in SL. A pin-like dark line anterior to anus. Iris in preserved holotype black. Color when fresh as in Fig. 12.

**Etymology.** This species is named for KwaZulu-Natal, the province of the Republic of South Africa in which it was collected. This province resulted from the merger of the former provinces of KwaZulu and Natal in 1994. The largest city is Durban. The specific epithet is a noun in apposition.

**Remarks.** The first specimens of this species were collected by Allan Connell with a multiprong spear in March, 2008. As might be expected, the small fish were badly damaged. We asked if he could collect further specimens by less damaging method. He succeeded in getting the specimens listed above with a hand net. None are fully mature. We hope to get fully adult specimens of this colorful species in the near future, as well as underwater photographs.



**Figure 12.** *Parapriacanthus kwazulu*, fresh holotype, BPBM 41244, immature male, 37 mm SL, Park Rynie, KwaZulu-Natal, South Africa (A.D. Connell).

## *Parapriacanthus punctulatus*, n. sp.

Figures 2B, 13–16; Table 1.

**Holotype.** SAIAB 201845, male, 64.5 mm SL, Mozambique, Ponta Malongane, 26.7666° S, 32.9000° E, ichthyocide, P. Heemstra, T. Andrew, & A. Wood, Nov. 1, 1995.

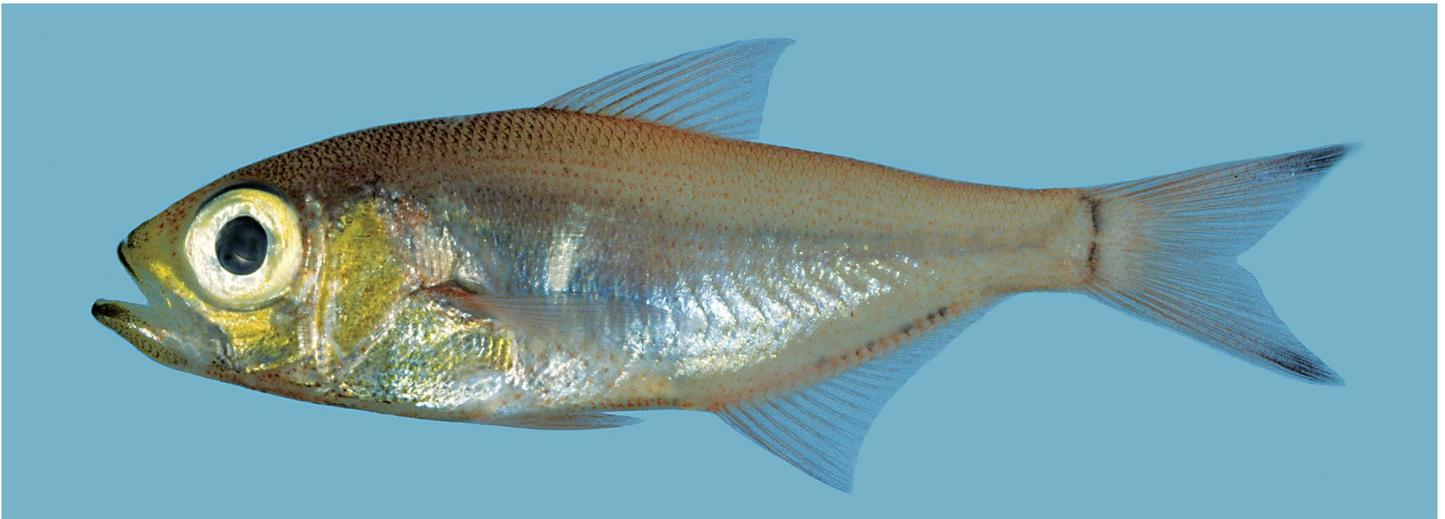
**Paratypes.** SAIAB 201846, 37: 13–66 mm SL, BPBM 41238, 5: 39–55 mm SL, and USNM 437219, 5: 39–53.5 SL, same data as holotype; SAIAB 64653, 10: 43–61 mm SL, KwaZulu-Natal, 8-Mile Reef, 27.44138° S, 32.71694° E, reef, 17 m, ichthyocide, P. Heemstra, H. Larson, & M. Smale, May 14, 2001; SAIAB 79271, 53: 22–51 mm, Seychelles, Île du Nord, 4.38210° S, 55.24179° E, coral reef, 16 m, ichthyocide, P. Heemstra, E. Heemstra, M. Smale, K. Moots, & M. Mwale, May 6, 2005; SAIAB 192761, female, 50 mm SL, northern Madagascar, 19°25.08' S, 49°5.94' E, trawl, min. depth 61 m, J. Escobar, Sept. 15, 2008; SAIAB 83990, 19: 32–67 mm SL, St. Brandon's Shoals (Cargados Carajos), 16°50.36' S, 59°35.36' E, depth not given, trawl, D. Tweddle & A. Oddgeir, Oct. 13, 2008.

**Description.** Dorsal-fin rays VI,9; anal-fin rays III,21 (20–23); pectoral-fin rays 16 (15–17, modally 16); lateral-line scales 69 (63–72); rows of scales between lateral-line and origin of dorsal fin 5.5; gill rakers 24 (23–26, modally 25); body depth 3.2 (3.25–3.35) in SL; body width 2.1 (2.0–2.2) in body depth; caudal-peduncle depth 10.4 (8.9–9.6 in SL; head length 2.95 (2.8–2.9) in SL; snout length 11.4–13.0 in SL; eye relatively large, the orbit diameter 7.2 (6.25–7.4) in SL; interorbital width 12.7 (12.5–13.3) in SL; mouth forming an angle of about 60° to horizontal axis of body; sharply conical, recurved teeth in two irregular rows in upper jaw, those of upper row more forward-projecting, those of second row more strongly recurved; similar smaller teeth in lower jaw, well-spaced, in a single row; very small, incurved, sharply conical teeth in a single irregular row on vomer and palatines; lips thin, covered with closely adjacent papillae; tongue broadly triangular, indented on side near tip, forming a small, half-round, flexible flap; predorsal length 2.3 (2.3–2.4) in SL; first dorsal-fin soft ray longest, 5.3 (4.7–5.4) in SL; caudal-fin forked, fin length 4.5 (3.6–4.3) in SL; pectoral-fin length 3.5 (3.25–3.6) in SL; prepelvic length 2.7 (2.5–2.7) in SL; pelvic fins not reaching anus, the fin length 5.9 (5.1–6.5) in SL; preanal length 1.5 (1.5–1.6) in SL. No pin-like dark line anterior to anus; instead a very dark blue band with a median dull pink streak that narrows anteriorly. Iris in preserved holotype black. Color in alcohol as Fig. 13; color when fresh as in Fig. 14; color in life as in Fig. 15.

**Etymology.** Named *punctulatus* from the Latin for dotted, in reference to the profusion of dark dots on the side of the body below the lateral line that extend well posterior to the origin of the anal fin. The dots are more evident on preserved specimens than in life.



**Figure 13.** *Parapriacanthus punctulatus*, holotype, preserved, SAIAB 201845, male, 64.5 mm SL, Ponta Malongane, southern Mozambique, median fins damaged (H.A. Randall).



**Figure 14.** *Parapriacanthus punctulatus*, fresh specimen, ROM 58575, 48 mm SL, Comoro Islands (R.W. Winterbottom).

**Remarks.** The SAIAB fish collection of Nov. 1, 1995 in southern Mozambique included two species of *Parapriacanthus*: 78 specimens of *P. argenteus* and 48 of *P. punctulatus*. We do not believe these two species were in the same aggregation. More likely, the rotenone affected two nearby schools of the different species. The two were easily sorted by eye color in preservative: silvery white for *P. argenteus* and dark bluish gray for *P. punctulatus* (except for juveniles), as well as the presence of the distinctive pin-like dark line anterior to the anus in *P. argenteus* that is absent in *P. punctulatus*. Okamura & Abe (1997) published a well-illustrated book on the fishes of Japan (in Japanese). The underwater photograph on the upper left corner of page 380 depicts two species of *Parapriacanthus* (their caption cites only *P. ransonneti*), with one species concentrated in the upper left corner, and the other in the lower right corner, with very little mixing. An aggregation of a probable third species is shown



**Figure 15.** *Parapriacanthus punctulatus*, specimens are needed to confirm identification, Réunion (A. Diringer).

as a separate photograph in the upper right corner of the page, also identified as *P. ransonneti*. Specimens are needed to confirm identifications.

While *P. argenteus* has been collected only from continental seas of southern Mozambique to Eastern Cape at 32° S, *P. punctulatus* is wide-ranging from KwaZulu-Natal and Mozambique to the Comoro Islands, northern Madagascar, Seychelles, the Mascarene Ridge, and the Mascarene Island of Réunion. The last record is based on the underwater photograph (Fig. 15) taken by Alain Diringer.

One internal color feature serves to unite these populations as probably representing a single variable species: the dark brown spots along the inner base of the anal fin, beginning at the posterior end, as may be seen on Fig. 14. Nine of 10 specimens of ROM 58575 from the Comoro Islands have one or more of these spots; they are also present in 25 of 54 specimens from Île du Nord, Seychelles (SAIAB 79271); seven of 19 specimens from the Mascarene Ridge (SAIAB 83990); four of 10 specimens from Eight-Mile Reef, KwaZulu-Natal (SAIAB 64653); and seven of 18 specimens from southern Mozambique (SAIAB 20194). We found obvious evidence of tissue sampling in only two specimens of SAIAB 83990, one of which has an attached label with the number GMB-216.

We emphasize that our identifications of these insular populations as *Parapriacanthus punctulatus* are preliminary. We would like to obtain tissue samples from all for genetic study.

The very large stomach of the 66-mm male paratype was opened and found to contain a half-digested polychaete about 45 mm by 5 mm, along with copepods, crustacean larvae, etc. Although species of *Pempheris* are reported to feed heavily at times on polychaetes (Golani & Diamant 1991), it was surprising to find such a large one in *P. punctulatus*. The stomach of another large adult from the same collection contained mainly the remains of several small compressed fishes too well digested to attempt identification.

We were perplexed to find some adult specimens of *P. punctulatus* with a prepelvic length of 2.7 in SL, and others with 2.5, a difference strongly suggesting two species. In addition, the anus and origin of the anal fin are a little more posterior in the fish with the shorter prepelvic length. These fish are females, with the pelvic fins in a more anterior position, and the anus and origin of anal fin a little more posterior (Fig. 16). This morphological difference with sex is also apparent for *P. guentheri* and *P. rahah*, n. sp. (next species), but apparently not for *P. argenteus* or *P. sharm*, n. sp. (description below).



**Figure 16.** *Parapriacanthus punctulatus*, paratypes, preserved, SAIAB 20194, ventral view: female (upper), 61 mm SL; male (lower), 66 mm SL, southern Mozambique (H.A. Randall).

## *Parapriacanthus rahah*, n. sp.

Figure 17; Table 1.

*Parapriacanthus ransonneti* [non Steindachner] Randall 1995: 244, fig. 636 (Oman).

**Holotype.** BPBM 36324, female, 53 mm SL, Arabian Sea, south coast of Oman, Rahah Bay, cave in drop-off known as Hole-in-the-Wall, 16°57' N, 59°49' E, 14 m, rotenone, J.P. Hoover & D.N. Cochrane, Feb. 6, 1993.

**Paratypes.** BPBM 41240, 3: 50–54 mm SL, and USNM 437250, 50.5 mm SL, same data as holotype; a sixth specimen was sent as a gift to Randall D. Mooi, then of the Milwaukee Public Museum, in 1992.

**Description.** Dorsal-fin rays VI,9; anal-fin rays III,20 (20–22); pectoral-fin rays 15 or 16 (usually 16); lateral-line scales 65 (64–69); rows of scales between lateral-line and origin of dorsal fin 5.5; gill rakers 25 (24–26, modally 25); body depth 3.2 (3.1–3.2) in SL; body width 2.1 (2.0–2.15) in body depth; caudal-peduncle depth 10.2 (9.5–10.1) in SL; head length 3.0 (2.85–3.0) in SL; snout length 12.2 (12.2–12.9) in SL; eye relatively large, the orbit diameter 7.5 (7.6–7.8) in SL; interorbital width 13.1 (12.0–14.0) in SL; mouth forming an angle of about 60° to horizontal axis of body; upper jaw primarily with two irregular rows of slender, recurved teeth that project downward, becoming progressively smaller to end of jaw; lower jaw with two medial rows of strongly recurved and inward-projecting teeth, soon reduced to a single row for remainder of jaw; small, incurved, sharply conical teeth in a single irregular row on vomer and palatines; upper lip thin, densely covered with dark purple papillae; lower lip with smaller, more widely spaced papillae; tongue broadly triangular, slightly indented on sides anteriorly, forming a small rounded tip; predorsal length 2.5 (2.4–2.45) in SL; first dorsal-fin soft ray longest, 4.4 (4.6–4.65) in SL; caudal-fin forked, fin length 3.9 (3.95 & broken) in SL; pectoral-fin length 3.5 (3.45–3.55) in SL; prepelvic length 2.75 (2.5–2.7) in SL; pelvic fins not reaching anus, the fin length 5.0 (5.1–5.3) in SL; preanal length 1.55 (1.5–1.6) in SL. No pin-like dark line anterior to anus. Iris in preserved specimens golden. Color when fresh as in Fig. 17.

**Etymology.** This species is named for the type locality as a noun in apposition.

**Remarks.** Instead of a black pin-like mark, bordered by white, before the anus, as seen on *P. argenteus*, *P. guentheri*, and *P. kwazulu*, *P. rahah* has a pale yellowish brown pin-like mark, one scale in width, within a deep blue midventral band that extends forward between the pelvic fins. Rahah Bay on the exposed south coast of Oman is unusual in harboring four species of *Pempheris* (Randall & Victor 2015). A photograph of the tidal channels of the bay was published by Randall & Victor (2014; Fig. 2).



**Figure 17.** *Parapriacanthus rahah*, holotype, fresh, BPBM 36324, female, 53 mm SL, Rahah Bay, Oman (J.E. Randall).

***Parapriacanthus sharm*, n. sp.**

Figures 18 & 19; Table 1.

**Holotype.** BPBM 21526, female, 61.5 mm SL, Red Sea, Gulf of Aqaba, southern end of Sinai Peninsula, Sharm el Sheikh, boat pier, multiprong spear, J.E. Randall, April 30, 1977.

**Paratypes.** BPBM 41241, 57 mm SL, SAIAB 201582, 53.5 mm SL, and USNM 437249, 59 mm SL, all with same data as holotype.

**Description.** Dorsal-fin rays VI,9; anal-fin rays III,22 (22–23); pectoral-fin rays 17 (16 or 17, modally 17); lateral-line scales 67 (64–68); rows of scales between lateral-line and origin of dorsal fin 5.5; gill rakers 25 (25 or 26); body depth 3.1 (3.1–3.15) in SL; body width 2.35 (2.2–2.35) in body depth; caudal-peduncle depth 10.1 (9.5–10.2) in SL; head length 2.85 (2.75–2.8) in SL; snout length 13.2 (12.0–13.0) in SL; eye relatively large, orbit diameter 6.9 (6.7–6.8) in SL; interorbital width 12.2 (11.7–12.1) in SL; mouth forming an angle of about 65° to horizontal axis of body; lower jaw slightly protruding when mouth fully closed; upper jaw primarily with two irregular rows of slender, recurved teeth, those of upper row initially in the same plane as the surface of upper lip, then sharply curved inwardly and posteriorly; inner row of teeth more sharply recurved; teeth continue in two rows, progressively smaller, nearly to end of jaw, before reduced to a single row; lower jaw with a single row of slightly smaller, strongly recurved slender teeth; small, incurved, sharply conical teeth in a single irregular V-shaped row on vomer; similar teeth in a row on palatines; lips thin with very small, well-spaced, dark purple papillae; tongue broadly triangular, slightly indented on sides anteriorly to form a small, rounded, thickened tip; predorsal length 2.45 (2.4–2.45) in SL; first dorsal-fin soft ray longest, 4.7 (broken & 4.8) in SL; caudal-fin forked, fin length 4.35 (4.05–4.1) in SL; pectoral-fin length 3.4 (3.1–3.15) in SL; prepelvic length 2.6 (2.55–2.7) in SL; pelvic fins far from anus, the fin length 5.0 (5.35–5.7) in SL; preanal length 1.55 (1.5–1.6) in SL. No pin-like dark line anterior to anus. Iris in preserved holotype black. Color in alcohol as in Fig. 18; color in life as in Fig. 19.

**Etymology.** This species is named for the type locality, the Egyptian dive-resort city of Sharm el Sheikh near the southern end of the Sinai Peninsula, and the gateway to Ras Muhammed National Park. Sharm in Arabic means narrow passage; the city contains a narrow isthmus between the Gulf of Aqaba and the Gulf of Suez. The specific epithet is a noun in apposition.

**Remarks.** Specimens of both *P. guentheri* and *P. sharm* were collected by multiprong spear by the first author at the southern end of the Sinai Peninsula, the former in 1977 from Ras Muhammad (became a national park in 1983), the latter at Sharm el Sheikh in 1977; both collections were from shallow water. The fish in the underwater



**Figure 18.** *Parapriacanthus sharm*, holotype, preserved, BPBM 21526, female, 61.5 mm SL, Sharm el Sheikh, Red Sea (H.A. Randall).



**Figure 19.** *Parapriacanthus sharm*, Ras Abu Galum, Sinai Peninsula, Gulf of Aqaba, Red Sea (S.V. Bogorodsky).

photograph of Fig. 19 were identified as *P. sharm* primarily by predorsal, prepelvic, and preanal lengths. These measurements are more stable with growth than others such as eye size, body depth, and fin lengths. We would have preferred to have specimens for the description that came from the same aggregation that was photographed.

### Acknowledgments

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## Appendix

The word “preliminary” in the title of the paper is well-deserved, because there are clearly more species of *Parapriacanthus* in the western Indian Ocean than are included here. The following underwater photographs represent fishes for which we have been unable to obtain specimens. The chapter on the family Pempheridae is the last needed for a series of multiple-author volumes on the coastal fishes of the western Indian Ocean to be published by the South African Institute for Aquatic Biodiversity. This review is needed to complete the chapter on the sweepers (Pempheridae). A large second loan of specimens of the genus *Parapriacanthus* from the SAIAB was lost in the mail. It probably included specimens of at least one of the species shown on the next pages.



**Appendix Figure 1.** *Parapriacanthus* sp., Sodwana Bay, KwaZulu-Natal, South Africa (D.R. King).



**Appendix Figure 2.** *Parapriacanthus* sp., Sodwana Bay, KwaZulu-Natal, South Africa (D.R. King).



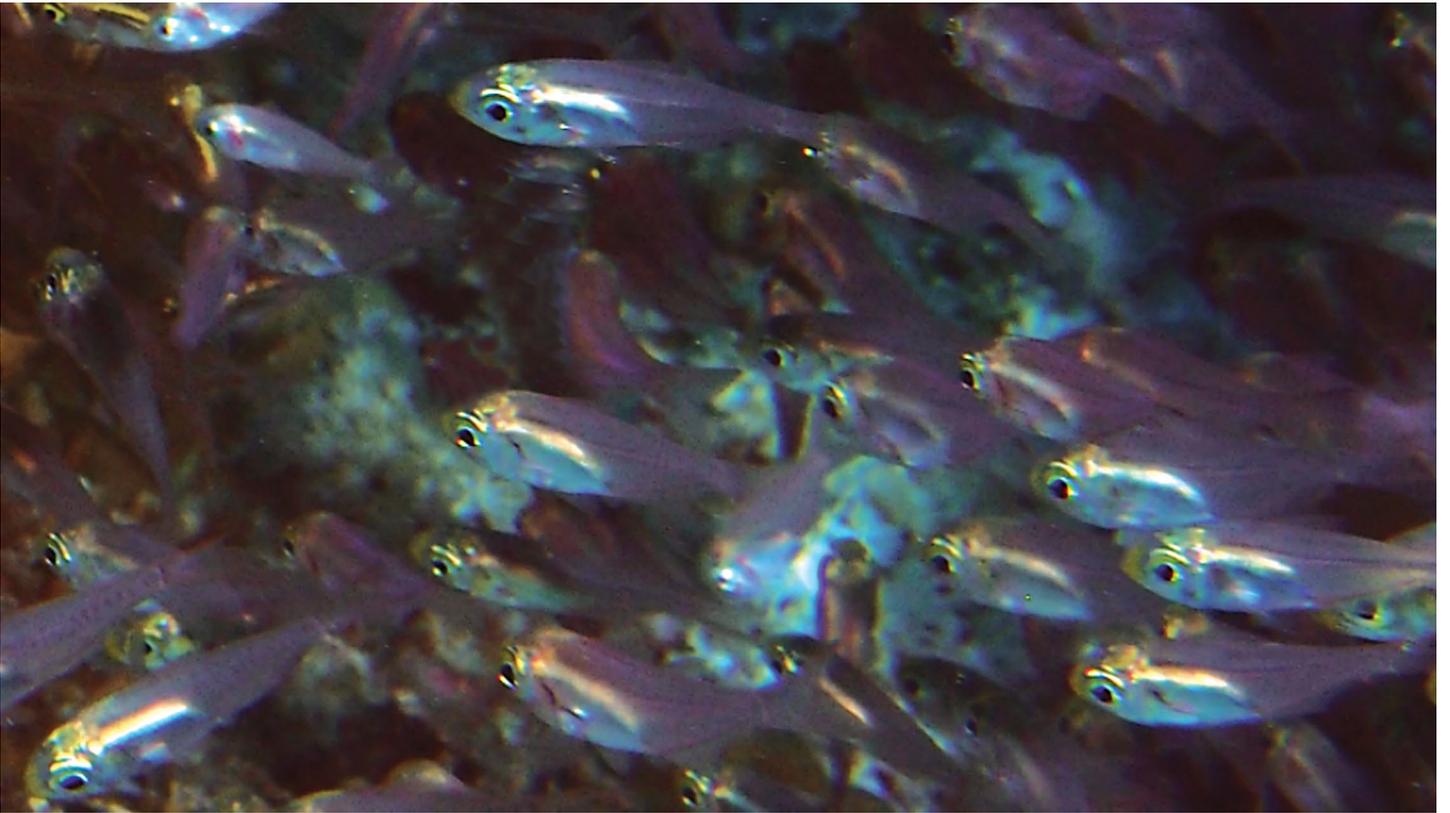
**Appendix Figure 3.** *Parapriacanthus* sp., Maldives (J.E. Randall).



**Appendix Figure 4.** *Parapriacanthus* sp., Maldives (R.C. Anderson).



**Appendix Figure 5.** *Parapriacanthus* sp., Dahab, Egypt, Red Sea (S.V. Bogorodsky).



**Appendix Figure 6.** *Parapriacanthus* sp., Marsa Shagra, Egypt, Red Sea (B. Hazes).



**Appendix Figure 7.** *Parapriacanthus* sp., Sharm el Naga, Safaga, Egypt, Red Sea (A. Ryanskiy).