

***Scorpaenopsis stigma* Fowler, 1938, a Junior Synonym of *Phenacoscorpius megalops* Fowler, 1938, with Comments on the Type Series of *P. megalops* (Teleostei: Scorpaenidae)**

Hiroyuki Motomura

Kagoshima University Museum, 1-21-30 Korimoto, Kagoshima 890-0065, Japan

(Accepted April 3, 2008)

Hiroyuki Motomura (2008) *Scorpaenopsis stigma* Fowler, 1938, a junior synonym of *Phenacoscorpius megalops* Fowler, 1938, with comments on the type series of *P. megalops* (Teleostei: Scorpaenidae). *Zoological Studies* 47(6): 774-780. Examination of the holotype and paratype of the poorly known scorpionfish *Scorpaenopsis stigma* Fowler, 1938, described from the Philippines, showed it to be a species of *Phenacoscorpius*. Furthermore, the characters of the types of *S. stigma* were consistent with those of the holotype of *Phenacoscorpius megalops* Fowler, 1938, in the synonymy of which the former is now placed. In addition, examination of a series of paratypes of *P. megalops* revealed that they included 3 different species, in addition to *P. megalops*. Correct identifications of the paratypes are given here.
<http://zoolstud.sinica.edu.tw/Journals/47.6/774.pdf>

Key words: Scorpaenidae, Scorpionfish, *Scorpaenopsis stigma*, *Phenacoscorpius megalops*, Synonymy.

The scorpionfish *Scorpaenopsis stigma* was described by Fowler (1938: 66) on the basis of 2 specimens from northern Mindanao, the Philippines, from a depth of 366 m. He described the species as "Characterized by its heavy armature of the head with cirri, absence of palatine teeth, lowest 8 pectoral rays simple, short gill rakers and the large conspicuous black blotch on the spinous dorsal." Because most of these characters are general features of the family Scorpaenidae, the taxonomic status of *S. stigma* has been unclear. The only publication dealing with *S. stigma* since its original description is that of Herre (1952) who regarded it as a valid species of *Scorpaenopsis*, based only on the description and figure given by Fowler (1938: 66-67, fig. 28).

Following his original description of *S. stigma*, Fowler (1938: 70) described *Phenacoscorpius megalops* as a new genus and species of scorpionfish from the Philippines. Although

the taxonomic characters of *P. megalops* have remained obscure, it has been regarded as a valid species by many authors (e.g., Eschmeyer and Randall 1975, Paulin 1982, Poss 1999). The genus *Phenacoscorpius* is characterized by having the lateral line incomplete, with only a few anterior pored lateral-line scales present (Weber and de Beaufort 1962, Eschmeyer 1965b, Mandrytsa 1993, Poss 1999). *Phenacoscorpius megalops* is the only species in the genus currently known to lack palatine teeth (Eschmeyer 1965b, Chen 1981).

Although Fowler (1938) and Herre (1952) assigned *stigma* to the genus *Scorpaenopsis*, examination of the holotype and paratype of *S. stigma* showed them to represent a species of *Phenacoscorpius*, as the types have only 3 anterior pored lateral-line scales (versus a complete lateral line with 16-26 pored scales in *Scorpaenopsis*; Randall and Eschmeyer 2002, Motomura 2004a, Motomura et al. 2004). Furthermore, the type

*To whom correspondence and reprint requests should be addressed. E-mail: motomura@kaum.kagoshima-u.ac.jp

characters were closely consistent with those of the holotype of *P. megalops*. *Scorpaenopsis stigma* is therefore regarded here as a junior synonym of *P. megalops*.

Ongoing taxonomic studies of *Phenacoscorpius* by the author have indicated that specimens currently identified as *P. megalops* include several distinct species. Therefore, morphometric and selected meristic data for the holotype and type series of *P. megalops*, respectively, are provided, along with data for the types of *S. stigma*. In addition, examination of a series of paratypes of *P. megalops* revealed that these included 3 different species, in addition to *P. megalops*. Accordingly, correct identifications of the paratypes are also given here.

MATERIALS AND METHODS

Measurements follow Motomura (2004b-c), with head width following Motomura et al. (2005b 2006a), and maxillary depth following Motomura

et al. (2006b). Counts follow Motomura et al. (2005a-c) and Motomura and Johnson (2006), with predorsal scale counts following Motomura et al. (2006b). The last 2 soft rays of the dorsal and anal fins are counted as single rays, as each pair are associated with a single pterygiophore. Standard length is expressed as SL. Terminology of head spines follows Randall and Eschmeyer (2002: fig. 1) and Motomura (2004c: fig. 1) with the following additions: the spine occurring at the base of the uppermost preopercular spine is referred to as the supplemental preopercular spine (Eschmeyer 1965a); the spine occurring at the lateral surface of the lacrimal bone is referred to as the lateral lacrimal spine; and the coronal and pretympanic (as an extra spine) spines are figured in Chen (1981: fig. 1) and Motomura et al. (2004: fig. 14b), respectively. Institutional codes follow Leviton et al. (1985).

Specimens of *P. megalops*, including types of *S. stigma*, are listed under the account of the species. Data for paratypes of *P. megalops*, which are not identified as *P. megalops*, are as follows:



Fig. 1. *Phenacoscorpius megalops*. (A) Holotype of *Scorpaenopsis stigma*, USNM 98896, 53.6 mm SL; (B) holotype of *Phenacoscorpius megalops*, USNM 98903, 81.1 mm SL.

Neomerinthe rotunda Chen, 1981 — USNM 136373 (paratypes of *P. megalops*), 2 specimens, 29.9-32.7 mm SL, Cabugan Grande I., Philippines, 10°27'30"N, 125°18'E, 123 m, RV *Albatross*, 30 July 1909; *Neomerinthe megalepis* (Fowler, 1938) — USNM 136386 (paratype of *P. megalops*), 34.8 mm SL, Tacbuc Point, Surigao Strait, Philippines, 10°44'45"N, 125°12'30"E, 88 m, RV *Albatross*, 29 July 1909; and a species of Serranidae — USNM 136373 (paratype of *P. megalops*), 19.3 mm SL, Cabugan Grande I., Philippines, 10°27'30"N, 125°18'E, 123 m, RV *Albatross*, 30 July 1909. Specimens of related species examined in this study are as follows: *P. adenensis* Norman, 1939 — BMNH 1939.5.24.1545 (holotype of *P. adenensis*), 72.9 mm SL, Gulf of Aden, 274-366 m; and *P. nebris* Eschmeyer, 1965 — USNM 231727 (holotype of *P. nebris*), 86.8 mm SL, Peninsula de Guajira, Venezuela, Caribbean Sea, 12°46'N, 70°59'W, 347 m, shrimp trawl, RV *Oregon*, 29 Sept. 1963.

***Phenacoscorpius megalops* Fowler, 1938**

[English name: Noline Scorpionfish]

(Fig. 1)

Phenacoscorpius megalops Fowler, 1938: 70, fig. 30 (type locality: 27 miles SE of Bagatao I. Light between Burias and Luzon, Philippines, 12°54'40"N, 123°20'30"E).

Scorpaenopsis stigma Fowler, 1938: 66, fig. 28 (type locality: 8.7 miles SW of Point Tagolo Light, northern Mindanao, Philippines, 08°48'N, 123°31'E).

Type material examined: USNM 98896 (holotype of *Scorpaenopsis stigma*), 53.6 mm SL, 8.7 miles SW of Point Tagolo Light, northern Mindanao, Philippines, 08°48'N, 123°31'E, 366 m, RV *Albatross*, 9 Aug. 1909; USNM 99012 (paratype of *S. stigma*), 52.6 mm SL, collected with USNM 98896; USNM 98903 (holotype of *Phenacoscorpius megalops*), 81.1 mm SL, 27 miles SE of Bagatao I. Light, Philippines, 12°54'40"N, 123°20'30"E, 382 m, RV *Albatross*, 11 Mar. 1909; USNM 136337 (paratype of *P. megalops*), Baliscasag Is., Philippines, 09°52'30"N, 123°40'45"E, 318 m, RV *Albatross*, 9 Apr. 1908; USNM 136371 (paratypes of *P. megalops*), 5, 33.7-73.4 mm SL, vicinity of Point Tagolo, N Mindanao, Philippines, 08°45'30"N, 123°33'45"E, 309 m, RV *Albatross*, 9 Aug. 1909; USNM 136372 (paratype of *P. megalops*),

64.4 mm SL, vicinity of Macabalan Point, N Mindanao, Philippines, 08°36'26"N, 124°36'08"E, 413 m, RV *Albatross*, 4 Aug. 1909; USNM 136374 (paratypes of *P. megalops*), 3, 53.5-66.2 mm SL, vicinity of Point Tagolo, N Mindanao, Philippines, 08°47'N, 123°31'15"E, 333 m, RV *Albatross*, 9 Aug. 1909; USNM 136375 (paratypes of *P. megalops*), 2, 60.3, 61.9 mm SL, Dupon Bay, Ponson I., Philippines, 10°50'N, 124°26'18"E, 347 m, RV *Albatross*, 17 Mar. 1909; USNM 136376 (paratypes of *P. megalops*), 2, 43.3, 57.8 mm SL, Lauis Pt., Philippines, 10°10'N, 123°53'15"E, 302 m, RV *Albatross*, 25 Mar. 1908; USNM 136377 (paratypes of *P. megalops*), 5, 48.3-59.8 mm SL, Capitancillo I., Philippines, 11°10'N, 124°17'15"E, 333 m, RV *Albatross*, 16 Mar. 1909; USNM 136378 (paratype of *P. megalops*), 2, 55.5-56.2 mm SL, Capitancillo I., Philippines, 11°11'45"N, 124°15'45"E, 344 m, RV *Albatross*, 16 Mar. 1909; USNM 136379 (paratypes of *P. megalops*), 2, 52.2-58.2 mm SL, off SE coast of Kayoa Is., Indonesia, 00°07'N, 127°28'E, 421 m, RV *Albatross*, 29 Nov. 1909; USNM 136380 (paratype of *P. megalops*), 51.4 mm SL, Bagalao I., Philippines, 12°51'30"N, 123°26'15"E, 413 m, RV *Albatross*, 11 Mar. 1909; USNM 136381 (paratype of *P. megalops*), 68.9 mm SL, vicinity of Tayabas, Marinduque I., Philippines, 13°49'40"N, 121°40'15"E, 152 m, RV *Albatross*, 24 Feb. 1909; USNM 136382 (paratype of *P. megalops*), 64.1 mm SL, Anima Sola I., Philippines, 12°52'00"N, 123°23'30"E, 393 m, RV *Albatross*, 22 Apr. 1908; USNM 136383 (paratype of *P. megalops*), 60.0 mm SL, vicinity of Point Tagolo, N Mindanao, Philippines, 08°48'00"N, 123°31'00"E, 366 m, RV *Albatross*, 9 Aug. 1909; USNM 136384 (paratype of *P. megalops*), 64.0 mm SL, SE of Kayoa I., Indonesia, 00°07'30"N, 127°29'00"E, 0-485 m, RV *Albatross*, 29 Nov. 1909; USNM 136385 (paratype of *P. megalops*), 47.0 mm SL, Capitancillo I., Philippines, 10°38'00"N, 124°13'08"E, 346 m, RV *Albatross*, 18 Mar. 1909.

Description of types of S. stigma: Morphometric and selected meristic data are given in Tables 1 and 2, respectively. Dorsal fin with 12 spines and 9 soft rays; anal fin with 3 spines and 5 soft rays; 7 (8 in paratype) predorsal scale rows; a small slit behind 4th gill arch; posterior margin of maxilla extending slightly beyond a vertical through posterior margin of pupil; no distinct longitudinal ridge on lateral surface of maxilla; villiform teeth on vomer; no palatine teeth; nasal spine directed dorsally; ascending process of premaxilla not intruding into interorbital space, its posterior margin

just reaching level with anterior margin of posterior nostril in dorsal view when mouth completely closed; median interorbital ridge absent; interorbital ridges well developed, beginning posterior to nasal spines and ending at level with bases of postocular spines, ridges not conjoined; preocular, supraocular, postocular, and tympanic spines simple; interorbital, coronal and pretympanic spines absent; occipital pit absent, occipital nearly flat, without distinct transverse ridge in rear; nuchal and parietal spines simple, joined at base; sphenotic with several tiny spines; postorbital without spines; pterotic, posttemporal, and supracleithral spines simple; upper posttemporal spine absent; cleithral spine flattened, spine with a low median ridge; lateral lacrimal spine present; posterior lacrimal spine simple, triangular, directed ventrally; suborbital ridge with 6 spines, last spine vestigial and located basally behind posteriormost well-developed spine; space between ventral margin of eye and suborbital ridge very narrow; preopercle with 4 spines, lacking 2nd spine; supplemental preopercular spine present; upper and lower opercular spines simple, lower spine with a median ridge; posterior tip of pectoral fin extending beyond a vertical through origin of anal fin (not observed in holotype with damaged fins); posterior tip of depressed pelvic fin not reaching anus; origin of 1st anal-fin spine level with slightly posterior to base of last dorsal-fin spine; distinct melanophores

scattered on caudal-fin base and posterior portion of caudal peduncle; a large brownish blotch on dorsal-fin membranes between 5th and 9th spines (6th and 10th spines in paratype).

DISCUSSION

The above characters of the holotype and paratype of *Scorpaenopsis stigma* agreed with those of the holotype of *Phenacoscorpius megalops*, indicating the conspecificity of the specimens. *Scorpaenopsis stigma* and *P. megalops* were described on the same date in the same publication (Fowler 1938), the former appearing on page 66 and the latter on page 70. However, "position precedence" is now restricted to subsequent fixation of type species (article 69A.10), following ICZN (1999). Following article 24 (ICZN 1999), *P. megalops* is herein selected as a valid name (being a senior synonym of *S. stigma*) so as to serve the stability and universality of nomenclature, since the name *P. megalops* has been widely used in publications (e.g., Eschmeyer and Randall 1975, Paulin 1982, Poss 1999).

The genus *Phenacoscorpius* currently consists of 4 valid species: *P. adenensis* (distributed in the western Indian Ocean; Mandrytsa 1992), *P. eschmeyeri* Parin and Mandrytsa, 1992 (eastern Pacific), *P. megalops*

Table 3. Identifications of paratypes of *Phenacoscorpius megalops* examined in this study

Catalog number	Standard length (mm)	Re-identification	Catalog number	Standard length (mm)	Re-identification
USNM 136371	33.7	<i>Phenacoscorpius megalops</i>	USNM 136377	48.3	<i>Phenacoscorpius megalops</i>
USNM 136371	50.1	<i>Phenacoscorpius megalops</i>	USNM 136377	55.4	<i>Phenacoscorpius megalops</i>
USNM 136371	57.8	<i>Phenacoscorpius megalops</i>	USNM 136377	56.0	<i>Phenacoscorpius megalops</i>
USNM 136371	59.4	<i>Phenacoscorpius megalops</i>	USNM 136377	57.5	<i>Phenacoscorpius megalops</i>
USNM 136371	73.4	<i>Phenacoscorpius megalops</i>	USNM 136377	59.8	<i>Phenacoscorpius megalops</i>
USNM 136372	64.4	<i>Phenacoscorpius megalops</i>	USNM 136378	55.5	<i>Phenacoscorpius megalops</i>
USNM 136373	19.3	Serranidae	USNM 136378	56.2	<i>Phenacoscorpius megalops</i>
USNM 136373	29.9	<i>Neomerinthe rotunda</i>	USNM 136379	52.2	<i>Phenacoscorpius megalops</i>
USNM 136373	32.7	<i>Neomerinthe rotunda</i>	USNM 136379	58.2	<i>Phenacoscorpius megalops</i>
USNM 136374	53.5	<i>Phenacoscorpius megalops</i>	USNM 136380	51.4	<i>Phenacoscorpius megalops</i>
USNM 136374	58.4	<i>Phenacoscorpius megalops</i>	USNM 136381	68.9	<i>Phenacoscorpius megalops</i>
USNM 136374	66.2	<i>Phenacoscorpius megalops</i>	USNM 136382	64.1	<i>Phenacoscorpius megalops</i>
USNM 136375	60.3	<i>Phenacoscorpius megalops</i>	USNM 136383	60.0	<i>Phenacoscorpius megalops</i>
USNM 136375	61.9	<i>Phenacoscorpius megalops</i>	USNM 136384	64.0	<i>Phenacoscorpius megalops</i>
USNM 136376	43.3	<i>Phenacoscorpius megalops</i>	USNM 136385	47.0	<i>Phenacoscorpius megalops</i>
USNM 136376	57.8	<i>Phenacoscorpius megalops</i>	USNM 136386	34.8	<i>Neomerinthe megalopsis</i>

Four paratypes (SU 40198-40200) were identified as *P. megalops* by Chen (1981).

(western central Pacific; Motomura unpubl. data), and *P. nebris* (Atlantic Ocean; Mandrytsa 1993, Poss and Eschmeyer 2003). *Phenacoscorpius megalops* can easily be distinguished from all other congeners by the lack of palatine teeth in the former species (Eschmeyer 1965b, Chen 1981).

The description and figure of *S. stigma* by Fowler (1938: 66-67, fig. 28) have numerous errors. Although that figure showed the number of dorsal-fin soft rays (counting the last 2 rays as 1) to be 8, the holotype of *S. stigma* had 9. Both the figures, which showed the complete lateral line, and the description of *S. stigma* indicated “scales 26 + 2 in lateral line”. However, the holotype and paratype of *S. stigma* had only 3 pored lateral-line scales on each side of the body. Furthermore, lateral-line scale pockets were not evident on the lateral surface of the body, although most body scales of the types were missing due to being collected by deep-water trawl. Fowler gave the pectoral-fin ray count as 15, the uppermost and lower 8 rays were unbranched, and the middle 6 rays were branched. The holotype of *S. stigma*, however, had 17 pectoral-fin rays, although the presence or absence of branching of the rays cannot now be determined due to fin damage. The paratype of *S. stigma* also had 17 rays, the uppermost and lower 8 were unbranched, and the remainder were branched.

The number of longitudinal series scale rows is an important taxonomic character in scorpionfishes. This has not been reported for *P. megalops* because the body scales of the species are remarkably delicate and easily lost during capture by deepwater trawls. Only a single specimen with nearly complete body scales was found among 31 specimens of *P. megalops* examined in this study. This specimen, USNM 136384, 64.0 mm SL, had 46 scale rows in longitudinal series.

All of the paratypes of *P. megalops* were originally cataloged at the Smithsonian Institution, Washington DC: USNM 136370 (1 specimen), 136371 (5), 136372 (1), 136373 (3), 136374 (3), 136375 (2), 136376 (2), 136377 (5), 136378 (2), 136379 (2), 136380 (1), 136381 (1), 136382 (1), 136383 (1), 136384 (1), 136385 (1), 136386 (1), 136466 (2), 136467 (1), and 136468 (1), with a total number of specimens of 37 (Eschmeyer, 1998). Subsequently, 3 lots including 4 specimens (USNM 136466-136468) and a single specimen (USNM 136370) were re-registered at Stanford University (SU 40198-40200) and the Zoological Survey of India (ZSI, cat. no. unknown), respectively. The 4

SU specimens were transferred to the California Academy of Sciences (CAS) in the late 1960s, the catalog numbers were retained (SU 40198-40200), and specimens were subsequently examined by Chen (1981) who confirmed them to be *P. megalops*. The ZSI specimen was not available for this study, and identification of the specimen remains unknown. All remaining paratypes were examined in this study, included 3 different species, in addition to *P. megalops* (Table 3). Two (29.9 and 32.7 mm SL) of 3 specimens of USNM 136373 were identified as *Neomerinthe rotunda* on the basis of the following characters: 12 dorsal-fin spines; 9 dorsal-fin soft rays; 18 pectoral-fin rays; a flat occiput; lateral lacrimal spine absent; 3 suborbital spines; and 5 preopercular spines. The remaining specimen (19.3 mm SL) of that lot was identified as a serranid, having 2 opercular spines, a serrated preopercular margin, no suborbital stay, 13 pectoral-fin rays, 11 dorsal-fin spines, and 13 dorsal-fin soft rays. USNM 136386 (34.8 mm SL) was identified as *Neomerinthe megalepis* by having 12 dorsal-fin spines, the 4th spine longest; 9 dorsal-fin soft rays; 19 pectoral-fin rays; a flat occiput; lateral lacrimal spine present; 3 suborbital spines; 4 preopercular spines; and a protruding lower-jaw tip. Identifications of *Neomerinthe* were based on Chen (1981), Poss (1999), and Motomura (unpubl. data).

Acknowledgments: I am especially grateful to Jeffrey Williams and the staff at the Smithsonian Institution Museum Support Center, Suitland, MD, for their kind hospitality during my stay at the museum. Photographs of figure 1 were taken by Sandra Raredon (USNM). This study was supported in part by a Grant-in-Aid for Young Scientists (B) awarded to the author (19770067) by the Ministry of Education, Science, Sports and Culture, Tokyo, Japan.

REFERENCES

- Chen LC. 1981. Scorpaenid fishes of Taiwan. Q. J. Taiwan Mus. **34**: 1-60.
- Eschmeyer WN. 1965a. Western Atlantic scorpionfishes of the genus *Scorpaena*, including four new species. Bull. Mar. Sci. **15**: 84-164.
- Eschmeyer WN. 1965b. Three new scorpionfishes of the genera *Pontinus*, *Phenacoscorpius* and *Idiastion* from the western Atlantic Ocean. Bull. Mar. Sci. **15**: 521-534.
- Eschmeyer WN, ed. 1998. Catalog of fishes. Vol. 2. Species of fishes (M-Z). San Francisco, CA: California Academy of Sciences.
- Eschmeyer WN, JE Randall. 1975. The scorpaenid fishes of

- the Hawaiian Islands, including new species and new records (Pisces: Scorpaenidae). Proc. CA. Acad. Sci. 4th ser. **40**: 265-334.
- Fowler HW. 1938. Descriptions of new fishes obtained by the United States Bureau of Fisheries steamer "Albatross", chiefly in Philippine seas and adjacent waters. Proc. US Natl. Mus. **85**: 31-135.
- Herre AWCT. 1952. A review of the scorpaenoid fishes of the Philippines and adjacent seas. Philipp. J. Sci. **80**: 381-482.
- ICZN (The International Commission on Zoological Nomenclature). 1999. International code of zoological nomenclature, 4th ed. adopted by the General Assembly of the International Union of Biological Sciences. London: International Trust for Zoological Nomenclature.
- Leviton AE, RH Gibbs Jr, E Heal, CE Dawson. 1985. Standards in herpetology and ichthyology. Part I. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. Copeia **1985**: 802-832.
- Mandrytsa SA. 1992. New species and records of species of *Phenacoscorpius* and *Plectrogenium* in the Pacific, Atlantic, and Indian Oceans. Voprosy Ikhtiol. **32**: 10-17.
- Mandrytsa SA. 1993. Results of the research cruises of FRV 'Walther Herwig' to South America. LXX. New records of two rare scorpionfishes, *Idiastion kyphos* Eschmeyer, 1965 and *Phenacoscorpius nebris* Eschmeyer, 1965 (Pisces, Scorpaenidae), from off South Brazil. Arch. Fischwiss. **41**: 197-201.
- Motomura H. 2004a. *Scorpaenopsis insperatus*, a new species of scorpionfish from Sydney Harbour, New South Wales, Australia (Scorpaeniformes: Scorpaenidae). Copeia **2004**: 546-550.
- Motomura H. 2004b. New species of scorpionfish, *Scorpaena cocosensis* (Scorpaeniformes: Scorpaenidae) from the Cocos Islands, Costa Rica, eastern Pacific Ocean. Copeia **2004**: 818-824.
- Motomura H. 2004c. Revision of the scorpionfish genus *Neosebastes* (Scorpaeniformes: Neosebastidae) with descriptions of five new species. Indo-Pacific Fishes **37**: 1-75.
- Motomura H, R Fricke, WN Eschmeyer. 2005a. Redescription of a poorly known scorpionfish, *Scorpaena canariensis* (Sauvage), and a first record of *Pontinus leda* Eschmeyer from the Northern Hemisphere (Scorpaeniformes: Scorpaenidae). Stuttg. Beitr. Naturk. Ser. A (Biol.) **674**: 1-15.
- Motomura H, JW Johnson. 2006. Validity of the poorly known scorpionfish, *Rhinopias eschmeyeri*, with redescriptions of *R. frondosa* and *R. aphanes* (Scorpaeniformes: Scorpaenidae). Copeia **2006**: 500-515.
- Motomura H, PR Last, MF Gomon. 2006a. A new species of the scorpionfish genus *Maxillicosta* from the southeast coast of Australia, with a redescription of *M. whitleyi* (Scorpaeniformes: Neosebastidae). Copeia **2006**: 445-459.
- Motomura H, PR Last, GK Yearsley. 2005b. *Scorpaena bulacephala*, a new species of scorpionfish (Scorpaeniformes: Scorpaenidae) from the northern Tasman Sea. Zootaxa **1043**: 17-32.
- Motomura H, PR Last, GK Yearsley. 2006b. New species of shallow water scorpionfish (Scorpaenidae: *Scorpaena*) from the central coast of Western Australia. Copeia **2006**: 360-369.
- Motomura H, CD Paulin, AL Stewart. 2005c. First records of *Scorpaena onaria* (Scorpaeniformes: Scorpaenidae) from the southwestern Pacific Ocean, and comparisons with the Northern Hemisphere population. NZ J. Mar. Freshw. Res. **39**: 865-880.
- Motomura H, T Yoshino, N Takamura. 2004. Review of the scorpionfish genus *Scorpaenopsis* (Scorpaeniformes: Scorpaenidae) in Japanese waters with three new records and an assessment of standard Japanese names. Jpn. J. Ichthyol. **51**: 89-115.
- Norman JR. 1939. Fishes. The John Murray Expedition 1933-34. Sci. Rep. John Murray Exped. **7**: 1-116.
- Paulin CD. 1982. Scorpionfishes of New Zealand (Pisces: Scorpaenidae). NZ J. Zool. **9**: 437-450.
- Poss SG. 1999. Scorpaenidae. In KE Carpenter, VH Niem, eds. FAO species identification guide for fishery purposes. The living marine resources of the western central Pacific. Vol. 4. Bony fishes part 2 (Mugilidae to Carangidae). Rome: Food and Agriculture Organization of the United Nations, pp. 2291-2352.
- Poss SG, WN Eschmeyer. 2003 (dated 2002). Scorpaenidae. Scorpionfishes (also rosefishes, rockfishes, stingfishes). In KE Carpenter, ed. FAO species identification guide for fishery purposes and American Society of Ichthyologists and Herpetologists special publication no. 5. The living marine resources of the western central Atlantic. Vol. 2. Bony fishes part 1 (Acipenseridae to Grammatidae). Rome: Food and Agriculture Organization of the United Nations, pp. 1232-1265.
- Randall JE, WN Eschmeyer. 2002 (dated 2001). Revision of the Indo-Pacific scorpionfish genus *Scorpaenopsis*, with descriptions of eight new species. Indo-Pac. Fishes **34**: 1-79.
- Weber M, LF de Beaufort. 1962. The fishes of the Indo-Australian Archipelago. Vol. 11. Scleroparei, Hypostomides, Pediculati, Plectognathi, Opisthomi, Discocephali, Xenopterygii. Leiden: E. J. Brill.