

Scorpaenopsis rubrimarginatus, a new species of scorpionfish from Réunion, southwestern Indian Ocean (Teleostei: Scorpaenidae)

by

Ronald FRICKE* (1), Patrick DURVILLE (2) & Thierry MULOCHEAU (2)



© SFI
Received: 14 Sep. 2012
Accepted: 4 Apr. 2013
Editor: P. Béarez

Abstract. - The scorpionfish *Scorpaenopsis rubrimarginatus* n. sp. is described based on a single specimen from 80 m depth off Réunion, southwestern Indian Ocean. The new species is characterised within the *Scorpaenopsis cotticeps* lineage, which comprises small and short-snouted species with the upper opercular spine divided into two or more points (two points in *S. rubrimarginatus*), by a combination of the following characters: 16 pectoral-fin rays, 23 lateral-line scales, 42 scales in longitudinal series on body, the posterior lacrimal spine single, a broad space present between the eye and the suborbital ridge, the suborbital ridge bearing five retrorse spines, the interorbital ridges not elevated posteriorly to join the tip of the tympanic spines, a deep subtriangular suborbital pit present, the base of the parietal spines curving strongly into the occipital pit, the orbit large (eye diameter 0.62 in snout length; preorbital length 2.4 in head length), a small, triangular supraocular tentacle present, the head length 2.3 in SL, the first dorsal-fin spine 2.5 in second spine, the second anal-fin spine about equal in length to third spine and the pectoral-fin of the male with a large black spot basally on 8th-10th rays (which is missing in females). *Scorpaenopsis rubrimarginatus* n. sp. is compared with related species. A revised key to the species of the genus *Scorpaenopsis* is provided.

Résumé. - *Scorpaenopsis rubrimarginatus*, une nouvelle espèce de rascasse de La Réunion, océan Indien sud-ouest (Teleostei: Scorpaenidae).

Key words

Scorpaenidae
Scorpaenopsis rubrimarginatus
Scorpionfish
Indian Ocean
Réunion Island
Systematics
New species

La rascasse *Scorpaenopsis rubrimarginatus* n. sp. est décrite à partir d'un seul spécimen collecté à 80 m de profondeur à l'île de La Réunion, dans le sud ouest de l'océan Indien. La nouvelle espèce est proche de la lignée de *Scorpaenopsis cotticeps* qui comprend des espèces petites et au museau court, une épine operculaire supérieure divisée en deux ou plusieurs éléments (en deux chez *S. rubrimarginatus*) et présentant les caractères suivants : 16 rayons au niveau des pectorales, 23 écailles sur la ligne latérale, 42 écailles sur la série longitudinale le long du corps, une épine lacrymale postérieure simple, un large espace entre les yeux et la crête sous-orbitale qui porte cinq épines pointées vers l'arrière, des crêtes interorbitales non élevées postérieurement pour rejoindre l'extrémité des épines tympaniques, une profonde fossette sous-orbitale de forme triangulaire, la base des épines pariétales fortement incurvée vers la fossette occipitale, de grandes orbites (diamètre des yeux 1,6 fois la longueur du museau ; longueur préorbitale 0,4 fois la longueur de la tête), un petit tentacule supraoculaire de forme triangulaire, longueur de la tête 0,43 fois la longueur standard, la première épine dorsale 0,4 fois celle de la seconde épine, la seconde épine anale de même longueur que la troisième épine, et les pectorales des mâles présentant un ocelle noir au niveau des 8^e et 10^e rayons (ce dernier est absent chez les femelles). *Scorpaenopsis rubrimarginatus* n. sp. est comparée avec les espèces apparentées et une nouvelle clé des espèces du genre *Scorpaenopsis* est proposée.

The scorpionfish family Scorpaenidae is a group of fishes living worldwide in tropical and warm temperate marine and brackish waters (rarely in freshwater) (Nelson, 2006). They are usually found on rocky substrate bottoms in coastal waters of the continental shelf and continental slope. Most species live at shallow depths, while a few occur down to 600 m (Eschmeyer, 1969; Randall and Eschmeyer, 2001; Motomura and Causse, 2011).

The genus *Scorpaenopsis* was revised by Randall and Eschmeyer (2001), who recognised 24 valid species. The genus is mainly characterised by the absence of palatine teeth in combination of 12 dorsal-fin spines (versus 13 in the similar genus *Scorpaenodes*) (Randall and Eschmeyer,

2001). Motomura (2004) added *Scorpaenopsis insperatus* from New South Wales, Australia; Randall and Greenfield (2004) described *S. eschmeyeri* from the southwestern Pacific Ocean. Recently, Motomura and Causse (2011) described a deepwater species, *S. crenulata*, from Wallis and Futuna. Motomura *et al.* (2011) revised Indo-Pacific specimens in the MNHN collection.

Fricke (1999) recorded three species of *Scorpaenopsis* from the Mascarenes, *S. diabolus*, *S. gibbosa* and *S. venosa*. Fricke *et al.* (2009) reported *S. diabolus*, *S. gibbosa* and *S. longispina* from Réunion.

During fieldwork aiming in the collection of fishes for the Sarl Aquarium de la Réunion, a small specimen of the

(1) Staatliches Museum für Naturkunde, Rosenstein 1, 70191 Stuttgart, Germany.

(2) Sarl Aquarium de la Réunion, Port de Plaisance, 97437 Saint-Gilles les Bains, La Réunion, France. [aquarium.reunion@wanadoo.fr]

* Corresponding author [ronald.fricke@smns-bw.de]

genus *Scorpaenopsis* was procured from 80 m depth off the west coast of Réunion. The fish turned out to represent another undescribed species of the genus, and is described in the present paper, bringing the total number of species of *Scorpaenopsis* to 28, and the number of species occurring at Réunion to four.

METHODS AND MATERIALS

Methods follow Randall and Eschmeyer (2001). The sex of the male was determined by an observation of the testis; the sex of the female was inferred from courtship behaviour seen on underwater photographs. The genus and species classification follows Eschmeyer (2013), unless otherwise noted; references follow Fricke (2013). The key is based on Randall and Eschmeyer (2001), but modified based on the data of recently described species. The museum abbreviations follow Fricke and Eschmeyer (2013).

Comparative material

Scorpaenopsis altirostris: USNM 51636 (holotype), Hawaiian Islands, Molokai; USNM 51671 (3 paratypes), Hawaiian Islands, Molokai.

Scorpaenopsis barbata: SMF 1381 (holotype), Red Sea, Eritrea; SMNS 3465 (2 spms), Red Sea, Egypt; SMNS 25552 (1 spm), Red Sea (Egypt); USNM 191695 (2 spms), Red Sea, Israel.

Scorpaenopsis brevifrons: NMW 4996-5000 (5 spms), Midway Atoll.

Scorpaenopsis cacopsis: USNM 49690 (holotype), Hawaiian Islands, Oahu.

Scorpaenopsis cirrosa: CAS 214066 (1 spm), China, Hong Kong.

Scorpaenopsis cotticeps: BPBM 22444 (1 spm, Philippines); BPBM 28478 (1 spm, Philippines); BPBM 35486 (1 spm, Seychelles); BPBM 35557 (2 spms, Seychelles); BPBM 38780 (1 spm, Philippines); CAS 54066 (1 spm), Macclesfield Bank.

Scorpaenopsis crenulata: MNHN 1995-0746 (holotype), Wallis and Futuna.

Scorpaenopsis diabolus: SMNS 16823 (1 spm), Mauritius; SMNS 18679 (1 spm), Indonesia, Lombok; SMNS 22565 (1 spm), Red Sea, Egypt; SMNS 22928 (1 spm), New Caledonia, Loyalty Islands; SMNS 23845 (1 spm), New Caledonia, Loyalty Islands; SMNS 26474 (1 spm), New Caledonia, Grande Terre.

Scorpaenopsis eschmeyeri: SMNS 15043 (2 spms), Fiji, Viti Levu; SMNS 22816 (2 spms), New Caledonia, Grande Terre.

Scorpaenopsis furneauxi: AMS E.2896 (holotype), Australia, Queensland.

Scorpaenopsis gilchristi: SAM 11851 (holotype), KwaZulu-Natal, South Africa.

Scorpaenopsis gibbosa: SMNS 17081 (1 spm), Réunion; SMNS 20799 (1 spm), Réunion; SMNS 20974 (1 spm), Réunion; SMNS 21083 (1 spm), Réunion; SMNS 21164 (1 spm), Réunion.

Scorpaenopsis longispina: SAIAB 53133 (1 spm), Mauritius.

Scorpaenopsis macrochir: SMNS 10854 (1 spm), Indonesia, Maluku, Ambon; SMNS 10854 (3 spms), Indonesia, Maluku, Ambon; SMNS 18426 (1 spm), Western Australia, Broome.

Scorpaenopsis neglecta: NMW 89882 (holotype), Indonesia.

Scorpaenopsis obtusa: USNM 169475 (holotype), Philippines, Sulu Archipelago.

Scorpaenopsis orientalis: AMS I.40743-001 (1 spm), Japan, Ogasawara Islands.

Scorpaenopsis oxycephala: SMNS 2463 (1 spm), Taiwan.

Scorpaenopsis papuensis: USNM 2616 (1 spm), Indonesia, West Papua.

Scorpaenopsis possi: SMNS 1609 (1 spm), Red Sea, Egypt; SMNS 2069 (1 spm), Red Sea, Egypt; SMNS 25417 (1 spm), New Caledonia, île des Pins.

Scorpaenopsis pusilla: CAS 214037 (1 paratype), Marquesas Islands, Nuku Hiva.

Scorpaenopsis ramaraoi: SMNS 26541 (2 spms), New Caledonia, Grande Terre.

Scorpaenopsis venosa: SMNS 14624 (1 spm), Western Australia, Onslow; SMNS 14632 (1 spm), Western Australia, Point Quobba; SMNS 19668 (1 spm), New Caledonia, Grande Terre.

Scorpaenopsis vittapinna: SMNS 21558 (2 spms), New Caledonia, Grande Terre.

Scorpaenopsis rubrimarginatus new species

(Figs 1-4)

Holotype

MNHN 2012-0401 (24.3 mm SL, male), off Saint-Gilles, La Réunion, 21°03'23''S-55°13'04''E, 80 m depth, P. Durville, 2011.

Diagnosis

The following combination of characters distinguishes *Scorpaenopsis rubrimarginatus* from small and short-snouted species with the nape and anterior body not highly arched, and with the upper opercular spine divided into two or more points (two points in *S. rubrimarginatus*): 16 pectoral-fin rays, 23 lateral-line scales, 42 scales in longitudinal series on body, the posterior lacrimal spine single, a broad space present between the eye and the suborbital ridge, the suborbital ridge bearing five retrorse spines, the interorbital ridges not elevated posteriorly to join the tip of the tympanic spines, a deep subtriangular suborbital pit present, the base of the parietal spines curving strongly into the occipital pit, the orbit large (eye diameter 0.62 in snout length/preorbital length, 2.4 in head length), a small, triangular supraocular tentacle present, the head length 2.3 in SL, the first dorsal-fin spine 2.5 in second spine, the second anal-fin spine about equal in length to third spine, and the pectoral-fin of the male



Figure 1. - *Scorpaenopsis rubrimarginatus* new species, holotype, MNHN 2012-0401 (24.3 mm SL), lateral view, colouration in preservative.

Figure 2. - *Scorpaenopsis rubrimarginatus* new species, holotype, MNHN 2012-0401 (24.3 mm SL), dorsal view of head.

Figure 3. - *Scorpaenopsis rubrimarginatus* new species, holotype, MNHN 2012-0401 (24.3 mm SL), ventral view of head.

Figure 4. - *Scorpaenopsis rubrimarginatus* new species, male (right) and presumed female (left); underwater photograph, off Saint-Gilles, Réunion, 80 m depth (photograph: P. Durville).

with a large black spot basally on 8th-10th rays (which is missing in presumed females).

Description

Dorsal-fin spines XII; dorsal-fin rays 9. Anal-fin rays III, 6. Pectoral-fin rays 16. Lateral-line scales 23. Scales ctenoid on most of the body, becoming cycloid on abdomen, 42 in longitudinal series. Gill rakers broad, spiny, eight on lower arch. For measurements of the holotype see table I.

Upper jaw with three series of small teeth, which are slightly recurved. The teeth are similar in the lower jaw. Palatine teeth absent. One-fourth of eye extending above dorsal profile of head. Occipital pit present but not deep; anterior edge of pit incurved; no transverse ridge across posterior end of occipital pit. Nasal spines small. Preocular spine strong, slightly curved backward. Supraorbital ridge barely expanded over posterior half of eye. A pair of small supraocular

spines present. Width between tips of postocular spines 2.5 times orbit diameter. Interorbital ridges moderately developed, separated at narrowest place by less than width of a single ridge. Tympanic spines longer than postocular spines, nearly directly behind them. No ridge connecting tympanic and parietal spines. Parietal and nuchal spines elevated; parietal spines shorter than nuchal spines. Suborbital pit present, shallow. Suborbital ridge with five spines, the first on lacrimal small. Posterior lacrimal spine longer than anterior. Upper opercular spine double. Lower opercular spine preceded by a ridge. Postocular region and basal part of opercle scaled, but no scales on opercle between spines. Predorsal scale rows 4. Preopercle with a total of three spines. Upper preopercular spine strong. A small, triangular supraocular tentacle present. No other tentacles on head or body. Anterior end of each mandibular canal with two pores, not opening to a common midventral pit. Head length 43.2% of standard length.

First dorsal-fin spine short, 2.2 in length of second spine (45% of that length), and 2.9 in length of third spine (34% of that length). Fourth spine longest, its length 2.1 in head length. Penultimate dorsal-fin spine 2.2 in last spine. Second anal-fin spine short, 3.2 in head. First anal-fin spine 1.4 in length of second spine (73% of that length), and 2.2 in length of third spine (46% of that length). Uppermost and lower eight rays of pectoral fin unbranched, remaining rays branched; eighth ray longest, its length less than head length; lower unbranched rays slightly thickened; posterior margin of fin rounded.

Colour in preservative

Body pale yellowish, dorsal parts of head, opercle, and anterior dorsal parts of body with dark brown pigment (Fig. 1). Eye dark grey, dorsally with dark brown pigment. Fins pale whitish, except a large black spot basally on 8th-10th pectoral fin rays; pectoral fin with few additional small black pigment spots.

Colour in life

Body pale yellowish, dorsal parts of head, opercle, and anterior dorsal parts of body with oblique, brownish yellow to rose grey bars (Fig. 4; the presumed female colouration is based on photographed specimens, which were not collected). Eye brownish yellow to rose grey, dorsally with crimson blotches and streaks. Dorsal fin pale whitish to yellow, with broad, crimson bars. Anal fin bright crimson, distal part of posterior membranes bluish white. Caudal fin pale whitish to yellow, with a basal and a distal vertical crimson bar. Pectoral

Table I. - Measurements of the holotype of *Scorpaenopsis rubrimarginatus* new species; values are given in per mm, and in percentage of the standard length.

Measurements	Holotype	
	mm	% of SL
Catalogue no.	MNHN 2012-0401	
Standard length	24.3	–
Total length	30.7	–
Head length	10.5	43.2
Head width	8.5	35.0
Postorbital length	3.9	16.0
Predorsal fin length	10.5	43.2
Preal anal fin length	15.2	62.6
Body depth at origin of first dorsal fin	8.7	35.8
Preorbital length (snout length)	2.7	11.1
Upper jaw length	6.0	24.7
Eye diameter	4.3	17.7
Interorbital distance	1.1	4.5
Caudal peduncle length	4.0	16.5
Caudal peduncle depth (minimum)	2.5	10.3
First dorsal fin spine length	1.4	5.8
Second dorsal fin spine length	3.1	12.8
Third dorsal fin spine length	4.1	16.8
Base length of spiny portion of dorsal fin	8.2	33.7
Base length of soft portion of dorsal fin	4.7	19.3
First anal fin spine length	1.1	4.5
Second anal fin spine length	1.5	6.2
Third anal fin spine length	2.4	9.9
Anal fin base length	5.0	20.6
Anal fin length (base of first spine to tip of last ray)	7.2	29.6
Pectoral fin length	7.2	29.6
Pelvic fin length	6.2	25.5
Caudal fin length	6.4	26.3

Table II. - Comparison of the holotypes of *Scorpaenopsis rubrimarginatus* new species and *Scorpaenopsis gilchristi* Smith, 1957.

	<i>Scorpaenopsis rubrimarginatus</i>	<i>Scorpaenopsis gilchristi</i>
Dorsal-fin count	XII, 9	XII, 9
Anal-fin count	III, 6	III, 5
Pectoral-fin count	16	16
Lateral-line scales	23	22
Scales in longitudinal series	42	34
Supraocular tentacle	Short, triangular, unbranched, much shorter than eye diameter	Long, elongate, fimbriate, longer than eye diameter
Suborbital pit	Deep, subtriangular	Absent
Mandibular pore pattern	2 pores at anterior end of each mandibular canal, not opening to a common midventral pit	Open medially to a deep midventral pit
First dorsal spine length in length of third spine	2.9	2.0
First anal spine length in length of third spine	2.2	2.3
Anal fin length (% of standard length)	29.6	34.4

fins pale whitish to brownish yellow, basal two-thirds with brownish to rose-grey blotches, a broad distal margin bright crimson, leaving the tips of the fin-rays bluish white. Male with a large black spot basally on 8th-10th pectoral fin rays; this spot, which is found on both pectoral fins of the holotype and was observed on additional photographed specimens, is missing in the presumed females. Pelvic fins bright crimson.

Distribution

This species is only known from the holotype, which was collected at 80 m depth off Saint-Gilles, Réunion, Mascarene Islands, southwestern Indian Ocean.

Etymology

Ruber (Latin) = red; marginatus (Latin) = margined. The name of the new species refers to the conspicuous red margin of the pectoral fin.

Comparison

This new species is a member of the lineage of small, short-snouted species like *Scorpaenopsis cotticeps* with the upper opercular spine divided into two or more points, as defined by Randall and Poss in Randall and Eschmeyer (2001). Within this lineage (key couplet no. 7 in the key to the genus presented below), it differs from *S. brevifrons*, *S. crenulata*, *S. pluralis*, *S. vittapinna* in its single posterior lacrimal spine (2-3 points in those species) and the large orbit (0.62 in snout length/preorbital length, compared to 1.2-1.7 in those species). From the Hawaiian Islands endemic *Scorpaenopsis altirostris*, the new species differs in the second anal-fin spine which is about equal in length to the third spine (clearly longer than third spine in *S. altirostris*), possibly the larger eye (eye diameter 2.4 in head length, compared

to 3.3-3.6 in *S. altirostris*; however, the eye may be relatively larger in the small holotype of *S. rubrimarginatus* n. sp.), the shorter head (head length 2.3 in SL, compared with 1.9-2.0 in *S. altirostris*), its 16 pectoral-fin rays (usually 18 in *S. altirostris*), and its 42 longitudinal scale series (45 in *S. altirostris*). It is distinguished from the South African species *S. gilchristi* by the broad space between the suborbital ridge and the eye (suborbital ridge directly below the eye in *S. gilchristi*), the presence of a deep subtriangular suborbital pit (suborbital pit usually absent in *S. gilchristi*), the small and triangular supraocular tentacle (long, fimbriate, longer than eye diameter in *S. gilchristi*), the mandibular pore pattern (pores at symphysis of lower jaw open medially to a deep midventral pit in *S. gilchristi*), and the slightly higher lateral-line scale count (22 in *S. gilchristi*); the holotypes of the two species are directly compared in table II. *Scorpaenopsis rubrimarginatus* n. sp. differs from *S. cotticeps* in its 42 longitudinal scale series (33-37 in *S. cotticeps*), the interorbital ridges which are not elevated posteriorly to join the tip of the tympanic spines (elevated and joining the tympanic spines in *S. cotticeps*), and the base of the parietal spines curving strongly into the occipital pit (not curving into occipital pit in *S. cotticeps*). The new species is distinguished from the Marquesas Islands endemic *S. pusilla* in its suborbital ridge bearing five retrorse spines (four spines in *S. pusilla*), the absence of a supraocular tentacle (large supraorbital tentacle present in *S. pusilla*), the first dorsal-fin spine 2.5 in second spine (1.85 in *S. pusilla*), and the pectoral-fin with a small black blotch basally on 8th-10th rays (lacking such a black blotch in *S. pusilla*).

The new species differs from *Scorpaenopsis longispina*, which also occurs at the Mascarenes and may have a red colour pattern, in its smaller body size (*S. longispina* reaching

92 mm SL), in having the upper opercular spine divided into two points (single in *S. longispina*), in its 42 scales in the longitudinal series on the body (49-53 in *S. longispina*), the body depth 2.8 in SL (2.95-3.2 in SL in *S. longispina*), the first dorsal-fin spine 2.5 in length of second spine (1.95-2.15 in *S. longispina*), the second dorsal fin in the male pale in preservative, with a broad red bar in life, but without basal dark spots (with two basal dark spots in *S. longispina*), and the male's pectoral-fin with a single characteristic central-basal black spot (with several irregular dark spots in lower half).

A revised key to scorpaenid fish species of the genus *Scorpaenopsis* is presented below to distinguish *Scorpaenopsis rubrimarginatus* n. sp. from other species of the genus.

Remarks

The *Scorpaenopsis cotticeps* lineage, which comprises small and short-snouted species with the upper opercular spine divided into two or more points, now includes nine species, mostly from shallow to very deep water in isolated, marginal Indo-Pacific localities. Other species have restricted distribution ranges in northeastern South Africa, Wallis and Futuna, the Hawaiian Islands and the Marquesas Islands, while a single species is widespread in shallow water (2.5-28 m) from East Africa to the Society Islands (*Scorpaenopsis vittapinna*). The Wallis and Futuna endemic *Scorpaenopsis crenulata* has been collected at a depth of 600 m. Together with the Hawaiian Islands endemics *S. altirostris* (79-134 m depth) and *S. pluralis* (110 m depth), the new species *S. rubrimarginatus* n. sp. (80 m depth) is intermediate between *S. crenulata* and the other species known in the group (which are known from 1-50 m depth).

A male and a presumed female of the new species were photographed on black sand (Fig. 4); the species is expected to be associated with deep volcanic rock habitats. It is difficult to collect in such habitats which are below regular SCUBA-diving depths and barely accessible by dredges or trawls.

Key to species of the genus *Scorpaenopsis*

Remark. - This key is based on Randall and Eschmeyer (2001), but was modified according to subsequent findings.

- 1. Upper opercular spine single **15**
- Upper opercular spine divided into 2 or more points **2**
- 2. Nape and anterior body highly arched, giving a humpback appearance; interorbital space broad, the least width 3.9-4.55 in head length **3**
- Nape and anterior body not highly arched; interorbital space not broad, the least width 5.5-8.2 in head length. **7**
- 3. Snout very short, about equal to orbit diameter; ascending process of premaxilla extending into interorbital space; body

- depth of adults 2.0-2.2 in SL; longitudinal scale series 37-39 (Japan, Philippines and Papua New Guinea to northern Australia) *Scorpaenopsis obtusa* Randall & Eschmeyer, 2001
- Snout longer than orbit diameter; ascending process of premaxilla not extending into interorbital space; body depth 2.2-2.55 in SL; longitudinal scale series 40-47 **4**
- 4. Pectoral-fin rays 17-19 (usually 18, rarely 17); axil of pectoral fins without small black spots; upper posttemporal spine double; mouth strongly oblique, forming an angle of about 60-70° to horizontal axis of head and body (Indo-Pacific Ocean) *Scorpaenopsis diabolus* (Cuvier, 1829)
- Pectoral-fin rays 16-18 (usually 17, rarely 18); axil of pectoral fins with small black spots; upper posttemporal spine single and blade-like; mouth not strongly oblique, forming an angle of about 40-50° to horizontal axis of head and body **5**
- 5. Supraorbital ridge serrate; pterotic, lower posttemporal, and second suborbital spines replaced by serrate ridges; nuchal spine with 1 or 2 supplemental spines; anterior ridge of lacrimal serrate; orbit diameter 1.7-1.95 in preorbital length (western Pacific Ocean to India) *Scorpaenopsis neglecta* Heckel, 1837
- Supraorbital ridge not serrate; pterotic, lower posttemporal, and second suborbital spines not replaced by serrate ridges; nuchal spine without supplemental spines; anterior ridge of lacrimal not serrate; orbit diameter 1.3-1.5 in preorbital length. **6**
- 6. Ascending process of premaxilla narrow, its maximum width 1.8-2.2 in orbit diameter; a series of papillae or nodules (sometimes on a low ridge) across interorbital space between supraocular spines; nasal spine single; a black spot nearly as large as eye on inner surface of pectoral fins near base of 1st to 5th rays; no black mark inside mouth at front of upper jaw (western Indian Ocean) *Scorpaenopsis gibbosa* (Bloch & Schneider, 1801)
- Ascending process of premaxilla broad, its maximum width 1.4-1.8 in orbit diameter; no series of papillae or nodules across interorbital space between supraocular spines; nasal spine usually divided into 2 to 6 points; no black spot nearly as large as eye on inner surface of pectoral fins near base of 1st to 5th rays; a narrow triangular black mark inside mouth at front of upper jaw (Mauritius to Caroline Islands and Marquesas Islands) *Scorpaenopsis macrochir* Ogilby, 1910
- 7. Posterior lacrimal spine usually divided into 2 or 3 points (except juveniles); orbit diameter 1.2-1.7 in snout length . . **8**
- Posterior lacrimal spine single; orbit diameter varying from greater than snout to 1.2 in snout length **11**

8. Occipital pit deep; mouth oblique, the gape forming an angle of about 35°; pectoral-fin rays 17 **9**
 Occipital pit shallow; mouth slightly oblique, the gape forming an angle of about 20°; pectoral-fin rays 17-20 (rarely 17) **10**
9. Posterior lacrimal spine divided into 3 points; anterior lacrimal spine single; maxilla not reaching a vertical at rear edge of orbit; pectoral-fin axil without a black blotch, pale yellowish (Laysan, Hawaiian Islands; 110 m depth)
 *Scorpaenopsis pluralis* Randall & Eschmeyer, 2001
 Posterior lacrimal spine divided into 2 points; anterior lacrimal spine divided into 2 spinous points; maxilla extending posteriorly to a vertical at rear edge of orbit; upper one-third of pectoral-fin axil with a large black blotch (Wallis and Futuna; 600 m depth)
 *Scorpaenopsis crenulata* Motomura & Causse, 2011
10. Pectoral-fin rays 18-20 (rarely 18); snout length 3.2-3.9 in head length; interorbital width 6.0-8.8 in head length; no black band across anal and pelvic fins; reaches 133 mm SL (Hawaiian Islands)
 *Scorpaenopsis brevifrons* Eschmeyer & Randall, 1975
 Pectoral-fin rays 17-19 (rarely 19); snout length 3.0-3.3 in head length; interorbital width 5.7-6.5 in head length; a broad black band across anal and pelvic fins; reaches 65 mm SL (Red Sea and East Africa to Society Islands, but not the Hawaiian Islands, north to Japan)
 *Scorpaenopsis vittapinna* Randall & Eschmeyer, 2001
11. Second anal-fin spine clearly longer than third spine (reaching beyond tip of third spine when depressed); eye large, the orbit diameter 3.3-3.6 in head length; head large, 1.9-2.0 in SL; pectoral-fin rays usually 18; longitudinal scale series about 45 (Hawaiian Islands, 74-134 m depth)
 *Scorpaenopsis altirostris* Gilbert, 1905
 Second anal-fin spine about equal to third spine (not reaching tip of third spine when depressed); eye moderate to large, the orbit diameter of adults 2.4-4.2 in head length; head not as large, 2.0-2.4 in SL; pectoral-fin rays usually 16-17; longitudinal scale series about 33-43 **12**
12. Suborbital ridge directly below eye; no suborbital pit; pores at symphysis of lower jaw open medially to a deep midventral pit (KwaZulu-Natal, South Africa)
 *Scorpaenopsis gilchristi* (Smith, 1957)
 A broad space between eye and suborbital ridge; a deep subtriangular pit beneath anterior half of eye; 2 pores at anterior end of each mandibular canal, not opening to a common midventral **13**
13. Longitudinal scale series 33-37; interorbital ridges elevated posteriorly to join tip of tympanic spines; base of parietal spines not curving into occipital pit; first dorsal-fin spine 1.6-1.9 in second spine (western Pacific to Somalia and Gulf of Aden) *Scorpaenopsis cotticeps* Fowler, 1938
 Longitudinal scale series 42-43; interorbital ridges not elevated posteriorly to join tip of tympanic spines; base of parietal spines curving strongly into occipital pit **14**
14. Suborbital ridge with 5 retrorse spines; no supraocular tentacle present; first dorsal-fin spine 2.5 in second spine; pectoral-fin in male with a small black blotch basally on 8th-10th rays (Réunion, 80 m depth)
 *Scorpaenopsis rubrimarginatus* new species
 Suborbital ridge with 4 retrorse spines; a prominent supraocular tentacle present; first dorsal-fin spine 1.85 in second spine; pectoral-fin without a black blotch (Marquesas Islands, 17 m depth)
 *Scorpaenopsis pusilla* Randall & Eschmeyer, 2001
15. Longitudinal scale series 30-34; pectoral-fin rays 16 (Australia, New South Wales)
 *Scorpaenopsis insperatus* Motomura, 2004
 Longitudinal scale series 43-67; pectoral-fin rays 17-21 **16**
16. Longitudinal scale series 59-67; pectoral-fin rays 18-20. **17**
 Longitudinal scale series 43-61 (only *cirrosa* with 59 or more); pectoral-fin rays 17-21 (usually 17-18, except for *papuensis*, usually 19, one specimen with 21) **18**
17. Third dorsal-fin spine longest, 2.05-2.5 in head length; occipital pit absent or very shallow; snout very long, 2.7-3.0 in head length; space between opercular spines naked; first dorsal-fin spine short, 1.85-2.5 in length of second spine; supraocular and postocular spines broadly joined in adults (only tip of supraocular spine showing) and flaring outward to form a shelf over posterior half of eye; pectoral-fin rays 18-20 (usually 20) (western Pacific to East Africa and Red Sea) *Scorpaenopsis oxycephala* (Bleeker, 1849)
 Fourth or fifth dorsal-fin spine longest, 2.6-3.1 in head length; occipital pit moderately deep; snout not very long, 3.05-3.35 in head length; space between opercular spines with scattered small scales; first dorsal-fin spine short, 1.7-1.9 in length of second spine; supraocular and postocular spines not broadly joined; pectoral-fin rays 18-19 (usually 18) (Persian Gulf, northwestern Indian Ocean)
 *Scorpaenopsis lactomaculata* (Herre, 1945)
18. Upper opercular spine broad with a strong median ridge; space between opercular spines with 1 or 2 ridges; first 2 suborbital spines with one or more parallel ridges (Red Sea to Somalia and Persian Gulf)
 *Scorpaenopsis barbata* (Rüppell, 1838)
 Upper opercular spine not broad and without a strong median ridge; space between opercular spines without ridges; suborbital spines without ridges **19**
19. A deep quadrangular occipital pit, its anterior edge, as viewed dorsally, straight, with a slight ridge; a low ridge on each side of pit between tympanic and parietal spines; pec-

toral-fin rays strongly modally at 17 (western Pacific to East Africa) *Scorpaenopsis venosa* (Cuvier, 1829)

Occipital pit not deep and not quadrangular, the anterior edge inwardly curved and without a ridge; no ridge on sides of pit between tympanic and parietal spines; pectoral-fin rays modally 17-19 **20**

20. Longest dorsal-fin spine 1.9-2.2 in head length; no distinct median ridge extending from between posterior nostrils to anterior fourth or more of interorbital space; tympanic spines small, about half length of postocular spines; largest specimen, 95 mm SL (Australia: northern Queensland to Torres Strait) *Scorpaenopsis furneauxi* Whitley, 1959

Longest dorsal-fin spine 2.2-2.95 in head length; a distinct median ridge extending from between posterior nostrils to anterior fourth or more of interorbital space; tympanic spines not small, usually as long as or longer than postocular spines; maximum SL greater than 160 mm **21**

21. Pectoral-fin rays 17-18 (rarely 18); supraocular tentacle of adults absent or very small **22**

Pectoral-fin rays 17-20 (rarely 17, except for *longispina*, which has a prominent supraocular tentacle); prominent supraocular tentacle present or absent in adults **23**

22. No extra spine anterior to each tympanic spine; head relatively short; maximum observed SL is 142 mm (Red Sea and East Africa to Marshall Islands and Pitcairn Group) *Scorpaenopsis possi* Randall & Eschmeyer, 2001

An extra spine anterior to each tympanic spine, joined by a low ridge to postocular spine (absent in juveniles; head long; maximum observed SL is 194 mm (southwestern Pacific Ocean, Queensland to Fiji) *Scorpaenopsis eschmeyeri* Randall & Greenfield, 2004

23. Ridge above first spine of lacrimal sharp-edged, angling slightly upward, with a pointed tip (developing at about 90 mm SL); longitudinal scale series 45-49 (Japan and Taiwan to New Caledonia, west to Sri Lanka and Pakistan) *Scorpaenopsis ramaraoi* Randall & Eschmeyer, 2001

Ridge above anterior spine on lacrimal not sharp-edged and without a pointed tip; longitudinal scale series 48-61 **24**

24. Second anal-fin spine long, 1.55-1.75 in head length; pectoral-fin rays 16-17 (usually 17); largest specimen, 92 mm SL (Mauritius and KwaZulu-Natal, South Africa) *Scorpaenopsis longispina* Randall & Eschmeyer, 2001

Second anal-fin spine not as long, 1.8-2.6 in head length; pectoral-fin rays 17-20 (rarely 17); maximum SL at least 195 mm **25**

25. Suborbital ridge with 5 spines, the anterior 2 on lacrimal (first very short, more erect, and projecting dorsoposteriorly); posterior lacrimal spine (of the 2 projecting downward over maxilla) about 1.5 times longer than anterior; interorbital width 5.5-6.95 in head length; largest specimen, 370 mm SL

(Hawaiian Islands) *Scorpaenopsis cacopsis* Jenkins, 1901

Suborbital ridge with 4 spines; posterior lacrimal spine equal to or slightly longer than anterior; interorbital width 6.6-8.8 in head length; largest specimen, 278 mm SL **26**

26. Pectoral-fin rays 18-21 (usually 19); space on opercle between opercular spines scaled; penultimate dorsal-fin spine 1.9-2.2 in length of last spine; reaches 195 mm SL (rarely over 170 mm SL) (Western Australia and western Pacific east to Mariana Islands and Society Islands) *Scorpaenopsis papuensis* (Cuvier, 1829)

Pectoral-fin rays 17-19 (usually 18); space on opercle between opercular spines not scaled; penultimate dorsal-fin spine 1.5-1.9 in length of last spine; largest specimens more than 230 mm SL **27**

27. About one-fourth of eye projecting above dorsal profile of head; interorbital space hemispherical when viewed from front, and not deep, the maximum depth contained more than 3 times in orbit diameter; fourth or fifth dorsal-fin spines usually longest, 2.6-3.15 in head length; first dorsal-fin spine 1.7-2.1 in second spine; snout length 3.0-3.4 in head length (Japan, China south to Hong Kong, northern Taiwan) *Scorpaenopsis cirrosa* (Thunberg, 1793)

About one-half of eye projecting above dorsal profile of head; interorbital space V-shaped and deep, the maximum depth about 2.5 in orbit diameter; third dorsal-fin spine usually longest, 2.15-2.5 in head length; first dorsal-fin spine 2.0-2.5 in second spine; snout length 2.8-3.05 in head length (southern Japan) *Scorpaenopsis orientalis* Randall & Eschmeyer, 2001

Acknowledgments. – We would like to thank the crew of R/V “Explorer” who collected the holotype of the new species, and P. Pruvost (MNHN, Paris) for providing a catalogue number. We also thank three anonymous reviewers for useful comments.

REFERENCES

ESCHMEYER W.N., 1969. - A systematic review of the scorpionfishes of the Atlantic Ocean (Pisces: Scorpaenidae). *Occ. Pap. Calif. Acad. Sci.*, 79: 1-143.

ESCHMEYER W.N. (ed.), 2013. - Catalog of fishes, electronic version (11 Feb. 2013). Internet publication, San Francisco (California Academy of Sciences). <http://research.calacademy.org/research/Ichthyology/Catalog/fishcatmain.asp>.

FRICKE R., 1999. - Fishes of the Mascarene Islands (Réunion, Mauritius, Rodriguez). An annotated checklist with descriptions of new species. 759 p. Königstein (Koeltz Scientific Books).

FRICKE R. (ed.), 2013. - Literature in the Catalog of fishes, electronic version (11 Feb. 2013). Internet publication, San Francisco (California Academy of Sciences). <http://research.calacademy.org/research/Ichthyology/Catalog/fishcatmain.asp>.

- FRICKE R. & ESCHMEYER W.N., 2013. - A guide to fish collections in the Catalog of fishes. Online version, updated 11 Feb. 2013. Internet publication, San Francisco (California Academy of Sciences). <http://research.calacademy.org/research/Ichthyology/Catalog/collections.asp>.
- FRICKE R., MULOCHAU T., DURVILLE P., CHABANET P., TESSIER E. & LETOURNEUR Y., 2009. - Annotated checklist of the fish species (Pisces) of La Réunion, including a Red List of threatened and declining species. *Stuttg. Beitr. Naturk. (Ser. A)*, Neue Ser., 2: 1-168.
- MOTOMURA H., 2004. - *Scorpaenopsis insperatus*: a new species of scorpionfish from Sydney Harbour, New South Wales, Australia (Scorpaeniformes: Scorpaenidae). *Copeia*, 3: 546-550.
- MOTOMURA H. & CAUSSE R., 2011. - A new deepwater scorpionfish of the genus *Scorpaenopsis* (Scorpaenidae) from Wallis and Futuna Islands, southwestern Pacific. *Bull. Mar. Sci.*, 87(1): 45-53.
- MOTOMURA H., BÉAREZ P. & CAUSSE R., 2011. - Review of Indo-Pacific specimens of the subfamily Scorpaeninae (Scorpaenidae), deposited in the Muséum national d'Histoire naturelle, Paris, with description of a new species of *Neomerinthe*. *Cybium*, 35(1): 55-73.
- NELSON J.S., 2006. - Fishes of the World. 601 p. Hoboken: John Wiley and Sons.
- RANDALL J.E. & ESCHMEYER W.N., 2001. - Revision of the Indo-Pacific scorpionfish genus *Scorpaenopsis*, with descriptions of eight new species. *Indo-Pac. Fish.*, 34: 1-79.
- RANDALL J.E. & GREENFIELD D.W., 2004. - Two new scorpionfishes (Scorpaenidae) from the South Pacific. *Proc. Calif. Acad. Sci.*, 55(9): 384-394.