

## A New Species of the Genus *Pempheris* (Teleostei: Pempherididae) from Rapa Iti, French Polynesia<sup>1</sup>

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**ABSTRACT:** *Pempheris rapa* Mooi, n. sp., is distinguished from congeners by the following combination of characters: scales strongly ctenoid and adherent; no gular scales; pelvic axillary scale absent; dorsal fin with six spines; in specimens 35 mm SL or larger, gill-raker counts on first arch 11–13 + 26–29 = 37–42 (usually 38–40); lateral-line scales 72–84 (rarely fewer than 76); no anterior light organ; anal fin with 33–37 segmented rays. A second species of *Pempheris* of uncertain identification, but a member of the cycloid-scaled and keeled species complex that includes *P. oualensis*, was found among the collections of the new species.

FISHES OF THE FAMILY Pempherididae, commonly known as sweepers or bullseyes, are small to medium-sized fishes (usually < 200 mm standard length [SL]) found on rocky and coral reefs of the tropical and temperate Indo-Pacific and western Atlantic Oceans to depths of 100 m. Tominaga (1965) restricted the definition of the family to include two genera: *Pempheris* Cuvier, 1829 (over 30 nominal species of which fewer than 20 are valid), and *Parapriacanthus* Steindachner, 1870 (eight nominal species of which about four are valid). They are characterized by strongly compressed bodies, a single, short, anteriorly placed dorsal fin, large eyes, and the lateral line extending well on to the caudal fin. Although there is clear support that the members of the two genera collectively form a monophyletic group (Tominaga 1968), the monophyly of each individual genus has yet to be rigorously tested. Currently, Indo-Pacific members of *Pempheris* are distinguished externally from *Parapriacanthus* by having lateral-line scales extending to the tips of the middle caudal rays (versus half-way), anal fin scaled (versus not scaled), and

more than 27 segmented anal-fin rays (versus 27 or fewer).

Collections from the eastern Pacific extreme of the range of *Pempheris* are uncommon. Specimens reported by Randall et al. (1990) from Rapa Iti (27° 36' S, 144° 20' W), the southernmost island of French Polynesia, were suspected to be an undescribed species by Randall and the late Yoshiaki Tominaga (J. E. Randall, pers. comm.). Ongoing revisionary work on the genus has confirmed this suspicion, and this paper describes the new species. Among these Rapa specimens, a second species of *Pempheris* was found. It is small and impossible to identify with confidence, but a brief description of this specimen is provided with a tentative identification.

### MATERIALS AND METHODS

Specimen sizes are reported as SL in mm, measured from the tip of the snout to the middle of the posterior edge of the hypural plates. All morphometric measurements are presented as percentages of SL, with holotype values presented first, followed, in parentheses, by mean and range values of remaining specimens. Head depth was measured at the vertical of the posterior margin of the eye. Predorsal, prepelvic, and preanal

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lengths were measured from the tip of the snout to the origin of the relevant fin. Body depth was measured at the vertical from the dorsal origin to the ventral belly. Peduncle depth was the vertical distance measured from the anal-fin insertion (base of last segmented ray). All other measurements follow Hubbs and Lagler (1949) or are self-explanatory.

Counts are presented with the holotype value(s) first, followed, in parentheses, by the mode, range, and frequency comments for the remaining specimens. Calculation of mode and determination of range for number of lateral-line scales and gill rakers includes counts of both sides. Gill-raker counts are provided as upper+lower limb counts of outer elements (including rudiments) of the first arch, with the raker in the angle included as part of the lower limb. Caudal-fin ray counts are separated into number of principal caudal rays (branched rays + 1 unbranched ray above and below) and procurrent rays (remaining unbranched elements anterior to the principal rays). Procurrent ray number is provided as upper and lower counts, with unsegmented and then segmented elements separated by a comma. Predorsal scale counts were made to the vertical at the anterior margin of the pupil. All other counts follow Hubbs and Lagler (1949). Cheek scale row number was often difficult to determine because scales are crowded and do not form obvious rows. Radiographs were used to make median fin and vertebral counts, as well as for examining the internal morphology of the pectoral girdle.

Most counts and measurements for the new species are based on specimens longer than 30 mm SL (14 specimens). Specimens smaller than 30 mm SL were not used for morphometric descriptions, but meristic data were obtained for lateral-line scale, gill raker, dorsal-fin ray, anal-fin ray, pectoral-fin ray, and vertebral number. Specimens smaller than 22 mm SL did not have lateral-line scales consistently developed on the caudal peduncle, and many of these could not be included for this count.

Material is deposited in the following institutions: AMS, Australian Museum, Sydney; BPBM, Bishop Museum, Honolulu; MNHN,

Muséum Nationale d'Histoire Naturelle, Paris; MPM, Milwaukee Public Museum, Milwaukee; ROM, Royal Ontario Museum, Toronto; USNM, National Museum of Natural History, Washington, D.C.

*Pempheris rapa* Mooi, n. sp.

Figures 1–2; Tables 1–3

*Pempheris* sp., Randall et al., 1990:22 (brief description).

TYPE MATERIAL: Holotype: BPBM 12889, 126.2 mm, French Polynesia, Rapa Iti, Haurei Bay, 5–10 feet (1.5–3 m), rotenone, Dean B. Cannoy and Aki Sinoto, 2 February 1971. Paratypes: 9 specimens, 125.0–134.7 mm, all collected with the holotype: AMS I. 37829-001, 130.5 mm; BPBM 37408, 4: 125.0–131.7 mm; MNHN 1997-57, 128.7 mm; MPM 31325, 126.9 mm; ROM 70538, 127.3 mm; USNM 344109, 134.7 mm.

OTHER MATERIAL EXAMINED: 30 specimens, 14.7–124.6 mm: BPBM 17289, 9: 14.7–124.6 mm, French Polynesia, Rapa, SW side of Karapoo Iti Island, cave, 60 feet (18.3 m), rotenone, J. Randall and D. Bryant, 16 February 1971; BPBM 12967, 21: 15.0–26.3 mm, Rapa Iti, off Hiri Bay, small cave, 60 feet (18.3 m), rotenone, specimens occurred as a school, J. Randall and D. Cannoy, 10 February 1971 (color and black and white photos of largest).

DIAGNOSIS: *Pempheris rapa* is unique among the Pempherididae in having the following combination of characters: VI dorsal spines; scales strongly ctenoid and adherent; no gular scales; 72–84 lateral-line scales, usually more than 76; 37–42 gill rakers on first arch; no anterior light organ.

DESCRIPTION: Dorsal-fin rays VI,11 (VI,11; VI,10–11); anal-fin rays III,36 (III,35; III,33–37); pectoral-fin rays 17 (16; 16–17); pelvic-fin rays I,5; principal caudal-fin rays 9 + 8; upper procurrent rays 6,1 (7,1; 6–7,1–2); lower procurrent rays 4,1 (5,1; 4–6,1–2); lateral-line scales 80 (80; 72–84, rarely fewer than 76); scale rows above lateral line 12 (13; 12–14); scale rows below lateral line 27 (25;

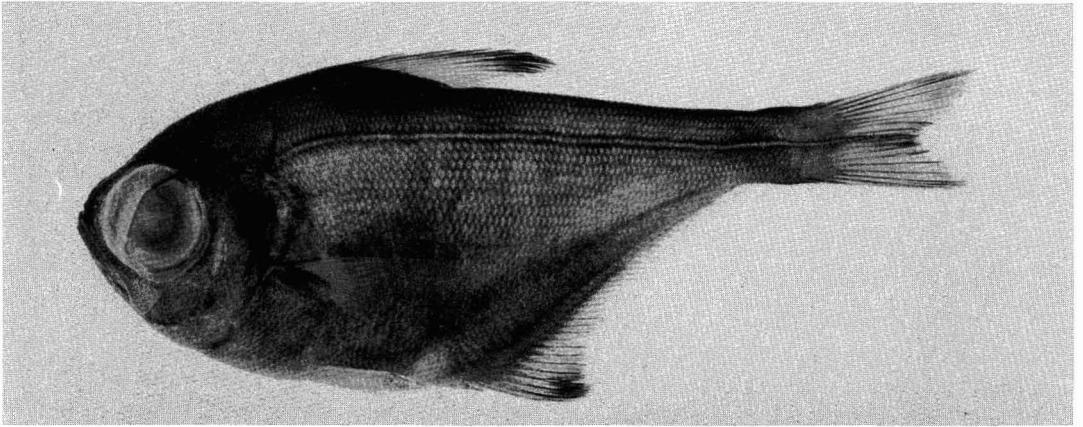


FIGURE 1. Holotype of *Pempheris rapa*, n. sp., BPBM 12889, 126.2 mm SL, Haurei Bay, Rapa Iti, French Polynesia.

22–27); cheek scale rows 8 (9; 8–9); predorsal scales 41 (44; 40–46); circumpeduncular scales 27 (28; 25–29); gill rakers 11 + 28 left, 12 + 28 right (12 + 28; 11–13 + 26–29 in specimens above 30 mm SL; 8–9 + 22–24 in specimens below 19 mm SL; 9–11 + 24–25 in specimens 19–23 mm SL; 10–11 + 25–26 in specimens 23.1–27 mm SL); total gill rakers 39 left, 40 right (38; 37–42 in specimens above 30 mm SL; 30–33 in specimens less than 19 mm SL; 32–36 in specimens 19–23 mm SL; 35–37 in specimens 23.1–27 mm SL) (Figure 2).

As percentage of SL: head length 30 (31; 29–33); head depth 32 (33; 31–35); snout length 6.3 (6.3; 6.0–7.0); eye diameter 15 (15; 14–16); interorbital width 7.8 (7.7; 6.7–8.1); upper-jaw length 17 (17; 15–19); predorsal length 40 (39; 37–41); prepelvic length 37 (38; 34–47); preanal length 52 (51; 49–57); pelvic-fin origin to anal-fin origin 17 (16; 14–18); body depth 45 (43; 41–45); pectoral-fin length 29 (29; 28–31); pelvic-fin length 18 (19; 18–23); dorsal-fin base 17 (18; 17–19); longest dorsal-fin ray 24 (25; 23–29); anal-fin base 51 (50; 48–52); longest anal-fin ray 17 (17; 16–19); caudal-peduncle length 10 (11; 9.6–11); caudal-peduncle depth 11 (12; 11–14); dorsal-fin origin to pelvic-fin origin 42 (42.5; 40–43); dorsal-fin origin to anal-fin origin 45 (44; 42–45); dorsal-fin origin to anal-fin insertion 58 (58; 55–61).

All scales ctenoid and adherent. Gular unscaled. Pelvic axillary scale absent. Prepelvic area (breast) unkeeled, flat, and broad. Caudal fin forked. Vertebrae 10 + 15 (precaudal + caudal).

Anterior and posterior light organs absent.

**COLORATION:** Live adult color unknown. Holotype preserved in 50% isopropanol (Figure 1): dorsal part of head, nape, and body brownish yellow, scale pockets outlined in darker brown; cheek, maxilla, ventral head, and prepelvic area paler than nape, speckled with brown chromatophores; dark, vertical elongate spot on opercle at level of eye; iris black; lateral line outlined in black, making lateral line obvious even on dark body; dorsal-fin spine membranes black, making leading edge of dorsal fin dark, distal quarter of first four segmented rays dark, remainder of fin paler; anal fin paler than body but speckled with dark chromatophores, distal quarter of first four segmented rays dark; pectoral fins mostly hyaline, bases darker than surrounding body color; pelvic fins hyaline with darker tips; caudal-fin rays hyaline, membranes dark, outermost branched rays (dorsal and ventral) with slightly darker tips. Color of paratypes essentially the same as that of holotype; some individuals darker in all aspects; some without an opercular spot.

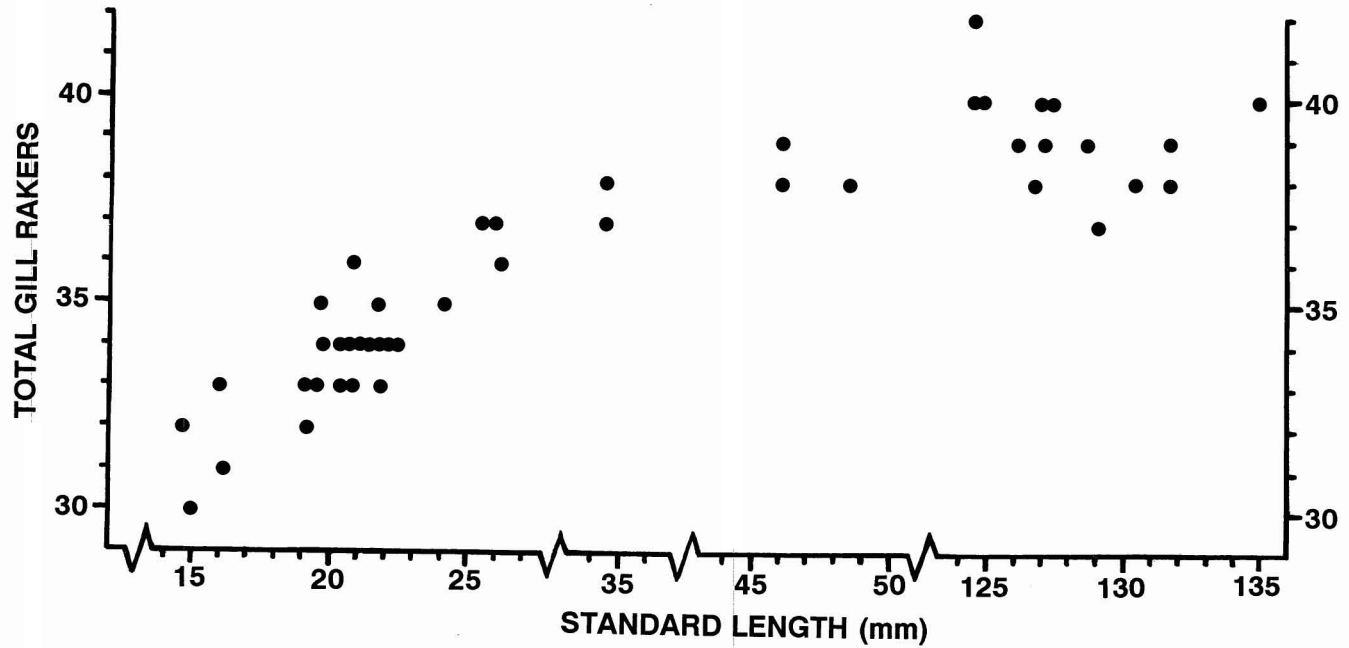


FIGURE 2. Ontogenetic changes in the number of gill rakers on the first arch of *Pempheris rapa*, n. sp., from Rapa Iti, French Polynesia.

TABLE 1

FREQUENCY OF GILL-RAKER COUNTS (BOTH SIDES) ON THE FIRST ARCH IN SPECIMENS OF *Pempheris rapa*, N. SP., GREATER THAN 30 MM SL

	UPPER ARCH			LOWER ARCH				TOTAL					
	11	12	13	26	27	28	29	37	38	39	40	41	42
FREQUENCY	10	13	3	7	11	9	1	3	9	7	8		1

TABLE 2

FREQUENCY OF NUMBER OF LATERAL-LINE SCALES IN SPECIMENS OF *Pempheris rapa*, N. SP. (INCLUDING BOTH SIDES, ALTHOUGH UNAVAILABLE FOR SOME SMALLER SPECIMENS)

	LATERAL-LINE SCALES												
	72	73	74	75	76	77	78	79	80	81	82	83	84
FREQUENCY	3		3		7	2	2	3	9	2	5		1

Color of nontype specimens similar, but paler, with body straw-colored.

Color photograph of 26.3-mm specimen (BPBM 12967): head and dorsal body yellowish and speckled with various-sized chromatophores; flank silvery, ventral body white; caudal peduncle mostly white, posteriorly dotted with chromatophores and ending with vertical yellow bar at caudal-fin base; dorsal fin yellow-orange anteriorly with chromatophores, posteriorly hyaline; anal fin hyaline; pectoral fin hyaline with yellowish base; pelvic fin orange-brown with dense chromatophores; caudal fin hyaline. Remarks on the label note that the fish was more transparent in life.

COMPARISONS: The genus *Pempheris* can be divided into two basic phenetic groupings: a keeled, cycloid-scaled species complex and an unkeeled, ctenoid-scaled species complex. *Pempheris rapa* falls into the latter, along with *P. adspersa* Griffin, 1927 (endemic to New Zealand), *P. analis* Waite, 1910 (restricted to the Kermadecs, Lord Howe, and mainland Australia), *P. compressa* (White, 1790) (endemic to eastern Australia), *P. japonica* Döderlein, 1883 (endemic to Japan), *P. klunzingeri* McCulloch, 1911 (endemic to

Australia), and *P. ypsilychnus* Mooi & Jubb, 1996 (endemic to Australia). Among these ctenoid-scaled *Pempheris* species, only *P. ypsilychnus* bears a pelvic axillary scale, a Y-shaped posterior light organ visible through the body wall, and a Y-shaped anterior light organ. Total gill-raker counts for *P. ypsilychnus* are considerably lower than for other ctenoid-scaled members of the genus, especially *P. rapa* (25–31 versus 37–42) (Table 1). *Pempheris klunzingeri* has five dorsal spines (versus six in *P. rapa*), an anterior light organ (versus no light organ), more segmented anal-fin rays (35–41 versus 33–37), and a scaled gular region (versus unscaled). *Pempheris adspersa* has fewer lateral-line scales (56–68, rarely more than 66 versus 72–84 [Table 2]) and fewer gill rakers (30–36 versus 37–42). *Pempheris analis* also has fewer gill rakers (31–36 versus 37–42) and generally fewer lateral-line scales (65–74, usually fewer than 73 versus 72–84, usually more than 76 [Table 2]). *Pempheris compressa* has a scaled gular region (versus unscaled), fewer lateral-line scales (59–68 versus 72–84), fewer gill rakers (33–38, usually fewer than 36 versus 37–42). *Pempheris japonica* also has fewer gill rakers (30–34 versus 37–42) and generally fewer lateral-line

TABLE 3

FREQUENCY OF NUMBER OF SEGMENTED ANAL-FIN RAYS IN SPECIMENS OF *Pempheris rapa*, N. SP.

	ANAL-FIN RAYS				
	33	34	35	36	37
FREQUENCY	3	10	14	9	4

scales (72–77 versus 72–84, usually more than 76).

DISTRIBUTION: *Pempheris rapa* is known only from Rapa Iti of the Tubuai Islands, French Polynesia (27° 36' S, 144° 18' W).

BIOLOGY: The gill-raker counts in this species do not consistently reach those of adult specimens until over 30 mm SL (Figure 2). As in many species, these counts increase with increasing size and do not become diagnostic until maturity. The unusual broad size range available for *P. rapa* has made it possible to outline the ontogenetic changes in this count. However, the three lots recorded by Randall et al. (1990) are all that are currently available, and our knowledge of the species' biology remains limited. The collections and label data suggest that this is a schooling species, at least as juveniles. The species has been collected from 1.5 to 18 m depth, and is found in or near caves during the daylight hours.

ETYMOLOGY: The epithet, to be treated as a noun in apposition, refers to the type locality and apparent endemism at Rapa.

REMARKS: Randall et al. (1990:22) noted that their *Pempheris* sp. (= *P. rapa*) has a "vertically elongate, oval dark spot on opercle at level of eye." Such a spot is no longer strongly evident on the preserved specimens, but would be an additional distinctive feature distinguishing the species from other ctenoid-scaled *Pempheris*.

The report on fishes of Rapa Iti by Randall et al. (1990:22) listed only one unidentified species of pempheridid, here described as *Pempheris rapa*. However, among some smaller specimens in one lot (BPBM

17289), I found a second species (now BPBM 37420). It is too small to identify with certainty, but it is a member of the cycloid-scaled and keeled species complex that includes *P. oualensis* Cuvier, 1831. This is a confusing array of about 20 nominal species in the Indo-Pacific alone, and for which the taxonomy is still under study (unpubl. data). In addition to bearing cycloid scales, a radiograph of the specimen clearly shows the typical coracoid morphology of the keeled species complex (i.e., similar to that of *P. xanthopterus* Tominaga, 1963 [= *P. schwenkii* Bleeker, 1855] in fig. 13 of Tominaga [1968:70]) rather than that typical of ctenoid-scaled species such as *P. japonica* (Tominaga 1968:fig. 13), which *P. rapa* resembles. Counts on the cycloid-scaled specimen are as follows: dorsal fin VI,9; anal fin III,40; pectoral-fin rays 17 left, 18 right; gill rakers on first arch 8 + 21; lateral-line scales 68. Other scale counts were not possible because of the deciduous nature of scales on these species and perhaps their lack of development in such a small specimen. The lateral-line scale count precludes the species from being *P. schwenkii* (68 versus 44–51). *Pempheris oualensis*-type specimens are known from as far east as Pitcairn (BPBM 16804), and this seems to be the most likely identification of this second species from Rapa Iti.

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