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Redescription of a Poorly Known Southeastern Pacific Scorpionfish (Scorpaenidae), *Phenacoscorpius eschmeyeri* Parin and Mandrytsa

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A poorly known scorpionfish (Scorpaenidae), *Phenacoscorpius eschmeyeri* Parin and Mandrytsa, 1992, has been known only from the holotype from the Sala y Gomez Ridge, southeastern Pacific Ocean. Two new specimens of the species, collected from the Nazca Ridge, near the type locality, and found in the fish collection of the Hokkaido University Museum, are described in detail. The holotype was also reexamined. The two diagnostic characters of the species given in the original description to separate it from a related congener, *Phenacoscorpius adenensis* Norman, 1939, were found to be invalid, but a new series of diagnostic characters was found. A revised diagnosis of the species is thereupon provided. A color photograph of *P. eschmeyeri* when fresh is published for the first time.

Key Words: Teleostei, Actinopterygii, *Phenacoscorpius adenensis*, morphology, diagnosis.

Introduction

The deepwater scorpionfish genus *Phenacoscorpius* Fowler, 1938 (Scorpaenidae) is characterized by having the lateral line incomplete, with only a few anterior pored lateral-line scales present (Eschmeyer 1965b; Poss 1999; Motomura 2008). Five species of the genus in the Indo–Pacific are regarded as valid species (Motomura 2008; Motomura and Last 2009; Motomura *et al.* 2012). One of these five species, *Phenacoscorpius eschmeyeri* Parin and Mandrytsa in Mandrytsa, 1992, was originally described on the basis of a single specimen from the Sala y Gomez Ridge, southeastern Pacific Ocean. No additional specimens of this species have been reported since its original description.

During a deep-sea survey conducted by the Japan Marine Fishery Resources Research Center in 1999, two specimens of *Phenacoscorpius* were collected from the Nazca Ridge; this ridge is located on the same seamount chain as the Sala y Gomez Ridge, the type locality of *P. eschmeyeri*. The newly collected specimens are herein identified as *P. eschmeyeri*. Examination of the holotype and the new specimens revealed that two important identifying characters given by Parin and Mandrytsa in Mandrytsa (1992) for *P. eschmeyeri*, *i.e.*, 16 pectoral fin rays and six anal fin soft rays, are invalid for diagnosis. The new specimens are described below in detail and a revised diagnosis for *P. eschmeyeri* is provided. The first color description of *P. eschmeyeri* is also given here, based on a photograph of a new specimen taken before preservation; the fresh coloration of the species was otherwise unknown.

Material and Methods

Measurements generally follow Motomura (2004a, b), except head width (Motomura *et al.* 2005b, 2006a), and maxillary depth (Motomura *et al.* 2006b). Body depth was measured vertically from the origin of the pelvic-fin spine; second body depth was defined as the direct distance between the origins of the last dorsal-fin spine and the first anal-fin spine. Post-nuchal-spine length is taken from the posterior end of the nuchal spine tip to the dorsal-fin origin. Counts follow Motomura *et al.* (2005a–c) and Motomura and Johnson (2006), with predorsal scale counts following Motomura *et al.* (2006b). The last two soft rays of both the dorsal and anal fins are counted as single rays, each pair being associated with a single pterygiophore. Counts of preopercular spines begin with the uppermost spine. Standard length is expressed as SL. Terminology of head spines follows Randall and Eschmeyer (2002: fig. 1) and Motomura (2004b: fig. 1) with the following additions: the spine at the base of the uppermost preopercular spine is referred to as the supplemental preopercular spine (Eschmeyer 1965a); the spine on the lateral surface of the lacrimal bone is referred to as the lateral lacrimal spine (Motomura and Senou 2008: fig. 2; Motomura *et al.* 2011b: fig. 1); and the coronal and pretympanic (as an extra spine) spines are as figured in Chen (1981: fig. 1) and Motomura *et al.* (2004: fig. 14b) respectively. The specimens examined in this study are deposited in the

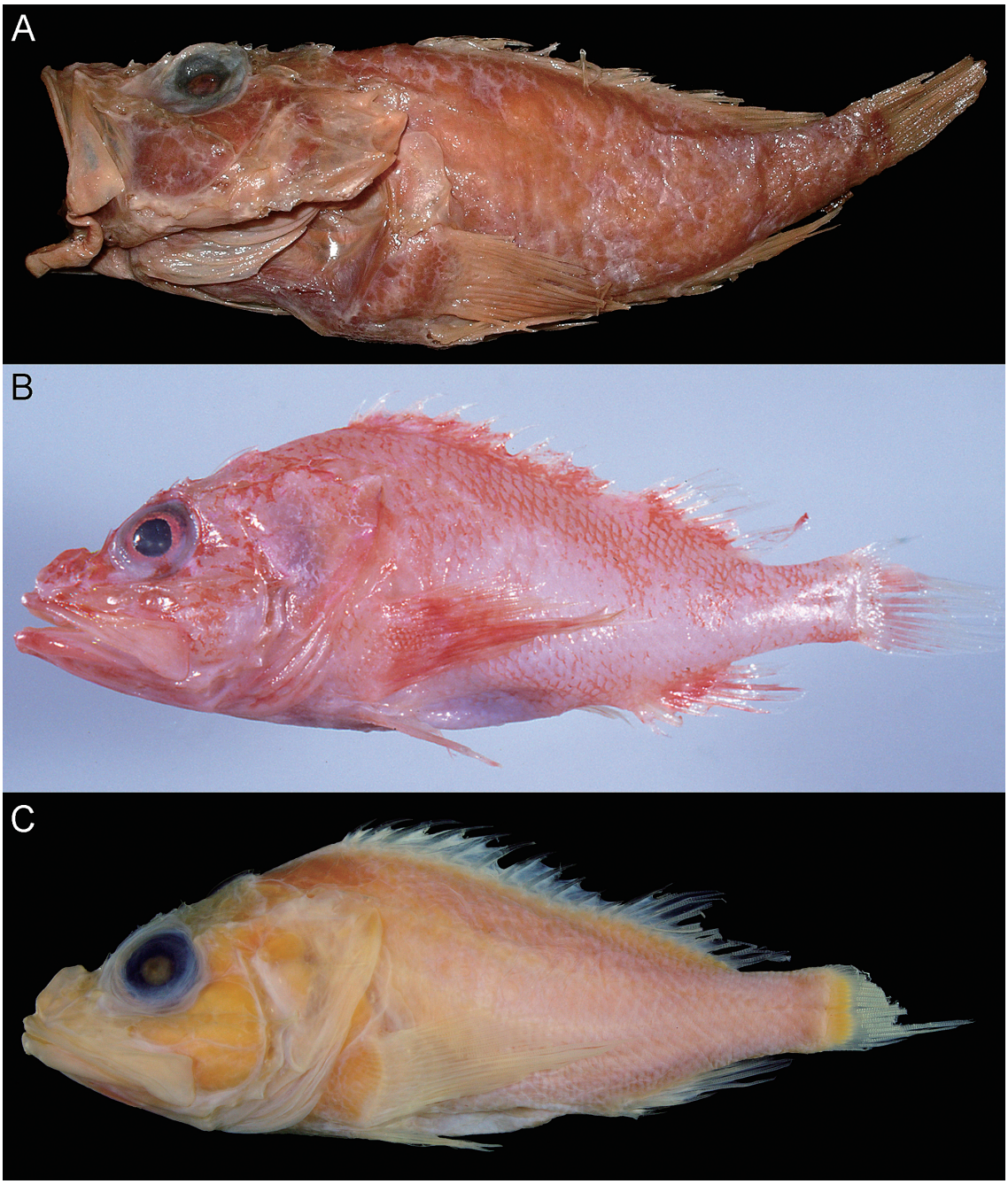

Fig. 1. Photographs of *Phenacoscorpius eschmeyeri*. A, ZIN 49328, holotype, 132.8 mm standard length; B, fresh specimen, HUMZ 164422, 124.0 mm standard length; C, preserved specimen, same as B.

Hokkaido University Museum, Hakodate, Japan (HUMZ) and the Laboratory of Ichthyology, Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (ZIN). As comparative material, 54 specimens of *Phenacoscorpius adenensis* Norman, 1939 were examined; these were listed in Motomura *et al.* (2012).

Phenacoscorpius eschmeyeri Parin and Mandrytsa, 1992
[New English name: Eschmeyer's No-line Scorpionfish]
(Fig. 1; Table 1)

Phenacoscorpius eschmeyeri Parin and Mandrytsa in Mandrytsa, 1992: 10, fig. 1 (type locality: Sala y Gomez Ridge, southeastern Pacific Ocean, 25°02′S, 90°41′W).

Material examined. ZIN 49328, holotype, 132.8 mm SL, Sala y Gomez Ridge, 25°02′S, 90°41′W, 630 m depth, FRV *Gerakl*, 3 November 1975; HUMZ 164422, 124.0 mm SL, Nazca Ridge, 25°29′S, 90°19′W, 584 m depth, 24 October 1999; HUMZ 166546, 110.7 mm SL, Nazca Ridge, 25°31′S, 90°18′W, 580 m depth, 28 October 1999.

Diagnosis. A species of *Phenacoscorpius* with the following combination of characters: pectoral fin rays 16–17, middle rays branched; pored lateral-line scales 2–7; palatine teeth present; second preopercular spine usually absent; nuchal and parietal spines fused to each other, forming single

Table 1. Counts and measurements of *Phenacoscorpius eschmeyeri*.

	Holotype Sala y Gomez Ridge	Non-types Nazca Ridge		
	ZIN 49328	HUMZ 164422	HUMZ 166546	
Standard length (SL, mm)	132.8	124.0	110.7	
Dorsal fin rays	XII, 8	XII, 9	XII, 9	
Pectoral fin rays (left/right)	16/16	17/17	17/17	
Pelvic fin rays	I, 5	I, 5	I, 5	
Anal fin rays	III, 6	III, 5	III, 5	
Pored lateral-line scales (left/right)	4/3	5/7	3/2	
Predorsal scale rows	—	—	12	
Gill rakers (upper+lower=total)	5+16=21	6+15=21	7+15=22	
% of SL				Mean
Body depth	33.2	35.7	34.6	34.5
2nd Body depth	—	25.2	23.3	24.3
Body width	—	19.8	19.5	19.7
Head length	44.5	46.0	44.4	45.0
Snout length	11.6	12.0	12.4	12.0
Orbit diameter	13.9	13.1	12.4	13.1
Interorbital width[1]	5.0	5.3	5.6	5.3
Interorbital width[2]	4.6	4.9	5.1	4.9
Head width	13.4	14.0	13.9	13.8
Upper-jaw length	22.3	23.8	22.6	22.9
Maxillary depth	7.2	7.0	6.5	6.9
Post-nuchal-spine length	—	11.3	11.0	11.2
Between tips of opercular spines	—	6.5	5.8	6.1
Postorbital length	19.4	22.8	20.4	20.9
Pre-dorsal-fin length	43.8	44.0	43.7	43.8
Pre-anal-fin length	80.6	75.2	75.2	77.0
Pre-pelvic-fin length	53.5	42.7	43.9	46.7
1st dorsal-fin spine length	4.4	5.4	—	4.9
2nd dorsal-fin spine length	7.9	8.3	6.8	7.7
3rd dorsal-fin spine length	—	11.5	10.5	11.0
4th dorsal-fin spine length	—	11.0	9.6	10.3
5th dorsal-fin spine length	—	—	9.5	9.5
11th dorsal-fin spine length	8.8	—	4.2	6.5
12th dorsal-fin spine length	4.7	8.8	8.2	7.2
1st anal-fin spine length	6.3	7.5	6.6	6.8
2nd anal-fin spine length	12.0	—	13.8	12.9
3rd anal-fin spine length	8.1	11.6	10.9	10.2
Longest anal fin soft ray length	17.0	18.0	—	17.5
Pectoral fin length	—	35.2	36.2	35.7
Pelvic fin spine length	12.1	13.7	12.4	12.7
Longest pelvic fin soft ray length	19.2	19.0	18.5	18.9
Caudal fin length	—	—	20.1	20.1
Caudal peduncle length	18.5	18.1	20.2	19.0
Caudal peduncle depth	8.9	9.4	9.0	9.1

[1] at vertical midline of eye; [2] at posterior end of preocular spine base.

large spine; relatively long post-nuchal spine (11.0–11.3% SL), snout (11.6–12.4%), upper-jaw (22.3–23.8%), pre-dorsal-fin (43.7–44.0%), pre-anal-fin (75.2–80.6%), and pre-pelvic-fin (42.7–53.5%) lengths; relatively short spines and soft rays in dorsal, pelvic, and anal fins; 0–1 distinct black spots on posterior half of caudal peduncle; largest recorded specimen 133 mm SL.

Description. Morphometrics and selected meristics of *P. eschmeyeri* given in Table 1. Body moderately compressed from side to side anteriorly, progressively more compressed posteriorly. Nape and anterior body moderately arched. Body moderately deep, but body depth less than head length. Uppermost ray and lower 9 rays of pectoral fin unbranched, remaining rays branched; ninth or tenth ray longest. Second soft rays longest among pelvic and anal fin rays. No distinct papillae, tentacles, or cirri on head and body. No supraocular tentacles. No fimbriate flap on posterior lacrimal spine. Pectoral fin axil without skin flap. Cycloid scales

covering opercle, cheek, and area defined by orbit, suborbital ridge, upper preopercle, nuchal spine, and lower posttemporal spine. Ctenoid scales (some scales cycloid) covering interorbital and occiput region; scales becoming smaller anteriorly; other parts of head not covered with scales. Well-exposed ctenoid scales covering lateral surface of upper body, scales becoming cycloid ventrally. Body scales not extending onto rays or membranes of fins, except basal part of caudal fin. Exposed cycloid scales covering anteroventral surface of body and pectoral fin bases. Embedded cycloid scales covering area between first anal-fin spine base and anus. Lateral line incomplete; last pored lateral-line scale below spinous portion of dorsal fin.

Mouth large, slightly oblique, forming angle of about 20 degrees to longitudinal axis of head and body. Posterior margin of maxilla just reaching to a vertical drawn through posterior margin of orbit. Lateral surface of maxilla smooth, without ridges, tentacles, or scales. Lower jaw with symphyseal knob. Width of symphyseal gap separating premaxillary teeth bands subequal to width of each band. Upper and lower jaw each with band of villiform teeth, tooth band of upper jaw wider than that of lower jaw, lengths of most teeth in both jaws equal. Vomer and palatines with villiform teeth; width of vomer plate subequal to length of palatine plate. Underside of dentary with 3 sensory pores on each side, first pore below tip of anterior lacrimal ridge, second pore below a point between anterior and posterior lacrimal spines, third pore located on posterior margin of dentary. A pore behind symphyseal knob of lower jaw on each side. Underside of lower jaw smooth, without ridges or tentacles.

Dorsal profile of snout steep, forming an angle of about 50 degrees to longitudinal axis of head and body. Nasal spine simple, somewhat conical, directed upward. Anterior nostril with low membranous tube and no tentacle. Ascending process of premaxilla not intruding into interorbital space, its posterior margin not extending beyond level of posterior margin of posterior nostril. Median interorbital ridge absent. Interorbital ridges poorly developed, separated by shallow channel, beginning posterior to nasal spines and not conjoined to each other. No distinct ridge on anterior edge of occiput. Interorbital ridges diverging anteriorly and posteriorly in dorsal view, space between interorbital ridges narrowest at a vertical through anterior margin of pupil. Interorbital space shallow, only about one-tenth of orbit extending above dorsal profile of head. Preocular spine simple, directed nearly upward. Supraocular spine simple, its tip located above middle of eye. Postocular spine simple, slightly shorter than tympanic spine. Tympanic spine simple; bases of tympanic spines joined with interorbital ridges. Coronal, interorbital, and pretympanic spines absent. Occiput nearly flat. No distinct transverse ridge at rear of occiput. Occiput surrounded laterally by tympanic and nuchal spines. Nuchal and parietal spines fused to each other, forming single large spine. Sphenotic with small spines. Postorbital smooth. Pterotic spine simple. Upper posttemporal spine absent, but distinct ridge present. Lower posttemporal spine simple, its base longer than that of pterotic spine. Supracleithral and cleithral spines flattened, rounded, lacking pointed tips.

Single lateral lacrimal spine present but small (absent in smaller specimen). Anterior lacrimal spine indistinct, not pointed; no additional spines at anterior base of lacrimal spine. Posterior lacrimal spine simple, not strongly pointed, triangular, its tip not reaching upper-jaw lip. Posterior lacrimal spine larger than anterior spine. Suborbital ridge with 4–6 spines, first spine below middle of eye. Preopercle with 4 or 5 spines, uppermost spine largest with supplemental preopercular spine on its base, second spine small or absent, third to fifth spines without median ridge. Preopercle without serrae or spines between uppermost preopercular spine and its own upper end. Upper opercular spine simple, without median ridge. Lower opercular spine simple, with distinct median ridge. Space between upper and lower opercular spines not covered with fleshy skin. Posterior tips of upper and lower opercular spines not reaching opercular margin.

Origin of first dorsal-fin spine above first pored lateral-line scale. Posterior margin of opercular membrane extending beyond vertical drawn through origin of second dorsal-fin spine. Posterior tip of pectoral fin reaching vertical drawn through middle of soft-rayed portion of dorsal fin. Posterior tip of depressed pelvic fin not reaching to anus. Origin of pelvic fin spine anterior to origin of pectoral fin. Origin of first anal-fin spine slightly posterior to origin of last dorsal-fin spine.

Color when fresh (Fig. 1B). Body and fins pale reddish, mottled with whitish blotches, without black stripes, bands, or blotches. Dark areas faintly seen through opercle and abdomen. Color when alive unknown.

Color of preserved specimens (Fig. 1C). Body uniformly white, except for black eyes and spot on caudal peduncle. No black blotch on spinous portion of dorsal fin.

Remarks. *Phenacoscorpius eschmeyeri* and *P. adenensis* can be easily distinguished from their congeners in the Indo–Pacific by having teeth on the palatines (Motomura 2008; Motomura and Last 2009). Parin and Mandrytsa in Mandrytsa (1992) separated *P. eschmeyeri* from *P. adenensis* by its having 16 pectoral fin rays (*vs* 17 rays in the latter) and six anal fin soft rays (*vs* five rays). However, the newly collected specimens of *P. eschmeyeri* have 17 pectoral fin rays on both sides of the body and five anal fin soft rays (Table 1); no other morphological difference between the holotype and the new specimens was found. In fact, the number of anal fin soft rays of the holotype (six) is unusual in the Scorpaenidae, species of which usually have five rays if there are three spines in the anal fin (six rays if two spines) and is most likely to be a deformity. The number of pectoral fin rays in some species of Scorpaenidae, including *Phenacoscorpius*, has a range of variation; *e.g.*, *Phenacoscorpius megalops* Fowler, 1938 has 16–18 rays (Motomura 2008). Thus, the two characters, *i.e.*, numbers of pectoral and anal fin rays, given by Parin and Mandrytsa in Mandrytsa (1992) cannot be used to separate the two species.

Examination of the holotype and the two new specimens showed that the nuchal and parietal spines of the specimens are fused to each other, forming a single large spine. This is a unique character among the species of *Phenacoscorpius*;

the nuchal and parietal spines of other congeners are indeed basally fused, but still present as two distinct spines (Motomura 2008; Motomura and Last 2009; Motomura *et al.* 2012). In Scorpaeninae, such a condition of the spine as found in *P. eschmeyeri* is known only in the western Indian Ocean species *Neoscorpaena nielseni* (Smith, 1964), and is regarded as a diagnostic character for the monotypic genus *Neoscorpaena* Mandrytsa, 2001 (Eschmeyer 1986; Motomura *et al.* 2011a).

In addition to the nuchal spine character, a detailed comparison of *P. eschmeyeri* with *P. adenensis* revealed that the post-nuchal-spine length of *P. eschmeyeri* (11.0–11.3% of SL) is greater than that of *P. adenensis* (3.2–9.5% of SL; Motomura *et al.* 2012: table 1). Lengths associated with the post-nuchal-spine length, *i.e.*, pre-dorsal-fin (mean 43.8% of SL), pre-anal-fin (77.0%), and pre-pelvic-fin (46.7%) lengths, of *P. eschmeyeri* are also greater than those (40.1%, 68.5%, and 38.4% respectively) of *P. adenensis* (see range of values in Motomura *et al.* 2012: table 1). Furthermore, the unpaired fins, *i.e.*, the spines and soft rays of the dorsal, pelvic, and anal fins, of *P. eschmeyeri* are extremely short compared with those of *P. adenensis*; for example, third dorsal-fin spine length 10.5–11.5% of SL in *P. eschmeyeri vs* 16.3–20.7% in *P. adenensis* (see Table 1; Motomura *et al.* 2012: table 1). Moreover, *P. eschmeyeri* tends to have a relatively longer snout (11.6–12.4% of SL) and upper jaw (22.3–23.8%) than *P. adenensis* (9.4–12.0% and 19.4–22.6% respectively), although there is a slight overlap between the two species. The examined specimens of *P. eschmeyeri* (110.7–132.8 mm SL) are larger than those of the small species *P. adenensis* (17.8–79.4 mm SL); proportions vary ontogenetically in most scorpaenids, and these apparent morphometric differences might disappear when smaller specimens of *P. eschmeyeri* that are of comparable size to *P. adenensis* are examined.

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