Taxonomic review of the scorpionfish genus *Scorpaena* (Teleostei: Scorpaenidae) in the Indo-Pacific Ocean

インド・太平洋におけるフサカサゴ属魚類の分類学的研究

Kunto Wibowo

The United Graduate School of Agricultural Sciences,

Kagoshima University

2021

Contents

Abstract

Updated definition for the Indo-Pacific genus *Scorpaena* Linnaeus 1758, most similar to the genus *Sebastapistes* Gill 1877, was provided in this study. The two genera have previously been considered to be separated only by the occipital condition (a pit present in the former vs. a flat occiput in the latter). However, although an occipital pit is consistently present in all species of *Scorpaena*, it is also distinct in *Sebastapistes ballieui* Sauvage 1875 and *Sebastapistes mauritiana* (Cuvier 1829). The two species were confirmed to be truly attributed to *Sebastapistes* in this study, and comparisons of all species belonging to both genera revealed that the two genera could be distinguished from each other by the combination of the occipital condition and number of suborbital spines.

Twenty one nominal species, including 4 small-sized new species (*Scorpaena longaecrista*, *Scorpaena regina*, *Scorpaena sororreginae*, and *Scorpaena vesperalis*) from Australian waters described in this review study, were recognized as valid. *Scorpaena dabryi* Sauvage 1878 had remained poorly known, with no further records since its original description, was regarded as a junior synonym of East Asian species *Scorpaena miostoma* Günther 1877 on the basis of examination of the type specimens and numerous non-type specimens. *Scorpaena fimbriata* Döderlein 1884, *Scorpaena izensis* Jordan and Starks 1904, *Scorpaena hemilopidota* Fowler 1938, and *Scorpaenopsella armata* Fowler 1938, the first mentioned and latter three previously treated as valid subspecies of *Scorpaena neglecta* Temminck and Schlegel 1843 and valid species, respectively, were regarded as junior synonyms of Indo-West Pacific species *Scorpaena neglecta* on the basis of examination of type and numerous additional specimens from a wide geographical range. *Scorpaena pele* Eschmeyer and Randall 1975, previously treated as a valid Hawaiian endemic species since its original description, was regarded as a junior synonym of Indo-Pacific species *Scorpaena onaria* Jordan and Snyder 1900. *Scorpaena cruenta* Solander 1842a*, Scorpaena ergastulorum*

Richardson 1842a, and *Scorpaena militaris* Richardson 1842b were confirmed as junior synonyms of Australasian species *Scorpaena papillosa* (Schneider and Forster 1801); neotype for *S. papillosa* was designated. Two subspecies were recognized in *S. papillosa*: *S. papillosa papillosa* from New Zealand; *S. papillosa ergastulorum* from Australia (a senior synonym of *S. militaris*). *Scorpaena plebeia* Solander 1842a and *Scorpaena cookii* Günther 1874 were confirmed as junior synonyms of New Zealand species *Scorpaena cardinalis* Solander and Richardson 1842, and *Scorpaena natalensis* Regan 1906 as a junior synonym of western Indian Ocean species *Scorpaena scrofa* Linnaeus 1758.

Four poorly known species, *Scorpaena barbata* Bonnaparte 1788, *Scorpaena spinosa* Gmelin 1789, *Scorpaena gronovii* Walbaum 1792, and *Scorpaena asperella* Bennet 1828, were considered as *nomina nuda*. Eight nominal species currently with uncertain status, *Scorpaena aplodactylus* Bleeker 1852, *Scorpaena peruana* Hildebrand 1946, and *Scorpaena lineagula* Fowler 1955 were considered to be assigned to the genus *Sebastapistes*, and *Scorpaena polyprion* Bleeker 1849, *Scorpaena zanzibarensis* Playfair 1867, *Scorpaena dentate* Günther 1874, *Scorpaena bleekeri* Day 1878, and *Scorpaena voelzkowi* Jatzow and Lenz 1898 to *Parascorpaena* Bleeker 1876. Two nominal species currently regarded as valid species of *Scorpanea*, *Scorpaena pascuensis* Eschmeyer and Allen 1971 and *Scorpaena grandisquamis* Ogilby 1910, were allocated to *Sebastapistes* and *Parascorpaena*, respectively, in this study.

A diagnosis, synonymy, distribution, and list of specimens examined (or appropriate citation if previously published in detail) were given for each species, together with an identification key for all valid Indo-Pacific species of *Scorpaena*.

要旨（Abstract in Japanese）

インド・太平洋産フサカサゴ属魚類の分類学的研究において，マダラフサカサゴ属 *Sebastapistes* Gill 1877 とよく似る本属の再定義を行った．両属はこれまで後頭部の形態（フサカサゴ属では後頭部に凹みをもつのに対して，マダラフサカサゴ属では平坦）のみで識別されると考えられていた．しかし，フサカサゴ属では全種で後頭部に凹みをもつものの，この形質はマダラフサカサゴ属の *Sebastapistes ballieui* Sauvage 1875 とハチジョウフサカサゴ *Sebastapistes mauritiana* (Cuvier 1829)にもみられる．この 2 種は本研究において，マダラフサカサゴ属に正しく帰属されることが確認され，本属とフサカサゴ属に含まれる全種の比較から，両属は後頭部の形態と眼下棘の本数の組み合わせによりそれぞれ識別できることが明らかになった．

本研究では 4 新種（*Scorpaena longaecrista*，*Scorpaena regina*，*Scorpaena sororreginae*，および *Scorpaena vesperalis*；いずれも本研究中で記載されたオーストラリア産の小型種）を含めた 21 有効種をフサカサゴ属魚類に認めた．原記載以降，報告がなかった *Scorpaena dabryi* Sauvage 1878 は，タイプ標本と多くの一般標本の調査に基づき，東アジアに生息するコクチフサカサゴ *Scorpaena miostoma* Günther 1877 の新参異名であることが明らかになった．*Scorpaena fimbriata* Döderlein 1884，*Scorpaena izensis* Jordan and Starks 1904，*Scorpaena hemilopidota* Fowler 1938，および *Scorpaenopsella armata* Fowler 1938 の 4 名義種は，これまでイズカサゴ *Scorpaena neglecta* Temminck and Schlegel 1843 の亜種（*Scorpaena fimbriata* の扱いにおいて）または有効種（残りの 3 名義種）と扱われてきたが，タイプ標本と分布域広域から得られた多数の追加標本の調査から，上記の 4 名義種は全てインド・西太平洋に生息するイズカサゴ *Scorpaena neglecta* の新参異名であることが明らかになった．

Scorpaena pele Eschmeyer and Randall 1975 は，原記載以降これまでハワイ固有種と考えられていたが，インド・太平洋の広域に生息するフサカサゴ *Scorpaena onaria* Jordan and Snyder 1900 の新参異名であることが確認された．*Scorpaena cruenta* Solander 1842，*Scorpaena ergastulorum* Richardson 1842a，および *Scorpaena militaris* Richardson 1842 は，*Scorpaena papillosa* (Schneider and Forster 1801)の新参異名とみなされ，*S. papillosa* に対してネオタイプを指定した．また，*S. papillosa* にはそれぞれ異所的に分布する *S. papillosa papillosa*（ニュージランド）と *S. papillosa ergastulorum S. militaris* の古参異名，オーストラリア）の 2 亜種が認められた．*Scorpaena plebeia* Solander 1842 と *Scorpaena cookii* Günther 1874 は，ニュージランドに生息する *Scorpaena cardinalis* Solander and Richardson 1842 の新参異名であることが確認され，*Scorpaena natalensis* Regan 1906 はインド洋に生息する *Scorpaena scrofa* Linnaeus 1758 の新参異名であることが明らかになった．

これまで情報が不足していた *Scorpaena barbata* Bonnaparte 1788，*Scorpaena spinosa* Gmelin 1789，*Scorpaena gronovii* Walbaum 1792，および *Scorpaena asperella* Bennet 1828 の 4 名義種は不適格名とみなされた．これまで分類学的位置が不確実であった 8 名義種の内，*Scorpaena aplodactylus* Bleeker 1852，*Scorpaena peruana* Hildebrand 1946，および *Scorpaena lineagula* Fowler 1955 の 3 種はマダラフサカサゴ属 *Sebastapistes* に帰属され，*Scorpaena polyprion* Bleeker 1849，*Scorpaena zanzibarensis* Playfair 1867，*Scorpaena dentate* Günther 1874，*Scorpaena bleekeri* Day 1878，および *Scorpaena voelzkowi* Jatzow and Lenz 1898 の 5 種はネッタイフサカサゴ属 *Parascorpaena* に帰属された．

インド・太平洋産フサカサゴ属各種の識別的特徴，異名関係，分布域，調査標本のリスト（これまでで出版済みのものはその引用），および検索表を示した.

Introduction

The scorpionfish genus *Scorpaena* Linnaeus 1758 (Scorpaenidae), comprising species of small to relatively large body size, is distributed circumglobal in tropical and temperate zones from shallow to deep habitats. No taxonomic definition of the genus on a worldwide basis is available (Eschmeyer 1965, 1969), most recent descriptions of the genus addressing groups of species associated with one or other of four geographical areas, e.g., western Atlantic, eastern Atlantic, Indo-Pacific, and eastern Pacific (Ginsburg 1953; Eschmeyer 1965, 1969; Poss 1999; Motomura 2004a; Motomura et al. 2005a, b).

The recent diagnostic characters of Indo-Pacific *Scorpaena*, given by Poss (1999), Motomura and Senou (2008), Motomura et al. (2011b), and Wibowo and Motomura (2019a), included the following: 12 dorsal-fin spines, teeth on the palatines, an occipital pit, some pectoral-fin rays branched, and pored lateral-line scales continuing onto the caudal-fin base. Of the above five characters, *Scorpaena* shares four with the closely related genus *Sebastapistes* Gill *in* Streets 1877, the two genera usually being separated only by the occipital condition (a pit in the former vs. a flat occiput in the latter) (see Poss 1999; Motomura et al. 2014). However, the examination of specimens of *Sebastapistes* in this study determined that features of two species [*Sebastapistes ballieui* (Sauvage *in* Vaillant and Sauvage 1875) and *Sebastapistes mauritiana* (Cuvier *in* Cuvier and Valenciennes 1829)] in fact conformed to all of the generic characters of *Scorpaena*, including having a distinct occipital pit.

Taxonomic studies of Indo-Pacific species of *Scorpaena* have been separately published by numerous authors (e.g., Eschmeyer and Allen 1971; Eschmeyer and Randall 1975; Randall and Greenfield 2004; Motomura et al. 2005a, b, 2006, 2007, 2011a, b; Motomura and Senou 2008; Fricke et al. 2018; Wibowo and Motomura 2019a, b, 2020; Wibowo et al. 2019; Fricke and Zhukov 2020), with many nominal species having been regarded as valid or synonyms of

species included in other genera e.g., *Scorpaenodes* Bleeker 1857, *Sebastapistes*, *Parascorpaena* Bleeker 1876, and *Neomerinthe* Fowler 1935 (Eschmeyer and Randall 1975; Eschmeyer 1986; Motomura 2009; Motomura et al. 2011a, 2015, 2016a, b).

Accordingly, the need for reevaluation of the taxonomic status of several nominal species became apparent, resulting in a review of generic and specific characters of Indo-Pacific *Scorpaena*, based on previous reports and examination of type and non-type specimens.

Material and Methods

Measurements and counts, made on the left side whenever possible, generally followed Motomura (2004a, b), with several additional counts and measurements following Motomura et al. (2005a, b, 2006) and Wibowo and Motomura (2020). The last two soft rays of the dorsal and anal fins were counted as single rays, each pair being associated with a single pterygiophore. Standard length is expressed as SL. A diagram of head spination is provided in Fig. 1. Sex and swimbladder were confirmed by dissection of the abdomen on the right side. Vertebral numbers were counted from radiographs. Standard names of Taiwanese specimen localities follow Ebert et al. (2013: table 5). Institutional codes follow Sabaj (2020), with an additional institutional abbreviation as follows: the Shobara Municipal Hiwa Museum for Natural History, Shobara, Japan (HMNH).

Descriptions of each valid nominal species are given in alphabetical order (followed with the two new species, *S. longaecrista* and *S. sororreginae*, recently described in this study), based on previously published taxonomic studies and confirmed by examination of available type and non-type specimens. The standard English names provided in this paper followed previous literature; if not available, new names were proposed in this study. The standard Japanese names followed Motomura (2021).

The following specimens of the Indo-Pacific species of *Sebastapistes* were examined for comparative purposes. ***Sebastapistes ballieui*** (14 specimens, all from Hawaiian Islands, USA): KAUM–I. 46485, 61.4 mm SL, off Oahu, 19°35′N, 155°34′W, W. Gosline, 1959; USNM 125662, 13 specimens, 29.8–83.2 mm SL, off Honolulu, RV *Albatross*, 1902. ***Sebastapistes cyanostigma*** (5 specimens, all from Japan): KAUM–I. 78576, 54.3 mm SL, Danno Beach, Yonaguni-jima Island, Yaeyama Islands, Okinawa, 24°27′33.0″N, 122°57′09.6″E, 0–5 m, hand net, K. Koeda et al., 23 Sep. 2015; KAUM–I. 99137, 49.7 mm SL, Yasurahama Port, Akuseki-jima Island, Tokara Islands, Kagoshima, 29°27′09.6″N,

129°35′20.4″E, 20–22 m, hand net, H. Motomura et al., 23 Apr. 2017; KAUM–I. 103872, 57.8 mm SL, Shinaha Beach, Yoron-jima Island, Amami Islands, Kagoshima, 27°03′33.0″N, 128°24′32.4″E, 10–20 m, hand net, D. Uyeno et al., 30 June 2017; KAUM–I. 122352, 47.7 mm SL, west of Okidomarri Fishing Port, Okinoerabu-jima Island, Amami Islands, Kagoshima, 27°23′32.4″N, 128°33′00.0″E, 10–18 m, hand net, D. Uyeno et al., 23 Oct. 2018; KAUM–I. 123464, 25.4 mm SL, Kasaishi Beach, Okinoerabu-jima Island, Amami Islands, Kagoshima, 27°24′21.6″N, 128°40′13.8″E, 1–1.8 m, hand net, H. Motomura, 23 Oct. 2018. ***Sebastapistes fowleri*** (5 specimens, all from Kagoshima, Japan): KAUM–I. 29674, 26.3 mm SL, south coast of Ombosaki, Take-shima Island, 30°48′19.2″N, 130°24′19.8″E, 5–20 m, hand net, KAUM Fish Team, 29 May 2010; KAUM–I. 37664, 23.8 mm SL, west coast of Iou-jima Island, 30°47′02.4″N, 130°15′25.2″E, 5–40 m, hand net, KAUM Fish Team, 11 May 2011; KAUM–I. 45856, 20.9 mm SL, Maehama Beach, Yoron-jima Island, 27°01′07.8″N, 128°26′15.6″E, 7 m, hand net, KAUM Fish Team, 17 Apr. 2012; KAUM–I. 57701, 31.9 mm SL, west coast of Sokaru, Amami-oshima Island, Amami Islands, 28°07′30.0″N, 129°21′04.2″E, 3–15 m, hand net, K. Hagiwara et al., 13 Dec. 2013; KAUM–I. 68045, 25.7 mm SL, off Nagata, Yaku-shima Island, Osumi Islands, 30°23′21.0″N, 130°23′03.6″E, 5–10 m, hand net, T. Yoshida et al., 27 Dec. 2014. ***Sebastapistes mauritiana*** (25 specimens): NSMT 120378, 35.4 mm SL, NSMT 120379, 14.9 mm SL, NSMT 120389, 13.1 mm SL, Minamidaito-jima Island, Ryukyu Islands, Japan, 25°49′N, 131°16′E, hand net, S. Chiba et al., 2 July 2014; USNM 379367, 44.5 mm SL, north coast of Point Kauira, Rapa, French Polynesia (FP), 27°34′04″S, 144°20′46″W, 2–6 m, J. Williams et al., 15 Nov. 2002; USNM 379398, 4 specimens, 36.4–59.7 mm SL, Anatakuri Bay, Rapa, (FP), 27°37′43″S, 144°18′42″W, 1–2.7 m, J. Williams and S. Planes, 11 Nov. 2002; USNM 400440, 14.6 mm SL, USNM 400627, 27.3 mm SL, Gambier Islands, (FP), 23°16′41″S, 134°56′06″W, 23–28 m, J. Williams et al. on Vessel *Clavmore II*, 7 Oct. 2010; USNM 404727, 55.6 mm SL,

Totegegie Island, Gambier Islands, (FP), 23°06′30″S, 134°52′30″W, 10–25 m, J. Williams et al. on Vessel *Clavmore II*, 14 Oct. 2010; USNM 411040, 3, 40.9–48.3 mm SL, USNM 411043, 5, 44.1–53.0 mm SL, Marquesas Islands, (FP), 7°51′26″S, 140°22′23″W, 7–9 m, J. Williams et al. on Vessel *Braveheart*, 1 Nov. 2011; BPBM 41382, 2, 30.6–33.5 mm SL, Pitcairn Islands; BSKU 5665, 48.1 mm SL, BSKU 5666, 44.9 mm SL, BSKU 80618, 42.4 mm SL, Japan; HMNH-P 6447, 68.3 mm SL, Kaigumbo, Minamidaito-jima Island, Daito Islands, Japan, H. Yoshigou, 26 Apr. 2003. ***Sebastapistes strongia*** (5 specimens, all from Kagoshima, Japan): KAUM–I. 20095, 40.6 mm SL, KAUM–I. 20096, 51.7 mm SL, KAUM–I. 20189, 54.7 mm SL, KAUM–I. 20190, 51.3 mm SL, Yudomari Port, Yaku-shima Island, Osumi Islands, 30°13′34.8″N, 130°28′11.4″E, 0–3 m, hand net, KAUM Fish Team, 29 Oct. 2008; KAUM–I. 38062, 54.2, mm SL, east coast of Yaku-shima Island, 30°17′33.6″N, 130°39′06.6″E, 0–1 m, hand net, KAUM Fish Team, 7 June 2011. ***Sebastapistes tinkhami*** (10 specimens, 9 and 1 from Kagoshima, Japan and French Polynesia, respectively): KAUM–I. 45838, 50.7 mm SL, KAUM–I. 45874, 63.0 mm SL, Maehama Beach, Yoron-jima Island, 27°01′07.8″N, 128°26′15.6″E, 5 m, hand net, H. Motomura et al., 16–17 Apr. 2012; KAUM–I. 47885, 66.6 mm SL, KAUM–I. 47917, 64.0 mm SL, KAUM–I. 47918, 63.0 mm SL, off Chabana, Yoron-jima Island, 27°03′24.0″N, 128°25′01.2″E, 2 m, hand net, KAUM Fish Team, 13–20 Aug. 2012; KAUM–I. 57664, 61.0 mm SL, off Kaitsuzaki, Amami-oshima Island, Amami Islands, 28°06′20.4″N, 129°22′20.4″E, 2–18 m, hand net, K. Hagiwara et al., 12 Dec. 2013; KAUM–I. 70878, 59.7 mm SL, off Chabana, Yoron-jima Island, Amami Islands, 27°02′08.4″N, 128°23′34.2″E, 2 m, hand net, K. Eguchi et al., 13 Mar. 2015; KAUM–I. 101198, 62.4 mm SL, 0.3 m, T. Yoshida et al., 27 June 2017, other data same as KAUM–I. 70878; KAUM–I. 104544, 66.4 mm SL, Yoron Port, Yoron-jima Island, Amami Islands, 8–12, hand net, T. Yoshida et al., 4 July 2017; KAUM–I. 108099, 60.1 mm SL, southwestern coast of Tahiti, Society Islands, 1–2 m, hand net, S. Tashiro, 6 Oct. 2017.

Results

Indo-Pacific genus of *Scorpaena*

Scorpaena Linnaeus 1758: 266 (type species: *Scorpena porcus* Linnaeus 1758, by subsequent designation, Bleeker 1876: 295).

Diagnosis. A genus of the family Scorpaenidae characterized by the following combination of characters: 12 dorsal-fin spines; teeth on palatines; occipital pit present; some pectoral-fin rays branched; pored lateral-line scales continuing onto caudal-fin base; and 3 suborbital spines.

Description. Frequency distributions of numbers of pectoral-fin rays, pored lateral-line scales, and total gill rakers in all Indo-Pacific species of *Scorpaena* are presented in Table 1. Dorsal fin normally with 12 (rarely 11 or 13) spines and 9 or 10 (rarely 8 or 11) soft rays; all soft rays branched; third to fifth spine longest, thereafter spines progressively shorter; first to fourth (usually second) soft ray longest; posterior branch of last soft ray broadly joined by membrane to caudal peduncle. Anal fin with 3 spines and 5 (rarely 4) soft rays; first spine shortest, second longest; all soft rays branched, first or second longest; posterior branch of last soft ray separate from or joined by narrow membrane to caudal peduncle. Pectoral-fin rays 13–21 (some upper rays branched in adults; fewer branched rays or all unbranched in juveniles). Pelvic-fin base posterior to pectoral-fin base; pelvic-fin rays with 1 spine and 5 soft rays; all soft rays branched, second longest, last soft ray broadly joined by membrane to abdomen. Principal caudal-fin rays 12–14. Scale rows in longitudinal series 36–74. Pored lateral-line scales 21–30. Scales above lateral line 3–10, below 9–26. Pre-dorsal scale rows 0–8. Scale rows between 6th dorsal-fin spine base and lateral line 4–11, between last dorsal-fin spine base and lateral line 4–11. Gill rakers on upper limb 4–6, lower limb 8–13 (rarely 6), total rakers 12–20. Branchiostegal rays 7.

Dorsal snout profile steep. Body moderately compressed anteriorly, progressively more compressed posteriorly. Body relatively shallow, body depth less than head length. Mouth large, slightly oblique. Posterior margin of maxilla between verticals through center of pupil and posterior margin of orbit, or extending to posterior margin of orbit; upper edge of posterior maxilla swollen laterally, forming a low or distinct ridge. Origin of first dorsal-fin spine above supracleithral spines. Jaws usually with a band of short conical teeth, band narrowing posteriorly. Vomer and palatine teeth present.

Interorbital ridges present, usually diverging anteriorly and posteriorly in dorsal view. Occipital pit varying from extremely deep to moderately shallow. Nasal, preocular, supraocular, postocular, tympanic, parietal, nuchal, pterotic, upper and lower posttemporal, supracleithral, cleithral, and upper and lower opercular spines present. Sphenotic with 1–6 small spines. Postorbital area smooth or ridged with one or a few tiny spines. Anterior and posterior lacrimal spines simple or with additional spine(s); anterior spine directed forward or slightly anteroventrally (distinct ventrally in *S. brevispina*); posterior spine directed ventrally or posteroventrally. Suborbital ridge with 3 spines. Suborbital pit usually absent. Preopercle with 5 spines; uppermost longest, with supplemental spine.

Lateral surface of body covered with ctenoid scales (cycloid in adults of both *S. cardinalis* and *S. jacksoniensis*), scales becoming cycloid ventrally. Pectoral-fin base and anteroventral surface of body covered by scales or naked. Body scales not extending onto fin rays or membranes, except basal caudal fin. Lateral line continuing onto caudal-fin base.

Underside of dentary usually with three sensory pores, first pore below tip of anterior lacrimal spine, second pore below and between anterior and posterior lacrimal spines, third pore located on posterior margin of dentary; single pores on each side of symphysial knob; single or two separated pores behind symphysial knob.

A tentacle(s) and flap(s) associated with anterior nostril, some body and pored lateral-line scales, and several spines, viz., preocular, supraocular, parietal, nuchal, anterior and posterior lacrimal, and preopercular spines.

Remarks. Examination of available type specimens and the original descriptions of all nominal Indo-Pacific species of *Scorpaena* resulted in the recognition of 21 valid species (including 4 new species) and 12 synonyms (see section on valid species below). In addition, four poorly known species, *Scorpaena barbata* Bonnaterre 1788, *Scorpaena spinosa* Gmelin 1789, *Scorpaena gronovii* Walbaum 1792, and *Scorpaena asperella* Bennet 1828, which were briefly described as new species with no identifiable diagnostic features and unknown whereabouts of type localities or specimens, are considered herein as nomina nuda under Article 12.1 (ICZN 1999). Furthermore, of eight nominal species currently with uncertain status, *Scorpaena aplodactylus* Bleeker 1852, *Scorpaena peruana* Hildebrand 1946, and *Scorpaena lineagula* Fowler 1955 are assigned to genus *Sebastapistes*, and *Scorpaena polyprion* Bleeker 1849, *Scorpaena zanzibarensis* Playfair in Playfair and Günther 1867, *Scorpaena dentata* Günther 1874, *Scorpaena bleekeri* Day 1878, and *Scorpaena voelzkowi* Jatzow and Lenz 1898 to *Parascorpaena*. Moreover, although Fricke et al. (2018) and Fricke and Zhukov (2020) recognized the binomina *Scorpaena pascuensis* Eschmeyer and Allen 1971 and *Scorpaena grandisquamis* Ogilby 1910 as valid, examination of the type specimens and original descriptions of those species showed their characteristics to match those of *Sebastapistes* and *Parascorpaena*, respectively.

Key to the Indo-Pacific species of *Scorpaena*

1a. Anteroventral surface of body and base of pectoral fin naked 2

1b. Anteroventral surface of body and base of pectoral fin covered by exposed or embedded scales 4

2a. Dorsal-fin soft rays 10; pectoral-fin rays 16; scale rows in longitudinal series 59–62; pored lateral-line scales 29 or 30; dermal flap on pectoral-fin axil absent ..... ***S. decemradiata*** (Gulf of Aqaba, northern Red Sea)

2b. Dorsal-fin soft rays 9 (rarely 8 or 10); pectoral-fin rays 17–21; scale rows in longitudinal series 41–47; pored lateral-line scales 22–24; dermal flap on pectoral-fin axil present (Fig. 42a) 3

3a. Ventral margin of lacrimal with 3 or 4 spines; underside of lower jaw with many tentacles; lateral surface of head usually with small blackish spots ..... ***S. scrofa*** (western Indian Ocean)

3b. Ventral margin of lacrimal with 2 or 3 spines (rarely 4); no tentacles on underside of lower jaw; no blackish spots on lateral surface of head ..... ***S. neglecta*** (western Australia and West Pacific)

4a. Lateral lacrimal spine absent (Fig. 43a)..... 5

4b. Lateral lacrimal spine present (Fig. 43b–d) 11

5a. Pre-dorsal scale rows 0–2 (rarely 3); most of entire predorsal area to near first pored lateral-line scale covered by thick skin with numerous small sensory pores; median interorbital ridge present; distinct ridge on lateral surface of maxilla (Fig. 42c; underside of lower jaw with one or two pairs of slender tentacles..... 6

5b. Pre-dorsal scale rows 3–7; skin covering absent on predorsal area to near first pored lateral-line scale; median interorbital ridge absent; no ridge on lateral surface of maxilla; no tentacles on underside surface of lower jaw 7

6a. Pectoral-fin rays 15 (rarely 14; see Table 1); scale rows in longitudinal series 35–42; scale rows below lateral line 13 or 14, between 6th dorsal-fin spine base and lateral line 5, between last dorsal-fin spine base and lateral line 5; 2nd, 3rd and 4th dorsal-fin spine lengths 11.4–15.3% of SL, 15.8–18.6% of SL, and 17.9–

19.0% of SL, respectively; caudal peduncle depth 10.5–11.7% of SL ..... ***S. gasta*** (western Australia)

6b. Pectoral-fin rays 16 (rarely 14, 15, or 17; see Table 1); scale rows in longitudinal series 42–47; scale rows below lateral line 16–18, between 6th dorsal-fin spine base and lateral line 6–8, between last dorsal-fin spine base and lateral line 6–8; 2nd, 3rd, and 4th dorsal-fin spine lengths 16.8–23.7% of SL, 22.0–29.6% of SL, and 22.1–25.9% of SL, respectively; caudal peduncle depth 11.5–14.3% of SL ..... ***S. sumptuosa*** (western Australia)

7a. Pectoral-fin rays 16–18 (rarely 16); occipital pit bordered laterally by ridges; bases of tympanic spines about level with parietal spines (Fig. 26a) 8

7b. Pectoral-fin rays 13–17 (usually 16, rarely 17); occipital pit bordered laterally by tympanic and parietal spine bases; bases of parietal spines distinctly medial to tympanic spines (Fig. 26b) 10

8a. Total gill rakers 13–16 ..... ***S. longaecrista*** (western Australia)

8b. Total gill rakers 17–20 9

9a. Scale rows in longitudinal series 39–44; longest pectoral-fin ray length 31.5–33.5% of SL ..... ***S. bulacephala*** (Tasman Sea and Vanuatu)

9b. Scale rows in longitudinal series 44–49; longest pectoral-fin ray length 33.2–36.9% of SL..... **S. *colorata*** (Hawaiian Islands, northern central Pacific)

10a. Scale rows above lateral line 4–6 (5); number of gill rakers on upper limb 4 or 5 (mode 5), lower limb 10 or 11 (11), total rakers 14–16 (16) (Table 10); body

width 15.9–21.3 (mean 19.1) % of SL; 9th and 10th dorsal-fin spine lengths 11.1–13.5 (12.4) % of SL and 8.4–10.9 (9.5) % of SL, respectively (Fig. 29) ..... ***S. sororreginae*** (western Australia)

10b. Scale rows above lateral line 5–7 (6); number of gill rakers on upper limb 4 or 5 (mode 4), lower limb 9–12 (10), total rakers 13–17 (14) (Table 10); body width 15.4–22.0 (mean 17.8) % of SL; 9th and 10th dorsal-fin spine lengths 8.9–13.3 (10.6) % of SL and 6.5–9.9 (8.1) % of SL, respectively (in specimens less than 45 mm SL, Fig. 29) ..... ***S. regina*** (eastern Australia)

11a. Lateral lacrimal spine with single spinous point (Fig. 43b, c) 12

11b. Lateral lacrimal spine with two spinous points (Fig. 43d)..... 20

12a. Dorsal-fin soft rays 10 (rarely 9 or 11); coronal spines present; anterodorsal lacrimal spine present (Fig. 43b) 13

12b. Dorsal-fin soft rays 9 (rarely 8 or 10); coronal spines absent; anterodorsal lacrimal spine absent (Fig. 43c) 15

13a. Scale rows in longitudinal series 37–41; pectoral-fin rays 14–16 (mode 15; see Table 1); small body size, maximum recorded length 67.6 mm SL; body and maxilla relatively deep; upper jaw and postorbital long; interorbital ridges well separated; short 1st anal-fin spine (Fig. 18) ..... ***S. vesperalis*** (western Australia)

13b. Scale rows in longitudinal series 41–48; pectoral-fin rays 15–17 (mode 16; see Table 1); large body size, maximum recorded length 208.4 mm SL; body and maxilla relatively shallow; upper jaw and postorbital short; interorbital ridges narrowly separated; long 1st anal-fin spine (in specimens less than 70 mm SL, Fig. 18) 14

14a. Scale rows above lateral line 4–7 (mode 6), below lateral line 10–14 (12), between 6th dorsal-spine base and lateral line 5–7 (5 or 6), between last dorsal-fin spine base and lateral line 4–7 (5) ..... ***S. papillosa ergastulorum*** (southeastern Australia)

14b. Scale rows above lateral line 6–8 (mode 7), below lateral line 13–18 (14), between 6th dorsal-spine base and lateral line 6–8 (7), between last dorsal-fin spine base and lateral line 6–8 (7) ..... ***S. papillosa papillosa*** (New Zealand)

15a. Underside of lower jaw with many tentacles (see Fricke and Zhukov 2020: fig. 3) ..... ***S. nasicornua*** (Gulf of Aden, northwestern Indian Ocean)

15b. No tentacles on underside of lower jaw 16

16a. Scale rows in longitudinal series 62, rows above lateral line 8, below lateral line 20, between 6th dorsal-fin spine base and lateral line 11, between last dorsal-fin spine base and lateral line 10 ..... ***S. lacrimata*** (Society Islands, southeastern Pacific)

16b. Scale rows in longitudinal series 42–48, rows above lateral line 3–7 (rarely 8, only one of all specimens examined of *S. miostoma*), below lateral line 13–18, between 6th dorsal-fin spine base and lateral line 6–9, between last dorsal-fin spine base and lateral line 6–9 17

17a. Pectoral-fin rays 15–17 (mode 16, rarely 15 or 17); gill rakers 12–15 (see Table 1); relatively shallow body; posterior margin of maxilla just reaching a vertical through posterior margin of pupil ..... ***S. miostoma*** (northwestern Pacific)

17b. Pectoral-fin rays 16–18 (usually 17; but 16 in *S. pepo*); gill rakers 14–17 (see Table 1); relatively deep body; posterior margin of maxilla just reaching or beyond a vertical through posterior margin of orbit (short of posterior margin of orbit in *S. onaria*) 18

18a. Scale rows below lateral line 13, between last dorsal-fin spine base and lateral line 6; anterior surface of preocular spine with three distinct vertical or oblique ridges (see Motomura and Senou 2008: fig. 3); tip of pectoral fin extending beyond first anal-fin spine base; occipital pit extremely deep, its length distinctly less than width (see Motomura and Senou 2008: fig. 5a)..... ***S. brevispina*** (northwestern Pacific)

18b. Scale rows below lateral line 14–17, between last dorsal-fin spine base and lateral line 7–9 (rarely 6, only one of all specimens examined of *S. onaria*); preocular spine simple, anterior surface without ridges; tip of pectoral fin not reaching first anal-fin spine base; occipital pit shallow, its length usually subequal to width (see Motomura and Senou 2008: fig. 5b)..... 19

19a. Pectoral-fin rays 16 (rarely 17; see Table 1); median interorbital ridge long, well developed, ending posterior to posterior margin of preocular spine bases or posterior to posterior margin of opercular spine bases, its highest portion higher than interorbital ridges; postorbital spine usually present; posterior margin of maxilla well beyond a vertical through posterior margin of orbit; numerous small distinct black spots scattered over head, body and fins ..... ***S. pepo*** (northwestern Pacific)

19b. Pectoral-fin rays usually 17 (rarely 16 or 18; see Table 1); median interorbital ridge present or absent (if present, short, ending anterior to margin of preocular spine bases, its highest portion lower than interorbital ridges); postorbital spine

absent; posterior margin of maxilla usually located below eye level, between center of pupil and posterior margin of orbit; small black spots usually absent on head, some present on body and fins ..... ***S. onaria*** (eastern Indian Ocean, western Pacific, and northern central Pacific)

20a. Scale rows below lateral line 16–19; known only from southeastern Pacific..... ***S. orgila*** (Easter Island, southeastern central Pacific)

20b. Scale rows below lateral line 20–26; distributed from east coast of Australia to north of New Zealand 21

21a. Pored lateral-line scales 23–25 (mode 24; see Table 1); scales above lateral line 6–9 (8); scale rows in longitudinal series 60–74 (68), between sixth dorsal-fin spine base and lateral line 8 or 9 (9), between last dorsal-fin spine base and lateral line 8–11 (10); pre-dorsal scale rows 4–8 (6); posterior lacrimal spine with 1–3 (usually 2) spinous points; exposed scales covering anteroventral surface of body; two large white blotches on caudal-fin base ..... ***S. cardinalis*** (Tasman Sea and northern New Zealand)

21b. Pored lateral-line scales 22–24 (mode 23; see Table 1); scales above lateral line 4–6 (5); scale rows in longitudinal series 52–61 (55), between sixth dorsal-fin spine base and lateral line 6–8 (7), between last dorsal-fin spine base and lateral line 7–9 (9); pre-dorsal scale rows 1–4 (2); posterior lacrimal spine simple; embedded scales covering anteroventral surface of body, not visible without dissection; no distinct white blotches on caudal-fin base ..... ***S. jacksoniensis*** (eastern Australia)

***Scorpaena brevispina* Motomura and Senou 2008**

[Standard English name: Japanese Shortspined Scorpionfish; standard Japanese name: Kurenai-fusakasago]

(Figs. 2, 30, 34; Table 1)

Scorpaena brevispina Motomura and Senou 2008: 1762, figs. 1–5 (type locality off Futo, Ito City, Shizuoka Prefecture, east coast of Izu Peninsula, Pacific coast of Honshu Island, Japan).

Holotype. KPM–NI 16667, 116.1 mm SL, off Futo, Ito, Shizuoka, east coast of Izu Peninsula, Pacific coast of Honshu Island, Japan, 34°52.9′N, 139°08.9′E, 45 m depth, coll. by A. Ono, 30 June 1982.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9; pectoral-fin rays 17; scale rows in longitudinal series 44; pored lateral-line scales 23; scale rows above lateral line 5, below 13, between 6th dorsal-fin spine base and lateral line 6, between last dorsal-fin spine base and lateral line 6; pre-dorsal scale rows 4; gill rakers 17; exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior surface of preocular spine with three vertical or slightly oblique ridges; anterior lacrimal spine with 1 additional spinous point, anterior lacrimal spine directed ventrally; posterior lacrimal spine simple; lateral lacrimal spine present, with 1 spinous point; anterodorsal lacrimal and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge absent; occipital pit extremely deep, its length distinctly less than width; body relatively deep (depth 42.0% of SL); tip of pectoral fin extending beyond first anal-fin spine base; 3rd to 5th dorsal-fin spine lengths 14.6% of SL, 15.5% of SL, and 15.8% of SL, respectively; largest recorded specimen 116.1 mm SL.

Distribution. *Scorpaena brevispina* is currently known only from the type locality in depths of 30–45 m (Figs. 30, 34b).

Remarks. *Scorpaena brevispina* appears to be one of the rarest species of Indo-Pacific *Scorpaena*, being known only from the single type specimen and underwater photographs of two uncollected individuals. Although Motomura and Senou (2008) noted that three vertical or slightly oblique ridges on the anterior surface of the preocular spine was an autapomorphic character in the species, such a feature also occurs in some large specimens of *S. sumptuosa*. However, the ventrally directed anterior lacrimal spine in *S. brevispina* is most likely autapomorphic for the species (see Motomura and Senou 2008: fig. 2) (vs. anterior lacrimal spine directed forward or just slightly anteroventrally in all other Indo-Pacific species of *Scorpaena*).

***Scorpaena bulacephala* Motomura, Last, and Yearsley 2005a**

[Standard English name: Bullhead Scorpionfish]

(Figs. 3, 27, 31, 34; Tables 1, 11)

Scorpaena bulacephala Motomura, Last, and Yearsley 2005a: 19, figs. 1–3 (type locality: south of Norfolk Island, Norfolk Ridge, Tasman Sea).

Holotype. CSIRO H 6009-05, 80.7 mm SL, south of Norfolk Island, Norfolk Ridge, Tasman Sea, 28°54–55′S, 167°40–41′E, 111–113 m depth, coll. by FRV *Tangaroa*, 15 May 2003.

Paratypes. 6 specimens, 32.4–84.2 mm SL. AMS I. 43470-001, 32.1 mm SL, southeast of Lord Howe Island (31°49′S, 159°20′E), Lord Howe Rise, Tasman Sea, 86–89 m depth, coll. by FRV *Tangaroa*, 22 May 2003; CSIRO H 6009-06, 87.5 mm SL, same data as

holotype; CSIRO H 6028-03, 49.5 mm SL, same data as AMS I. 43470-001; CSIRO H 6028-07, 2 specimens, 34.3–44.8 mm SL, same data as AMS I. 43470-001; NMV A. 25132-005, 84.2 mm SL, Balls Pyramid (31°52′26–40″S, 159°14′26”–15’27″E), Lord Howe Rise, Tasman Sea, 76–81 m depth, benthic sled, coll. by FRV *Tangaroa*, 23 May 2003.

Non-type specimens. 2 specimens, 30.5–40.8 mm SL, as listed in Motomura et al. (2011a).

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9; pectoral-fin rays 17 (rarely 18); scale rows in longitudinal series 39–44; pored lateral-line scales 23; scale rows above lateral line 5–7, below 13–16, between last dorsal-fin spine base and lateral line 6 or 7; pre-dorsal scale rows 4 or 5; gill rakers 17–20; exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine with 1–3 additional spinous points; posterior lacrimal spine simple; anterodorsal lacrimal, lateral lacrimal, and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge absent; first anal-fin spine base located slightly anterior to vertical through last dorsal-fin spine base; longest pectoral-fin ray length 31.5–33.5 (mean 32.2) % of SL; pre-pelvic-fin length 40.2–48.0 (46) % of SL; 9th to 11th dorsal-fin spine lengths 13.4–16.6 (14.9) % of SL, 9.5–14.0 (12.3) % of SL, and 8.7–10.8 (9.8) % of SL, respectively; largest recorded specimen 84.2 mm SL.

Distribution. *Scorpaena bulacephala* is distributed in the southwestern Pacific off Lord Howe and Norfolk Islands, Vanuatu (Motomura et al. 2005a, 2011a) and New Caledonia (Fricke et al. 2011), in depths of 76–150 m (Figs. 31, 34b).

Remarks. *Scorpaena bulacephala* was originally described by Motomura et al. (2005a) on the basis of seven specimens collected off Norfolk and Lord Howe Islands, northern Tasman Sea. Two MNHN specimens of this species from Vanuatu were found by Motomura

et al. (2011a). In addition, Fricke et al. (2011) reported this species for the first time from New Caledonia on the basis of IRDNC material.

***Scorpaena cardinalis* Solander and Richardson 1842a**

[Standard English name: Sandy-Bay Cod]

(Figs. 4, 32, 34; Tables 1, 11)

Scorpaena cardinalis Solander and Richardson *in* Richardson 1842a: 212 [original locality: Motuaro, Queen Charlotte's Sound, New Zealand (probably Motuaro, Bay of Islands, New Zealand; see Paulin 1982); type locality: White Island, New Zealand, based on neotype designated by Motomura et al. (2011b)].

Scorpaena plebeia Solander *in* Richardson 1842a: 214 (type locality: Tolaga [Bay], New Zealand).

Scorpaena cookii Günther 1874: 78, pl. 55 [type locality: Raoul Island (Sunday Island), Kermadec Islands, New Zealand].

Neotype. NMNZ P.044152, neotype of *Scorpaena cardinalis* (designated by Motomura et al. 2011b), 308.1 mm SL, White Island, New Zealand, 37°30′S, 177°09′E, 19–21 m, rod and line, coll. by C. Struthers, 16 Mar. 2009.

Other type specimen. BMNH 1855.8.16.88, holotype of *Scorpaena cookii*, 216.2 mm SL, Raoul Island, Kermadec Islands.

Non-type specimens. 73 specimens, 25.3–472.5 mm SL, as listed in Motomura et al. (2011a, b).

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9 (rarely 8); pectoral-fin rays 16–18 (mode 17); scale rows in longitudinal series

60–74 (68); pored lateral-line scales 23–25 (24); scale rows above lateral line 6–9 (8), below 21–26 (22), between 6th dorsal-fin spine base and lateral line 8 or 9 (9), between last dorsal-fin spine base and lateral line 8–11 (10); pre-dorsal scale rows 4–8 (6); gill rakers 14–18 (16); exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine with 1–3 additional spinous points; posterior lacrimal spine with 1–3 additional spinous points; lateral lacrimal spine present, with 2 spinous points; anterodorsal lacrimal and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge present; two large white blotches on caudal-fin base; largest recorded specimen 472.5 mm SL.

Distribution. *Scorpaena cardinalis* is restricted in the southwestern Pacific, ranging from Middleton and Elizabeth reefs, Norfolk and Lord Howe Islands, New South Wales, Australia and the Kermadec Islands and northeast of the North Island, New Zealand, in depths of 0–154 m (Figs. 32, 34b).

Remarks. *Scorpaena plebeia*, of uncertain status, and *S. cookii*, long treated as a valid species by numerous authors (e.g., Ogilby 1889; Poss 1999; Allen et al. 2006; Roberts et al. 2009), were both synonymized under *S. cardinalis* by Motomura et al. (2011b).

***Scorpaena colorata* (Gilbert 1905)**

[New standard English name: Hawaiian Red Scorpionfish]

(Figs. 5, 31, 34; Table 1)

Sebastapistes coloratus Gilbert 1905: 627, fig. 243 (type locality: south of Molokai Island, Hawaiian Islands).

Holotype. USNM 51631, holotype of *Sebastapistes coloratus*, 58.2 mm SL, south coast of Molokai Island, Hawaiian Islands, 79–134 m depth.

Paratypes. USNM 51667, 2 specimens, 44.1–51.4 mm SL, south coast of Molokai Island, Hawaiian Islands, 79–121 m depth.

Non-type specimens. 28 specimens, 23.9–94.7 mm SL, as listed in Motomura et al. (2005a, 2011a).

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9 (rarely 8); pectoral-fin rays 16–18 (mode 17); scale rows in longitudinal series 44–49; pored lateral-line scales 23; scale rows above lateral line 5–7, below 14–16, between 6th dorsal-fin spine base and lateral line 7 or 8, between last dorsal-fin spine base and lateral line 6–8; pre-dorsal scale rows 3–7 (5); gill rakers 17–20; exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine with 1 or 2 additional spinous points; posterior lacrimal spine simple; anterodorsal lacrimal, lateral lacrimal, and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge absent; longest pectoral-fin ray length (33.2–36.9% of SL); largest recorded specimen 94.7 mm SL.

Distribution. *Scorpaena colorata* is currently considered endemic to the Hawaiian Islands, in depths of 79–272 m (Figs. 31, 34b).

Remarks. *Sebastapistes coloratus* was regarded as a valid species of *Scorpaena* by Gosline and Brock (1960). Subsequently, Eschmeyer and Randall (1975), followed by numerous authors (e.g., Motomura et al. 2005a, 2011a; Mundy 2005; Randall 2007), treated this species as *S. colorata*.

***Scorpaena decemradiata* Fricke, Golani, Appelbaum-Golani, and Zajonz 2018**

[New standard English name: Red Sea Ten-rayed Scorpionfish]

(Figs. 6, 31, 34; Table 1)

Scorpaena decemradiata Fricke, Golani, Appelbaum-Golani, and Zajonz 2018: 2, fig. 1 (type locality: Eilat, Israel, Gulf of Aqaba, Red Sea).

Holotype. HUJ 2418, holotype of *Scorpaena decemradiata*, 123.1 mm SL, Red Sea, Gulf of Aqaba, Israel Eilat, coll. by Y. Berens, Sep. 1960.

Paratype. HUJ 20671, 90.5 mm SL, same data as holotype.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 10; pectoral-fin rays 16; scale rows in longitudinal series 59–62; pored lateral-line scales 29 or 30; pre-dorsal scale rows 5 or 6; gill rakers 16 or 17; anteroventral surface of body and base of pectoral fin naked; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior and posterior lacrimal spines simple; anterodorsal lacrimal, lateral lacrimal, and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; largest recorded specimen 123.1 mm SL.

Distribution. *Scorpaena decemradiata* is currently known only from the type locality (Fig. 31).

Remarks. In the original description of *S. decemradiata*, Fricke et al. (2018) noted that the species was most similar to the eastern Atlantic species *S. porcus*. However, *Scorpaena decemradiata* can be easily distinguished from all other Indo-Pacific species of *Scorpaena* in having a greater number of pored lateral-line scales 29–30 (vs. 21–25 in the latter).

***Scorpaena gasta* Motomura, Last, and Yearsley 2006**

[Standard English name: Ghostly Scorpionfish]

(Figs. 7, 31, 34; Table 1)

Scorpaena gasta Motomura, Last, and Yearsley 2006: 361, figs. 1–3 (type locality: Kalbarri, off mouth of Murchison River, Western Australia, Australia).

Holotype. WAM P. 27960-006, holotype of *Scorpaena gasta*, 69.4 mm SL, off mouth of Murchison River, Kalbarri, Western Australia, Australia, 27°30′S, 114°25′E, 16–17 m depth, rotenone, coll. by J. Hutchins, 17 Apr. 1983.

Paratypes. 4 specimens, 63.8–83.6 mm SL. AMS I. 43480-001, 67.4 mm SL, Australia, Western Australia, Houtman Abrolhos, Beacon Island, 28°29′S, 113°47′E, 3 m depth, rotenone, 9 April 1978, G. R. Allen; CSIRO H 6186-01, 63.8 mm SL, same data as AMS I. 43480-001; WAM P. 26069-002, 83.6 mm SL, same data as AMS I. 43480-001; WAM P. 32317-005, mature female, 73.7 mm SL, Australia, Western Australia, Shark Bay, 24.93 km west-northwest of Cape Peron North, 25°22.6′–23.0′S, 113°17.5′–17.6′E, 11.0–11.5 m depth, 7 Oct. 2002, S. M. Morrison.

Non-type specimens. 48 specimens, 9.7–83.6 mm SL, all collected from Western Australia. WAM P. 26071-002, 52.0 mm SL, Beacon Island, Houtman Abrolhos, 28°29′S, 113°47′E, 3–10 m, G. Allen, 9 Apr. 1978; WAM P. 26657-022, 6 specimens, 9.7–54.8 mm SL, WAM P. 26664-015, 2, 19.4–33.9 mm SL, South Passage, Steep Point, Shark Bay, 26°08′S, 113°08′E, 13–15 m, B. Hutchins and N. Sarti, 9 and 11 Apr. 1979; WAM P. 26662-001, 4, 25.2–30.3 mm SL, WAM P. 26671-020, 49.6 mm SL, Monkey Rock, South Passage, Steep Point, Shark Bay, 26°08′S, 113°09′E, 13–16 m, B. Hutchins and N. Sarti, 10 and 15 Apr. 1979; WAM P. 26677-008, 2, 24.6–41.6 mm SL, WAM P. 26678-005, 5, 29.5–60.6 mm SL, Wrights Anchorage, South Passage, Shark Bay, 26°10′S, 113°11′E, 2 m, B. Hutchins, 19

Apr. 1979; WAM P. 27585-004, 30.5 mm SL, East Wallabi Island, Houtman Abrolhos, 28°29′S, 113°47′E, 4–6 m, N. Sinclair, 16 Apr. 1982; WAM P. 27587-010, 39.2 mm SL, Long Island, Houtman Abrolhos, 28°29′S, 113°46′E, 25–32 m, G. Allen, 16 Apr. 1982; WAM P. 27953-027, 2, 64.5–71.2 mm SL, Jurien Bay, 30°18′S, 115°00′E, 10–14 m, G. Allen, 11 Apr. 1983; WAM P. 27965-006, 6, 16.5–30 mm SL, off west end of Point Quobba, 24°29′S, 113°25′E, 8–9 m, B. Hutchins et al., 23 Apr. 1983; WAM P. 27967-009, 8, 27.7–75.2 mm SL, Fitzroy Reefs, Point Quobba, 24°29′S, 113°25′E, 4–5 m, B. Hutchins et al., 25 Apr. 1983; WAM P. 27970-007, 30.9 mm SL, off Point Quobba, 24°29′S, 113°25′E, 10–12 m, B. Hutchins, 26 Apr. 1983; WAM P. 30082-001, 3, 26.5–53.0 mm SL, Shark Bay, 26°09′S, 113°13′E, 4–5 m, box trawl, B. Hutchins et al., 30 Mar. 1990; WAM P. 30168-002, 2, 44.5–53.3 mm SL, Shark Bay, 26°08′S, 113°10′E, 1–3 m, box trawl, B. Hutchins et al., 28 Nov. 1990; WAM P. 32311-004, 71.7 mm SL, Shark Bay, Cape Lesueur, Peron Peninsula, 25°36′46.3″–37′17.7″S, 113°14′26.2″–14′28.0″E, 16.3–16.8 m, S. Morrison, 6 Oct. 2002; WAM P. 32314-002, 83.6 mm SL, west of Cape Peron North, Shark Bay, 25°32′55.3″–33′31.3″S, 113°13′16.9″–13′19.5″E, 19 m, S. Morrison, 7 Oct. 2002; WAM P. 32499-003, 35.9 mm SL, northwestern of Cape Peron North, Shark Bay, 25°22′24.5″–22′53.2″S, 113°17′34.4″–17′36.7″E, 12 m, S. Morrison, 3 June 2003.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9; pectoral-fin rays 15 (rarely 14); scale rows in longitudinal series 35–42; pored lateral-line scales 23; scale rows below lateral line 13 or 14, between 6th dorsal-fin spine base and lateral line 5, between last dorsal-fin spine base and lateral line 5; pre-dorsal scale rows 0–2; gill rakers 12–15 (mode 13); exposed scales covering anteroventral surface of body and base of pectoral fin; numerous tentacles on head and trunk; anteroventral surface of lower jaw with one or two pairs of tentacles; no dermal flap on pectoral-fin axil; relatively thick skin with numerous small sensory pores covering predorsal area from posterior edge of occipital

pit to first dorsal-fin spine origin and extending to just above or near first pored lateral-line scale; anterior and posterior lacrimal spines simple; anterodorsal lacrimal, lateral lacrimal, and coronal spines absent; lateral surface of maxilla with a longitudinal ridge; median interorbital ridge indistinct, covered by skin; occipital pit extremely deep; 2nd, 3rd, and 4th dorsal-fin spine lengths 11.4–15.3% of SL, 15.8–18.6% of SL, and 17.9–19.0% of SL, respectively, third spine shorter than upper jaw length; caudal peduncle depth 10.5–11.7% of SL; a variable, diagonal cluster of black spots on soft-rayed portion of dorsal fin; spinous portion of dorsal fin uniform yellowish to reddish with narrow, translucent, submarginal stripe; largest recorded specimen 83.6 mm SL.

Distribution. *Scorpaena gasta* is distributed along the southwest coast of Australia in depths of 1–32 m (Figs. 31, 34b).

Remarks. *Scorpaena gasta*, described as a new species by Motomura et al. (2006) on the basis of five specimens from southwestern Australia, is most similar to the co-occurring species in the area, *S. sumptuosa*. All diagnostic characters of both species given by Motomura et al. (2006) were confirmed as valid in this study, following examination of a large number of additional specimens of each.

***Scorpaena jacksoniensis* Steindachner 1866**

[Standard English name: Northern Scorpionfish]

(Figs. 8, 32, 34, 43d; Tables 1, 11)

Scorpaena jacksoniensis Steindachner 1866: 50 (type locality: Port Jackson, New South Wales, Australia).

Holotype. NMW 75379, holotype of *Scorpaena jacksoniensis*, 182.9 mm SL, Port Jackson, New South Wales, Australia, 22 Jan. 1866.

Non-type specimens. 60 specimens, 25.1–336.5 mm SL, as listed in Motomura et al. (2011b).

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9 (rarely 8); pectoral-fin rays 16–18 (mode 17); scale rows in longitudinal series 52–61 (55); pored lateral-line scales 22–24 (23); scale rows above lateral line 4–6 (5), below 20–25 (22), between 6th dorsal-fin spine base and lateral line 6–8 (7), between last dorsal-fin spine base and lateral line 7–9 (9); pre-dorsal scale rows 1–4 (2); gill rakers 14–19 (16); embedded scales covering anteroventral surface of body and base of pectoral fin, scales on anteroventral surface of body not visible without dissection; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine with 1 or 2 additional spinous points; posterior lacrimal spine simple; lateral lacrimal spine present, with 2 (rarely 3) spinous points; anterodorsal lacrimal and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge present; pterotic spine usually simple in young specimens, with 2 or more points in large adults (usually > 280 mm SL); no distinct white blotches on caudal-fin base; largest recorded specimen 336.5 mm SL.

Distribution. *Scorpaena jacksoniensis* is distributed along the east coast of Australia in depths of 1–73 m (Figs. 32, 34b).

Remarks. Although numerous authors (e.g., Macleay 1881; Allen and Cross 1989; Allen et al. 2006) treated this species as junior synonym of *S. cardinalis*, Motomura et al. (2011b) confirmed the validity of *S. jacksoniensis*, after examination of the holotype and a large number of additional specimens.

***Scorpaena lacrimata* Randall and Greenfield 2004**

[New standard English name: Tear Scorpionfish]

(Figs. 9, 30, 34; Table 1)

Scorpaena lacrimata Randall and Greenfield 2004: 391, fig. 3 (type locality: Tahiti, Society Islands, French Polynesia).

Holotype. BPBM 31706, 200.1 mm SL, Tahiti, Society Islands, 400 m, hook and line, M. Kung (via L. Wrobel), 24 Oct. 1990.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9; pectoral-fin rays 17; scale rows in longitudinal series 62; pored lateral-line scales 23; scale rows above lateral line 8, below 20, between 6th dorsal-fin spine base and lateral line 11, between last dorsal-fin spine base and lateral line 10; pre-dorsal scale rows 8; gill rakers 14; exposed and embedded scales covering anteroventral surface of body and base of pectoral fin, respectively; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine with 1 additional spinous point; posterior lacrimal spine simple; lateral lacrimal spine present, with 1 spinous point; anterodorsal lacrimal and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge present; preserved coloration pale yellowish with scattered small dark brown spots on head, body, and dorsal fin; short, vertical, dark brown bar below orbit; largest recorded specimen 200.1 mm SL.

Distribution. *Scorpaena lacrimata* is currently known only from the type locality from a depth of 400 m (Figs. 30, 34b).

Remarks. *Scorpaena lacrimata* appears to be one of the rarest species of Indo-Pacific *Scorpaena*, being known only from the holotype specimen.

***Scorpaena miostoma* Günther 1877**

[Standard English name: Small-mouth Scorpionfish; standard Japanese name: Kokuchi-fusakasago]

(Figs. 10, 30, 34, 36; Tables 1, 2, 11)

Scorpaena miostoma Günther 1877: 435 (type locality: Japan).

Scorpaena dabryi Sauvage 1878: 124, pl. 1, fig. 8 (type locality: China).

Holotype. BMNH 1879.5.14.235, 106.4 mm SL, purchased at market in Yokohama, Kanagawa, Japan, during the H.M.S. Challenger Expedition.

Other type specimens. MNHN 6882, lectotype of *Scorpaena dabryi*, 75.5 mm SL, China, D. Thiersant; MNHN 2021-0285, paralectotype of *S. dabryi*, 71.0 mm SL, same data as lectotype.

Non-type specimens. 139 specimens, 21.5–133.4 mm SL. **CHINA:** CAS 66631, 84.9 mm SL, south of Hong Kong, 21°00′N, 113°32′E, 450 m, otter trawl, F. Ommanney on FRV *Alister Hardy*, 26 June 1958; CAS-SU 61032, 2, 84.0–104.3 mm SL, off Shing Shi Mun, Hong Kong, 22°11′55″N, 114°15′00″E, otter trawl, R. Bolin on FRV *Alister Hardy*, 8 January 1958; CAS-SU 32428, 76.8 mm SL, Chusan Island, Tianghai, Zhejiang, 32°18′32.6″N, 121°25′12.4″E, A. Herre, 5 October 1936; CAS-SU 25753, 73.8 mm SL, Guangzhou, Guangdong, A. Herre, September 1931; USNM 20438, 57.3 mm SL, W. Stimpson, 14 August 1877. **KOREA/JAPAN:** CAS 17558, 2 specimens, 54.0–82.8 mm SL, southeast of Cheju Do, Korea and west of Kyushu, Japan, F. Steiner, December 1971. **JAPAN:** BSKU 19614,, 94.5 mm SL, Uraga Channel, Kanagawa, 35°10′0″N, 139°42′6″E, 48–62 m, 30 March 1965; BSKU 39331, 123.5 mm SL, BSKU 39338, 67.8 mm SL, Tosa Bay, Kochi, trawl, 9 June 1983; BSKU 39373, 106.5 mm SL, 25 June 1983, other data as for BSKU 39331; BSKU 39888, 114.0 mm SL, Tosa Bay, Kochi, 14–15 March 1984; BSKU 40476, 108.6 mm SL, off

Nagasaki, 23 November 1984; BSKU 41752, 100.7 mm SL, Tosa Bay, Kochi, set net, 7 May 1985; BSKU 41760, 78.4 mm SL, BSKU 41765, 104.3 mm SL, BSKU 41767, 114.6 mm SL, Urado Bay, Kochi, 40–50 m, trawl, 13 May 1985; BSKU 41771, 89.5 mm SL, Tosa Bay, Kochi, 30–50 m, trawl, 16 May 1985; BSKU 41787, 92.9 mm SL, Uranouchi Bay, Kochi, 20 May 1985; BSKU 42583, 99.8 mm SL, Tosa Bay, Kochi, 8 April 1986; BSKU 65649, 57.1 mm SL, Uranouchi Bay, Kochi, hand net, 5 August 2003; BSKU 91353, 57 mm SL, Tosa Bay, Kochi, 27 June 2007; BSKU 125646, 87.0 mm SL, BSKU 125647, 102.8 mm SL, Tosa Bay, Kochi, 1970; BSKU 125648, 117.7 mm SL, precise locality unknown; BSKU 125649, 131.0 mm SL; CAS 219761, 98.0 mm SL, Osaka Bay, Kobe, 34°29′53.5″N, 135°11′03.0″E, D. Jordan and J. Snyder, 1900; CAS-SU 23547, 88.9 mm SL, off Misaki, Miura, Yokosuka, 35°08′26.6″N, 139°36′43.0″E, K. Aoki; CMNH-ZF 16001, 50.4 mm SL, Masaki, Shimizu, Shizuoka, 35°01′10″N, 138°31″32′E, hand net, Y. Ikeda and M. Aizawa, 12 October 2006; CMNH-ZF 7048, 21.5 mm SL, off Sanamijima Island, Kamogawa, Chiba, hand net, J. Okuno, 1 October 2003; FRLM 3917, 129.4 mm SL, Ago Bay, Shimacho Goza, Shima, Mie, S. Kimura et al., 2 May 1982; FRLM 5790, 118.6 mm SL, 31 October 1986, other data as for FRLM 3917; FRLM 6386, 97.4 mm SL, precise locality unknown, S. Kimura et al., 10 April 1987; FRLM 11012, 117.6 mm SL, off Kumano-nada, Shimacho Wagu, Shima, Mie, 17 March 1991; FRLM 14373, 94.2 mm SL, Ago Bay, Shimacho Goza, Shima, Mie, 34°16′56.3″N, 136°45′15.5″E–34°17′01.7″N, 136°46′19.2″E, 24 August 1995; KAUM–I. 10014, 124.4 mm SL, KAUM–I. 10015, 100.3 mm SL, off Kawajiri Fishing Port, Ibusuki, Kagoshima, 31°10′N, 130°32′E, 100–120 m, set net, G. Ogihara and T. Yoshida, 4 June 2008; KAUM–I. 10766, 47.1 mm SL, KAUM–I. 10767, 44.4 mm SL, east of Sakinoyama, Kasasa, Kagoshima, 31°25′44″N, 130°11″49″E, 27 m, set net, M. Ito, 2 July 2008; KAUM–I. 17388, 83.1 mm SL, KAUM–I. 17389, 58.1 mm SL, off Takane, Tateyama, Chiba, 34°58′38″N, 139°47′19″E, 20 m, hand net, M. Aizawa, 10 December 2008; KAUM–I. 20016, 57.1 mm

SL, off Kozakiyama, Kasasa, Kagoshima, 31°26′00″N, 130°10′05″E, 36 m, set net, M. Ito, 3 November 2008; KAUM–I. 20710, 82.2 mm SL, 11 August 2008, other data as for KAUM–I. 20016; KAUM–I. 21028, 94.8 mm SL, off Kasumi, Kami, Hyogo, 35°39′N, 134°37′E, 200 m, trawl, T. Wada, 16 May 2007; KAUM–I. 22718, 133.4 mm SL, KAUM–I. 22719, 114.7 mm SL, off Kushima, Uwajima, Ehime, 33°13′23″N, 132°52′50″E, 10 m, gill net, S. Kyoue, 2 August 2003; KAUM–I. 25862, 62.3 mm SL, off Field Science Center, Tateyama, Chiba, 34°58″37″N, 139°46′10″E, 7 m, hand net, M. Watai, 10 November 2009; KAUM–I. 30794, 95.9 mm SL, KAUM–I. 30795, 112.2 mm SL, KAUM–I. 30796, 108.2 mm SL, KAUM–I. 30797, 99.9 mm SL, Shibushi Bay, Shibushi, Kagoshima, 31°38′N, 131°14′E, 100–120, trawl, G. Ogihara et al., 7 July 2010; KAUM–I. 38820, female, 114.2 mm SL, off Ibusuki, Kagoshima, 31°12′05″–13°09′N, 130°40′05″–41°08′E, 50–60 m, line-fishing, Y. Masuda, 20–21 June 2011; KAUM–I. 38862, 90.4 mm SL, Uchinoura Bay, Kimotsuki, Kagoshima, 31°17′N, 131°05′E, 0–40, set net, M. Yamada, 22 February 2011; KAUM–I. 43931, 85.5 mm SL, Tosa Bay, Irino, Kochi, 33°00′N, 133°01′E, 50–100 m, trawl, M. Matsunuma and N. Nakayama, 15 December 2011; KAUM–I. 56305, 73.5 mm SL, 8 April 2013, other data as for KAUM–I. 10766; KAUM–I. 57301, 41.4 mm SL, Uchinoura Bay, Kimotsuki, Kagoshima, 31°17′N, 131°05′E, 40 m, set net, M. Yamada, 23 July 2013; KAUM–I. 71264, 43.8 mm SL, Uchinoura Bay, Kimotsuki, Kagoshima, 31°17′29″N, 131°06′59″E, set net, 30–35 m, K. Koeda et al., 23 March 2015; KAUM–I. 71449, 81.5 mm SL, Uchinoura Bay, Kimotsuki, Kagoshima, 31°16′55″N, 131°04′49″E, 30–35 m, set net, T. Yanagigawa, January–February 2015; KAUM–I. 77849, 80.4 mm SL, M. Yamada, 12 June 2015, other data as for KAUM–I. 71449; KAUM–I. 80376, female, 51.8 mm SL, off Koyama, Kimotsuki, Kagoshima, 31°21′N, 131°02′E, set net, K. Koeda and H. Hata, 21 October 2015; KAUM–I. 83236, 42.0 mm SL, 9 August 2015, other data as for KAUM–I. 10766; OMNH-P 6431, 120.9 mm SL, off Mio, Hamasaka, Hyogo; OMNH-P 7833, 104.1 mm SL, off Okami Park,

Hyogo; OMNH-P 8597, 87.4 mm SL, OMNH-P 8598, 93.0 mm SL, OMNH-P 8793, 92.5 mm SL, Osaka Bay, Misaki, Osaka; OMNH-P 9455, 95.3 mm SL, off Tanigawa, Misaki, Osaka; OMNH-P 10620, 116.4 mm SL, off Iyo, Iyo Nada, Ehime. **TAIWAN:** ASIZP 63629, 76.1 mm SL, Da-xi, Yilan county, 24°95′N, 121°93′E, 50 m, Z.-H. Wu, 23 March 2000; CAS 219760, 88.8 mm SL, Taiwan Strait, 90 m, trawl, F. Steiner, April 1971; KAUM–I. 9934, 127.6 mm SL, KAUM–I. 9935, 103.8 mm SL, off Da-xi, Yilan county, 24°59′N, 122°06′E, 400 m, bottom trawl, H. Motomura and H.-C. Ho, 29 May 2008; KAUM–I. 17755, 97.3 mm SL, KAUM–I. 17756, 106.1 mm SL, off Da-xi, Yilan county, bottom trawl, H.-C. Ho, 18 November 2007; KAUM–I. 17758, 90.9 mm SL, KAUM–I. 17759, 82.5 mm SL, KAUM–I. 17760, 81.6 mm SL, KAUM–I. 17761, 81.3 mm SL, KAUM–I. 17762, 74.1 mm SL, KAUM–I. 17763, 74.1 mm SL, KAUM–I. 17764, 73.3 mm SL, KAUM–I. 17765, 73.9 mm SL, KAUM–I. 17766, 72.9 mm SL, KAUM–I. 17767, 67.0 mm SL, off Dong-Shi, Chiayi county, bottom trawl, H.-C. Ho, 14 November 2008; KAUM–I. 39177, 93.9 mm SL, KAUM–I. 39178, 92.8 mm SL, KAUM–I. 39179, 85.6 mm SL, KAUM–I. 39180, 77.5 mm SL, off Kaohsiung city, trawl, H.-C. Ho, purchased at Tong Kang Fish Market, Kaohsiung city, 1 July 2011; KAUM–I. 39271, 87.9 mm SL, KAUM–I. 39272, 82.2 mm SL, off Da-xi, Yilan county, 300 m, trawl, KAUM Fish Team, 6 July 2011; KAUM–I. 39611, 131.1 mm SL, off Keelung city, gill net, KAUM Fish Team, purchased at Bisha Fish Market, 10 July 2011; KAUM–I. 44622, 85.1 mm SL, off Kaohsiung city, 400 m, trawl, H.-C. Ho, 7 July 2011; KAUM–I. 44774, 93.1 mm SL, off Da-xi, Yilan county, 500 m, trawl, KAUM Fish Team, 6 July 2011; KAUM–I. 46476, 70.3 mm SL, KAUM–I. 46477, 61.5 mm SL, KAUM–I. 46478, 70.6 mm SL, off Da-xi, Yilan county, bottom trawl, H.-C. Ho, 18 November 2007; KAUM–I. 110867, 45.3 mm SL, off Ke-tzu-liao, Kaohsiung city, K. Koeda et al., 14 December 2017; KAUM–I. 110894, 81.2 mm SL, off Dong-gang, Pingtung county, 22°39′N, 120°24′E, trawl, K. Koeda et al., 14 December 2017; KAUM–I. 111686, 71.2 mm SL, KAUM–I. 111687, 93.5

mm SL, KAUM–I. 111688, 87.1 mm SL, KAUM–I. 111689, 75.8 mm SL, KAUM–I. 111722, 79.0 mm SL, KAUM–I. 111723, 90.3 mm SL, mid-water trawl, 10 December 2017, other data as KAUM–I. 110894; KAUM–I. 113179, 90.5 mm SL, KAUM–I. 113497, 78.8 mm SL, KAUM–I. 113498, 89.4 mm SL, KAUM–I. 113676, 74.0 mm SL, KAUM–I. 113677, 90.9 mm SL, KAUM–I. 113678, 83.0 mm SL, KAUM–I. 113679, 78.9 mm SL, 5 and 8 March 2018, other data as KAUM–I. 110867; KAUM–I. 113887, 85.5 mm SL, KAUM–I. 113888, 76.4 mm SL, KAUM–I. 114273, 83.6 mm SL, KAUM–I. 114274, 75.0 mm SL, KAUM–I. 114276, 88.6 mm SL, KAUM–I. 114277, 88.9 mm SL, KAUM–I. 114278, 80.2 mm SL, 5 and 8 March 2018, other data as KAUM–I. 110894; KAUM–I. 115309, 90.1 mm SL, 8 May 2018, other data as KAUM–I. 110867; KAUM–I. 127461, 68.9 mm SL, KAUM–I. 127462, 76.2 mm SL, off Da-xi, Yilan county, bottom trawl, K. Koeda and H. Hata, 21 December 2018; KAUM–I. 151386, 68.8 mm SL, KAUM–I. 151387, 81.3 mm SL, KAUM–I. 151388, 85.0 mm SL, KAUM–I. 151389, 85.5 mm SL, KAUM–I. 151390, 91.1 mm SL, KAUM–I. 151391, 69.4 mm SL, KAUM–I. 151392, 92.8 mm SL, KAUM–I. 151393, 89.1 mm SL, KAUM–I. 151394, 74.5 mm SL, KAUM–I. 151395, 81.1 mm SL, off Da-xi Fishing Port, Yilan county, 24°56′N, 121°54′E, bottom trawl, M. Matsunuma, 23 February 2017; URM-P. 23069, 82.6 mm SL, URM-P. 23070, 78.7 mm SL, URM-P. 23071, 74.2 mm SL, URM-P. 23072, 67.1 mm SL, URM-P. 23073, 66.0 mm SL, URM-P. 23074, 67.3 mm SL, URM-P. 35679, 78.5 mm SL, precise locality unknown, trawl, T. Yoshino, 8 May 1989.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9 (rarely 8 or 10); pectoral-fin rays 15–17 (mode 16); scale rows in longitudinal series 43–47 (45); pored lateral-line scales 22–24 (23); scale rows above lateral line 5–8 (6), below 13–18 (15), between 6th dorsal-fin spine base and lateral line 6–9 (7 or 8), between last dorsal-fin spine base and lateral line 6–9 (7 or 8); pre-dorsal scale rows 4–7 (5); gill rakers

12–15 (14); embedded scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine with 1 (sometimes simple or with 2) additional spinous point; posterior lacrimal spine simple; lateral lacrimal spine present, with 1 spinous point; anterodorsal lacrimal and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge absent; relatively shallow body (depth 32.3–39.9% of SL); largest recorded specimen 133.4 mm SL.

Distribution. *Scorpaena miostoma* is distributed only in the northwestern Pacific Ocean, including China, Korea, Japan and Taiwan (Shimizu 1984; Motomura and Iwatsuki 1997; Shimizu and Hatooka 1997; Nakabo 2002; Wang 2011; this study, Fig. 30). Specimens examined in this study had been collected from shallow to deep waters, ranging between 7–500 m (Fig. 34b). The species is most likely to prefer temperate waters, since it tends to inhabit deeper waters in lower latitudes; it is common in tidal pools in Japan, but has been mostly collected from deep water (> 400 m) off Taiwan.

Remarks. *Scorpaena dabryi* has remained poorly known, with no further records since the original description by Sauvage (1878) as a new species based on two syntypes (MNHN 6882, 71.0–75.5 mm SL). Subsequently, Fricke et al. (2019) treated *S. dabryi* as a senior synonym of *Neomerinthe procurva* Chen 1981. However, examination of the type specimens in the present study revealed them to be conspecific with *S. miostoma* Günther 1877, there being no differences in their morphological characters, including counts and proportional measurements, compared with those of the holotype and non-type specimens of *S. miostoma* (Table 11). Accordingly, *S. dabryi* is considered to be conspecific with and a junior synonym of *S. miostoma*. For nomenclatural stability, the larger and better condition syntype (MNHN 6882, 75.5 mm SL) is designated herein as lectotype of *S. dabryi*, the smaller syntype (MNHN 6882, 71.0 mm SL) therefore becoming a paralectotype.

***Scorpaena nasicornua* Fricke and Zhukov 2020**

[New standard English name: Giant Nasal-spined Scorpionfish]

(Figs. 11, 30, 34; Table 1)

Scorpaena nasicornua Fricke and Zhukov 2020: 118, figs. 1–4 (type locality: Gulf of Aden, northwestern Indian Ocean).

Holotype. ZIN 56300, 175.0 mm SL, Gulf of Aden, coll. by A. Treskin on RV *Skif*, Aug.–Sep. 1986.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9; pectoral-fin rays 17; scale rows in longitudinal series 41; pored lateral-line scales 23; pre-dorsal scale rows 5; gill rakers 15; exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw with ca. 3 pairs of tentacles; anterior and posterior lacrimal spines simple; lateral lacrimal spine present, with 1 spinous point; anterodorsal lacrimal and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge absent; largest recorded specimen 175.0 mm SL.

Distribution. *Scorpaena nasicornua* is currently known only from the type locality (Fig. 30).

Remarks. In the original description, based on a single specimen from the Gulf of Aden, northwestern Indian Ocean, Fricke and Zhukov (2020) compared *Scorpaena nasicornua* with eastern Atlantic, Mediterranean, Red Sea, and Indian Ocean species of *Scorpaena*. However, *S. nasicornua* (known only from the holotype) can be distinguished from all other Indo-Pacific species of *Scorpaena* in having the following combination of characters: lateral lacrimal spine present, with a single point; anterodorsal lacrimal spine absent; and underside of lower jaw with many tentacles.

***Scorpaena neglecta* Temminck and Schlegel 1843**

[Standard English name: Neglected Scorpionfish; standard Japanese name: Izukasago]

(Figs. 12, 13, 31, 34, 37, 42a, 43a; Tables 1, 3, 11)

Scorpaena neglecta Temminck and Schlegel 1843: 43, pl. 17, fig. 4 (type locality: Nagasaki, Japan).

Scorpaena fimbriata Döderlein in Steindachner and Döderlein 1884: 195 (type locality: Tokyo, Japan).

Scorpaena izensis Jordan and Starks 1904: 134, fig. 10 (type locality: Suruga Bay, Japan).

Scorpaena hemilepidota Fowler 1938: 63, fig. 26 (type locality: off Tubig Point, between Samar and Masbate, Philippines).

Scorpaenopsella armata Fowler 1938: 68, fig. 29 (type locality: off Sombrero Island, Balayan Bay and Verde Island Passage, Philippines).

Lectotype. RMNH.PISC. 619, 187.4 mm SL, Nagasaki, Japan, H. Bürger, 1834.

Paralectotype. RMNH.PISC. 618, 139.8 mm SL, same data as lectotype.

Other type specimens. CAS 107366, 2 paratypes of *Scorpaena izensis*, 155.7–160.5 mm SL, Osezaki, Suruga Bay, west coast of Izu Peninsula, Japan, ca. 110–128 m, tanner beam trawl, RV *Albatross*, 8 May 1900; MZS 1145, syntype of *Scorpaena fimbriata*, 115.8 mm SL, Tokyo; NMW 22249, syntype of *S. fimbriata*, 124.5 mm SL, Tokyo; NMW 75383, syntype of *S. fimbriata*, 80.8 mm SL, Tokyo; NMW 77248, syntype of *S. fimbriata*, 285.0 mm SL, Tokyo; USNM 50909, holotype of *S. izensis*, 191.6 mm SL, Shizuoka, Suruga Bay, 88–95 m; USNM 98884, holotype of *Scorpaena hemilepidota*, 150.6 mm SL, between Samar and Masbate, 12°12′35″N, 124°02′48″E, 247 m, RV *Albatross*, 13 Mar. 1909; USNM 98893, holotype of *Scorpaenopsella armata*, 65.7 mm SL, off Sombrero Island, Balayan Bay and

Verde Island passage, Batangas, 13°52′22″N, 120°46′22″E, 216 m, RV *Albatross*, 21 Jan. 1908.

Non-type specimens. 129 specimens, 56.2–296.4 mm SL. **KOREA/JAPAN**: CAS 17558, 14 specimens, 61.8–129.4 mm SL, southeast of Cheju Do, Korea, and west of Kyushu Island, Japan, East China Sea, F. Steiner, Dec. 1971. **JAPAN:** BSKU 19639, 193.6 mm SL, off Miura Peninsula, Sagami Bay, 35°13′N, 139°27′E, 133–146 m, 2 Oct. 1965; BSKU 19690, 103.7 mm SL, off Boso Peninsula, Chiba, 34°57′N, 140°01′E, 565–600 m, 6 July 1966; BSKU 19670, 204.9 mm SL, off Miura Peninsula, Sagami Bay, 35°14′N, 139°28′E, 116–118 m, 7 Feb. 1966; BSKU 33744, 177.6 mm SL, west of Tokara Islands, Kagoshima, 30°25′N, 127°46′E, 220–240 m, 27 Oct. 1979; BSKU 51540, 138.6 mm SL, off Mimase, Kochi, 13 Apr. 2000; BSKU 68342, 93.0 mm SL, off Kochi; BSKU 74191, 147.9 mm SL, off Mimase, Kochi, 13 Jan. 2005; BSKU 75102, 137.3 mm SL, off Kochi, 150 m, RV *Kotaka-maru*, 13 June 2005; BSKU 88077, 183.6 mm SL, off Mimase, Kochi, 3 Nov. 2005; BSKU 88779, 56.2 mm SL, off Kochi, 150 m, RV *Kotaka-maru*, 16 July 2006; BSKU 89303, 90.1 mm SL, off Kochi, 150 m, RV *Kotaka-maru*, 17 Oct. 2005; BSKU 89971, 163.2 mm SL, off Mimase, Kochi, 12 Jan. 2007; BSKU 90781, 167.0 mm SL, off Mimase, Kochi, 12 Apr. 2007; BSKU 95354, 229.2 mm SL, off Kochi, 125 m, RV *Kotaka-maru*, 13 Nov. 1997; CAS 107398, 2 Jordan and Starks' non-type specimens, 144.6–145.4 mm SL, Osezaki, Suruga Bay, west coast of Izu Peninsula, Shizuoka, ca. 82–88 m, tanner beam trawl, RV *Albatross*, 11 May 1900; KAUM–I. 182, 175.5 mm SL, off Kasasa, Kagoshima, 31°29′N, 130°02′E, 145–150 m, gill net, T. Miyashita, 14 June 2006; KAUM–I. 1198, 175.4 mm SL, East China Sea, 30°59′07″–47′07″N, 127°25′03″–27′06″E, 123 m, trawl, RV *Kagoshima-maru*, 4 Nov. 2006; KAUM–I. 1321, 185.2 mm SL, KAUM–I. 1322, 178.9 mm SL, KAUM–I. 1323, 159.5 mm SL, KAUM–I. 1324, 145.1 mm SL, East China Sea, 31°05′02″–31°56′00″N, 127°29′03″–28′02″E, 123 m, trawl, RV *Kagoshima-maru*, 4 Nov. 2006; KAUM–I. 7192, 185.9 mm SL,

East China Sea, 30°56′80″–31°01′80″N, 127°20′66″–21′24″E, 121 m, trawl, RV *Kagoshima-maru*, 8 Nov. 2006; KAUM–I. 9227, 171.6 mm SL, west of Kaimon, Ibusuki, Kagoshima, 31°08′56″N, 130°35′12″E, 190 m, line-fishing, Y. Nakamura, 9 Apr. 2008; KAUM–I. 9426, 168.4 mm SL, KAUM–I. 9427, 231 mm SL, KAUM–I. 9648, 149.1 mm SL, off Nagasakibana, Ibusuki, Kagoshima, 31°08′56″N, 130°35′12″E, 180–190 m, line-fishing, Y. Nakamura and G. Ogihara, 19–29 Apr. 2008; KAUM–I. 9749, 251 mm SL, off Tobishima Island, Yamagata, line-fishing, H. Motomura, 1996 ; KAUM–I. 9769, 156.7 mm SL, west of Kaimon, Ibusuki, Kagoshima, 31°08′56″N, 130°35′12″E, 170 m, line-fishing, G. Ogihara and T. Yoshida, 7 May 2008; KAUM–I. 9907, 155.9 mm SL, off Kawajiri Fishing Port, Ibusuki, Kagoshima, 200 m, line-fishing, G. Ogihara and T. Yoshida, 14 May 2008; KAUM–I. 12642, 109.9 mm SL, KAUM–I. 12665, 232.3 mm SL, off Urato, Tosa Bay, Kochi, 33°29′N, 133°34′E, 200–400 m, trawl, G. Ogihara and T. Yoshida, 9 Mar. 2008; KAUM–I. 19113, 96.0 mm SL, west of Kaimon, Ibusuki, Kagoshima, 31°11′21″N, 130°30′6″E, 128 m, line-fishing, G. Ogihara, 28 Apr. 2009; KAUM–I. 20495, 182.0 mm SL, KAUM–I. 20496, 106.9 mm SL, KAUM–I. 20498, 176.7 mm SL, KAUM–I. 20499, 165.3 mm SL, KAUM–I. 20500, 163.3 mm SL, East China Sea, 30°47′47″–49′00″N, 127°19′13″–19′09″E, 116–117 m, trawl, RV *Kagoshima-maru*, 7 Nov. 2008; KAUM–I. 20851, 296.4 mm SL, off Yamagawa, Kagoshima Bay, Kagoshima, 12 Feb. 2009; KAUM–I. 22566, 200.1 mm SL, KAUM–I. 22567, 192.5 mm SL, KAUM–I. 22568, 118.4 mm SL, East China Sea, trawl, RV *Kagoshima-maru*, Nov. 2009; KAUM–I. 34068, 180.7 mm SL, KAUM–I. 34119, 189.7 mm SL, KAUM–I. 34120, 201.1 mm SL, KAUM–I. 34121, 187.2 mm SL, East China Sea, 30°46′364″–56′899″N, 127°20′481″–24′291″E, 150 m, trawl, RV *Kagoshima-maru*, 5–11 Nov. 2010; KAUM–I. 34252, 196.9 mm SL, East China Sea, 31°30′535″–43′211″N, 127°35′002″–34′701″E, 135 m, trawl, M. Matsunuma on RV *Kagoshima-maru*, 18 Nov. 2010; KAUM–I. 35798, 222.8 mm SL, East China Sea, 31°24′19″N, 128°02″39″E, 150 m, bottom trawl, M. Yamashita and M.

Matsunuma, 8 Des. 2010; KAUM–I. 35860, 78.0 mm SL, East China Sea, 28°16′36″N, 126°23′34″E, 164 m, bottom trawl, M. Yamashita and M. Matsunuma, 10 Des. 2010; KAUM–I. 35868, 171.2 mm SL, East China Sea, 26°28′36″N, 125°03′34″E, 136 m, bottom trawl, M. Yamashita and M. Matsunuma, 23 Nov. 2010; KAUM–I. 40976, 113.2 mm SL, East China Sea, 32°13′10″N, 127°28′05″E, 148 m, trawl, 30 May 2011; KAUM–I. 50034, 79.5 mm SL, East China Sea, 28°47′22″N, 126°47′26″E, 146–147 m, trawl, 12 June 2012; KAUM–I. 50041, 115.6 mm SL, East China Sea, 30°25′26″N, 127°45′46″E, 191–192 m, trawl, 14 June 2012; KAUM–I. 54075, 198.2 mm SL, off Ibusuki, Kagoshima Bay, Kagoshima, 31°14′N, 130°41′E, line-fishing, M. Matsunuma, 13 Apr. 2013; KAUM–I. 57776, 64.0 mm SL, East China Sea, 31°16′37″N, 127°15′09″E, 107 m, bottom trawl, M. Matsunuma and Y. Fukui, 16 Dec. 2013; KAUM–I. 58013, 151.2 mm SL, East China Sea, 28°51′17″N, 125°44′20″E, 111 m, 9 Dec. 2013, other data as for KAUM–I. 57776; KAUM–I. 58599, 235.2 mm SL, off Yamagawa, Kagoshima Bay, Kagoshima, 32°12′N, 130°38′E, 70–80 m, set net; K. Nishida, 22 May 2013; KAUM–I. 60088, 182.4 mm SL, East China Sea, 28°51′17″N, 125°44′20″E, 111 m, 9 Dec. 2013, other data as for KAUM–I. 57776; KAUM–I. 60135, 194.4 mm SL, East China Sea, 30°15′35″N, 125°16′38″E, 66 m, 21 Nov. 2013, other data as for KAUM–I. 57776; KAUM–I. 60935, 186.6 mm SL, KAUM–I. 60936, 187.5 mm SL, East China Sea, 30°14′01″N, 127°12′50″E, 115 m, 27 Nov. 2013, other data as for KAUM–I. 57776; KAUM–I. 62384, 285.1 mm SL, off Kumano, Tanega-shima island, Osumi Islands, Kagoshima, 30°28′13″N, 130°58′32″E, line-fishing, KAUM Fish Team, 21 June 2014; KAUM–I. 64280, 98.7 mm SL, KAUM–I. 64281, 100.2 mm SL, East China Sea, 30°38′40″N, 126°38′36″E, 90 m, trawl, 12 June 2014; KAUM–I. 64290, 93.5 mm SL, East China Sea, 29°15′10″N, 126°14′45″E, 112 m, trawl, 10 June 2014; KAUM–I. 64637, 202.3 mm SL, KAUM–I. 64638, 130.4 mm SL, East China Sea, 32°16′57″N, 127°15′02″E, 129 m, 3 Dec. 2013, other data as for KAUM–I. 57776; KAUM–I. 64730, 215.3 mm SL, East China

Sea, 31°46′59″N, 128°15′01″E, 171 m, 3 Dec. 2013, other data as for KAUM–I. 57776; KAUM–I. 70019, 80.9 mm SL, KAUM–I. 70020, 77.6 mm SL, East China Sea, 30°23′16″N, 127°45′27″E, 192–200 m, bottom trawl, M. Matsunuma, 17 June 2014; KAUM–I. 75264, 96.4 mm SL, East China Sea, 26°57′01″N, 123°09′11″E, 118–120 m, bottom trawl, M. Matsunuma et al., 15 May 2015; KAUM–I. 81581, 117.6 mm SL, East China Sea, 31°15′42″N, 127°14′57″E, 106–109 m, bottom trawl, M. Matsunuma, 12 Dec. 2015; KAUM–I. 84285, 195.1 mm SL, East China Sea, 30°25′05″N, 127°45′41″E, 194–200 m, bottom trawl, M. Matsunuma, 29 Aug. 2015; KAUM–I. 97664, 226.9 mm SL, off Yamagawa Port, Kagoshima Bay, Kagoshima, 32°12′N, 130°38′E, line-fishing, B. Jeong and K. Fujiwara, 28 Jan. 2017; KAUM–I. 200148, 212.8 mm SL, off Makurazaki, Kagoshima, line-fishing, H. Iwatsubo and K. Mori, purchased at Makurazaki Fish Market, 8 June 2015; MUFS 12885, 140.1 mm SL, Meitsu, Nango, Miyazaki, H. Motomura, 5 Apr. 1997; MUFS 12899, 164.7 mm SL, 12 Apr. 1997, other data as for MUFS 12885; MUFS 12906, 275.8 mm SL, 14 Apr. 1997, other data as for MUFS 12885; MUFS 12951, 202.8 mm SL, coll. date unknown, other data as for MUFS 12885; MUFS 13868, 62.4 mm SL, East China Sea, Seikai National Fisheries Research Institute, Fisheries Research Agency, 13–15 Apr. 1982; NSMT-P. 23127, 169.2 mm SL, off Katsuura, Tobi-shima Island, Yamagata, 100 m, 28 Aug. 1983; NSMT-P. 63518, 193.0 mm SL, East China Sea, 31°29′N, 127°31′E, 130 m, bottom trawl, T. Sato and H. Namikawa on RV *Youkou-maru*, 12 Oct. 2001; NSMT-P. 64045, 196.0 mm SL, off Hamada, Shimane, 200 m, A. Uno, 26 May 2002. **TAIWAN:** CAS 30587, 2, 165.9–166.9 mm SL, Taiwan Strait, Formosa Banks, ca. 50 m, trawl, F. Steiner, June 1973; KAUM–I. 30264, 126.3 mm SL, off Tashi, Yilan, northeastern Taiwan, 500 m, trawl, KAUM Fish Team, 6 July 2011; URM-P. 3658, 132.1 mm SL, East China Sea, trawl, RV *Nagasaki-maru*, 21 July 1982; URM-P. 3709, 143.1 mm SL, same data as URM-P. 3658; URM-P. 18234, 108.6 mm SL, East China Sea, 29°07′N, 126°18′E, 98 m, trawl, 4 Oct. 1986. **INDONESIA:**

NTM S. 14953–001, 254.0 mm SL, southeast of Tanimbar Islands, Arafura Sea, 269 m, FV Orion, 8 June, 1999. **AUSTRALIA:** AMS I. 21561-002, 182.8 mm SL, southeast of Ulladulla, New South Wales (NSW), 35°31′S, 150°44′E, 220 m, bottom trawl, FRV *Kapala*, 6 July 1976; AMS I. 22821-048, 218.0 mm SL, 190 km northwest of Port Hedland, Western Australia (WA), 18°16′S, 118°12′E, 298–320 m, engel trawl, J. Payton and M. McGrouther on FRV *Soela*, 11 Apr. 1982; AMS I. 30393-006, 2, 244.1–273.2 mm SL, east of Jervis Bay, NSW, 35°08–10′S, 151°00′E, 159–166 m, engel balloon net, FRV *Kapala*, 5 Dec. 1984; AMS I. 34520-001, 127.2 mm SL, off Green Cape, NSW, 37°19–22′S, 150°17–18′E, 137–141 m, trawl, FRV *Kapala*, 14 Mar. 1993; AMS I. 36136-001, 2, 78.9–84.3 mm SL, off Batemans Bay, Tasmania, 35°41–44′S, 150°24–25′E, 113–119 m, K. Graham, FRV *Kapala*, 24 Mar. 1994; AMS I. 39959-001, 156.1 mm SL, off Brush Island, NSW, 35°32–35′S, 150°43–44′E, 271–276 m, FRV *Kapala*, 27 May 1997; CSIRO CA 1167, 206.7 mm SL, east of Wide Bay, Queensland (Qld), 25°55′–26°03′S, 153°53′E, 179–300 m, RV *Craigmin*, 26 Nov. 1980; CSIRO CA 1168, 282.0 mm SL, same data as CSIRO CA 1167; CSIRO H 448-03, 199.3 mm SL, east of Rockhampton, Qld, 22°52–56′S, 152°41–42′E, 225–282 m, FRV *Soela*, 19 Nov. 1985; CSIRO H 448-04, 213.0 mm SL, same data as CSIRO H 448-03; CSIRO H 595-15, 259.9 mm SL, northeast of Townsville, Qld, 18°37–39′S, 148°05–07′E, 300 m, FRV *Soela*, 8 Dec. 1985; CSIRO H 630-23, 197.8 mm SL, south of Saumarez Reef, Qld, 22°35–36′S, 153°46–50′E, 345–350 m, FRV *Soela*, 17 Nov. 1985; CSIRO H 3773-01, 108.1 mm SL, east of Cape Howe, NSW, 37°23–25′S, 150°16–17′E, 161–184 m, G. Yearsley on FRV *Southern Surveyor*, 1 Sept. 1994; CSIRO H 3783-02, 293.2 mm SL, east of Bermagui, NSW, 36°28–30′S, 150°18′E, 247–250 m, G. Yearsley on FRV *Southern Surveyor*, 5 Sept. 1994; CSIRO H 4265-02, 158.5 mm SL, east of Pambula, NSW, 36°55–56′S, 149°57′E, 42–43 m, R. Daley on FRV *Southern Surveyor*, 30 Apr. 1996; NTM S. 12715-021, 2, 112.9–284.0 mm SL, north of Bathurst Island, Northern Territory (NT), 265–275 m, RV *Eylandt Pearl*, 4 Jan. 1990; NTM

S. 13065-004, 235.8 mm SL, north of Bathurst Island, NT, 260 m, D. Euans, 12 Dec. 1990; QM I. 9147, 77.5 mm SL, east of Mooloolоba, Qld, 26°41′S, 153°38′E, 126–128 m, R. Elks; QM I. 18673, 175.3 mm SL, Qld, 23°11′S, 153°00′E, 384–329 m, Queensland Fisheries Service (QFS), 20 Sept. 1980; QM I. 18691, 158.2 mm SL, Qld, 25°27′S, 153°46′E, 182–230 m, QFS, 14 Sept. 1980; QM I. 18807, 205.9 mm SL, Qld, 26°31′S, 153°48′E, 274–438 m, QFS, 13 Sept. 1980; QM I. 20990, 2, 96.9–102.7 mm SL, east of Point Lookout, Qld, 27°26′S, 153°46′E, 183 m, QFS, 11 Aug. 1982; QM I. 21633, 276.5 mm SL, east of Swain Reef, Qld, 22°06′S, 153°00′E, 3658, QFS, 28 Aug. 1983; QM I. 26924, 255.4 mm SL, east of Cape Moreton, Qld, 27°02′S, 153°35′E, H. Weng, 15 Sept. 1974; QM I. 33061, 62.8 mm SL, east of Noosa, Qld, 26°24′S, 153°40′E, 104 m, QFS, 21 June 2001; WAM P. 30583-003, 218.7 mm SL, WA, 14°10′S, 122°35′E, 348–350 m, FRV *Soela*, 14 Feb. 1984 .

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9 (rarely 8 or 10); pectoral-fin rays 17–21 (mode 19); scale rows in longitudinal series 41–47 (44 or 45); pored lateral-line scales 22–24 (23); scale rows above lateral line 4–7 (5 or 6), below 15–20 (16), between 6th dorsal-fin spine base and lateral line 5–8 (7), between last dorsal-fin spine base and lateral line 6–8 (7); pre-dorsal scale rows 3–8 (6); gill rakers 14–19 (16); anteroventral surface of body and base of pectoral fin naked; anteroventral surface of lower jaw without tentacles; dermal flap on pectoral-fin axil; anterior lacrimal spine simple or with 1 (rarely 2) additional spinous points; posterior lacrimal spine simple; anterodorsal lacrimal, lateral lacrimal, and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge absent; largest recorded specimen 296.4 mm SL.

Description. Frequency distributions of selected meristic characters and proportional measurements as percentages of SL are shown in Table 3. Body moderately compressed anteriorly, progressively more compressed posteriorly. Nape and anterior body not highly arched. Body relatively shallow, depth much less than head length. Numerous small papillae

on head, especially dorsal surface, snout and lateral surface above suborbital ridge; numerous tiny tentacles and cirri on head, except maxilla, lips and underside of lower jaw. A short slender tentacle (supraocular tentacle) posteriorly on supraocular spine base, its length less than pupil diameter and length of anterior nostril tentacle (in small individuals, usually longer than pupil diameter and anterior nostril tentacle); lateral surface of supraocular tentacle without distinct branches. Several small tentacles or papillae on outer margin of eye. A large tentacle on anterior nostril (anterior nostril tentacle), much longer than nasal spine, with several branches distally. A pair of slender tentacles on front of snout (anterior view), length usually shorter than length of anterior nostril tentacle. Anterior lacrimal spine with a short slender tentacle plus several smaller shorter tentacles. Posterior lacrimal spine associated with a large tentacle (posterior lacrimal tentacle; largest of head tentacles) and several small tentacles; posterior lacrimal tentacle linked posteriorly to head by fringed skin. A short, slender tentacle on central cheek. Several distinct rounded, flat, unbranched skin flaps along preopercular margin. A few small, flat tentacles associated with pored lateral-line scales. Pectoral-fin axil with a large fleshy skin flap (sometimes with several small tentacles; largest of body flaps and tentacles). A rounded skin flap on tip of cleithral spine. Distinct slender, unbranched tentacles scattered on lateral surface of body.

No exposed scales on entire head surface; embedded scales behind eye and below lower posttemporal spine; scales under cheek skin. Well-exposed cycloid scales (sometimes weakly ctenoid in juvenile) covering lateral surface of abdomen, remaining body lateral surface covered with well-exposed ctenoid scales, but not extending onto fin rays or membranes, except basal caudal fin. Exposed cycloid scales covering ventral surface of body from just anterior to first anal-fin spine base to behind pelvic-fin base, scales becoming embedded with growth. Scales absent from anteroventral surface of body extending to between pelvic fins, and pectoral-fin base. Lateral line sloping downward above anterior half of pectoral fin.

Mouth large, slightly oblique, forming an angle of between 40–50 degrees to horizontal axis of head and body. Posterior margin of maxilla not reaching a vertical at posterior margin of orbit (usually just reaching a vertical at posterior margin of pupil). Lateral surface of maxilla smooth, without ridges, tentacles or scales. Lower jaw with a distinct symphyseal knob. Width of symphyseal gap separating premaxillary teeth bands slightly less than width of each band. Upper jaw with a band of short, incurved, conical teeth in about 9 (about 5 in small individuals) rows anteriorly, band narrowing posteriorly. Lower jaw tooth band narrower than that of upper jaw, including both villiform and conical teeth of length usually slightly shorter than upper jaw teeth. One to 3 rows of small teeth in a V-shaped patch on vomer. Width of vomerine plate approximately equal to length of palatine plate. About 1 or 2 tooth rows on palatine. Underside of dentary with 3 sensory pores on each side, first pore below nasal spine base, second below midpoint between tips of anterior and posterior lacrimal spines, third below posterior margin of dentary. A pore on each side of lower jaw behind symphyseal knob, paired pores below symphyseal knob. A pore at anterior of lowermost preopercular spine. Underside of lower jaw smooth, without ridges or tentacles.

Angle of dorsal profile of snout variable, between 30–50 degrees to horizontal axis of head and body. Nasal spine simple, conical, directed dorsally, its length greater than anterior nostril diameter. Ascending process of premaxilla not intruding into interorbital space, its posterior margin not reaching to beyond level with posterior margin of posterior nostril in dorsal view. Median interorbital ridge absent. Interorbital ridges well developed, beginning posterior to nasal spines, separated by a deep (rarely shallow) channel and usually divergent anteriorly and posteriorly (dorsal view); distance between interorbital ridges narrowest at a vertical midline of eye, before meeting level with and between origins of tympanic spines to form a ridge (sometimes indistinct) to anterior angular edge of occipital pit. Interorbital space relatively shallow, about one-eighth of orbit extending above dorsal profile of head. Preocular

spine simple (rarely divided into 2 points), directed posterodorsally. Supraocular spine simple, its tip located slightly posterior to vertical midline of eye, spine shorter than preocular, postocular and tympanic spines. Postocular spines simple, bases wider than tympanic spine base. Tympanic spine simple, strongly pointed, base continuous with interorbital ridge to form a transverse ridge in front of occipital pit. A transverse ridge anterior to occipital pit usually curved posteromedially (rarely straight) in dorsal view. Coronal and pretympanic spines absent. Occipital pit moderately deep to shallow, center of pit usually slightly convex. A distinct transverse ridge in rear of occipital pit between bases of nuchal spines. Occipital pit surrounded laterally by tympanic spines, low ridges between tympanic and parietal spines, and parietal spines. Parietal spine simple, its base curving strongly into occipital pit. Nuchal spine simple, base continuous with parietal spine base. Sphenotic with 2–6 (usually 3 or 4, left side) and 1–5 (usually 3 or 4, right side) small spines. Postorbital with 3–7 (usually 4; left side) and 3–6 (usually 4 or 5; right side) small spines. Pterotic spine simple. Space between parietal, nuchal, pterotic and lower posttemporal spines sometimes with a small spine. Small upper posttemporal spine simple, pointed, directed posteriorly, its length much shorter than lower posttemporal spine. Lower posttemporal spine simple, base length usually less than (rarely equal to) that of pterotic spine. Supracleithral spines simple, flattened, not strongly pointed. Cleithral spine flattened, pointed. Vertebrae 24.

Lateral surface of lacrimal with a low ridge, rarely with spines (2 and 3 of all specimens examined with a small blunt and pointed spines, respectively). Anterior lacrimal spine pointed, directed forward or anteroventrally, its tip usually not reaching dorsal margin of upper-jaw lip; usually without or with a second short spine (rarely with 2 short spines; 1 of all specimens examined) on base. Posterior lacrimal spine simple (2 spines on left side of head in two specimens), directed ventrally in juveniles, anteroventrally in adults, its tip not reaching upper-jaw lip. Posterior lacrimal spine larger than anterior spine. Suborbital ridge with 3

spines, first at a vertical midline of eye, tip of second posterior to a vertical at posterior margin of orbit, third on end of suborbital ridge. Suborbital pit absent. Preopercle with 5 pointed spines; uppermost largest with a supplemental preopercular spine on base; second to fifth lacking a median ridge, directed posteriorly or posteroventrally; fourth and fifth with larger fleshy tentacle than other preopercular spines. Preopercle, between uppermost preopercular spine and upper end of preopercle, smooth, without serrae or spines. Upper opercular spine simple, with or without a low median ridge. Lower opercular spine simple, with a distinct median ridge. Space between upper and lower opercular spines without ridges, covered with thin skin. Posterior tips of upper and lower opercular spines not reaching opercular margin.

Origin of first dorsal-fin spine above supracleithral spine. Posterior margin of opercular membrane just reaching or extending beyond level with base of fourth dorsal-fin spine. Posterior tip of pectoral fin extending slightly beyond a vertical at tip of depressed pelvic fin, but not reaching a vertical at bases of last dorsal-fin spine and first anal-fin spine. Posterior tip of depressed pelvic fin not reaching anus (sometimes reaching in small juveniles). Origin of pelvic-fin spine posterior to origin of pectoral fin. Origin of first anal-fin spine about level with or slightly posterior to origin of last dorsal-fin spine.

Color when fresh. Body variegated, generally reddish or orange, lighter ventrally, mottled with irregular pale and some dark reddish or brownish blotches on lateral surface. Head reddish or orange with irregular whitish markings ventrolaterally; mottled with whitish narrow bars along upper and lower jaw lips, and sometimes on opercle posterior margin. Mottled with thin irregular whitish markings on eye outer margin. All tentacles on body and head generally whitish to reddish. Spinous portion of dorsal fin reddish-orange with indistinct oblique whitish bars. A large black blotch posteriorly on dorsal fin in males (usually from 7th to 10th spines; absent in females). Usually several small dark reddish dots at base of dorsal-

fin spines and soft rays. Soft-rayed portion of dorsal fin, and pectoral and caudal fins whitish with many reddish-orange spots (width less than pupil diameter), usually darker reddish spots scattered centrally along rays. Pectoral and caudal fins lighter basally and whitish distally, respectively. Pelvic fin plain reddish or orange, usually without spots. Anal fin reddish or orange, with two indistinct narrow oblique whitish bars anteriorly and a few darker spots on soft-rayed portion.

Color of preserved specimens. Melanistic and yellowish colour forms were apparent. Melanistic form (69 specimens) - body yellowish-brown to pale brown with five indistinct irregular blackish saddles dorsally; anteriormost saddle width from nape to about 3rd dorsal-fin spine base; second saddle width from about 5th to 7th dorsal-fin spine bases, descending beyond lateral line, sometimes connecting with anteriormost saddle; third saddle width from 9th to 11th dorsal-fin spine bases, descending to above or just reaching lateral line; fourth saddle width from 3rd to 7th dorsal-fin soft ray bases (usually across ca. upper two-thirds of body); posteriormost saddle on upper half of caudal peduncle. Head dusky brown dorsally, becoming pale ventrally; cheek and pectoral-fin base sometimes reddish; space between upper and lower opercular spines pale. All tentacles on body and head generally whitish. Dorsal fin translucent, a large dense black blotch of width greater than orbit diameter in males, on outer margin of membrane from 6th to 11th (usually 7th–10th) spines (absent in females); dorsal fin soft-rayed portion with many black spots; dense black spots, each less than body scale diameter but larger than those on soft-rayed portion of fin, scattered on basal membranes of spinous and soft-rayed portions. Pectoral fin pale, usually with many black spots on upper half of fin rays (sometimes on all rays). Pelvic fin uniformly pale. Anal fin pale or translucent, usually with a few faded black spots on soft-rayed portion. Caudal fin yellowish or translucent with many black spots. Size of black spots on all fins about equal. Usually one to three small black spots above pectoral-fin base.

Yellowish form (7 specimens). Body and head, including all fins, uniformly pale yellowish without blackish spots, blotches or scattered melanophores. After long-term storage, body yellowish-brown, head and almost all fins pale whitish.

Distribution. Currently known from Korea, Japan, Yellow Sea, East China Sea, Taiwan, Philippines, Indonesia, New Guinea, and Australia (Kanayama 1982; Shimizu 1984; Yatou 1985; Lindberg and Krasyukova 1987; Paxton et al. 1989; Chen et al. 1997; Poss 2000; Nakabo 2002; Takahashi et al. 2003; Kim et al. 2005; Fricke et al. 2014; this study, Fig. 31). Although Kyushin et al. (1977: fig. 157) reported *S. neglecta* from the Andaman Sea, it was re-identified by Motomura et al. (2005) as *S. onaria*. Specimens examined in this study had been collected from depths between 42–600 m (shallower water records being more common in higher latitudes; Fig. 34b). Whereas melanistic specimens have been recorded between 43–500 m, yellowish specimens have been recorded only from deep water (250–350 m).

Remarks. *Scorpaena neglecta* was originally described by Temminck and Schlegel (1843) on the basis of six specimens collected off Nagasaki, Japan. Examination of the syntypes, all mounted specimens registered as RMNH. PISC. 618–623 (Boeseman 1947; Fig. 13), confirmed that two only (RMNH.PISC. 618, 139.8 mm SL and RMNH. PISC. 619, 187.4 mm SL) conformed to the species regarded as *S. neglecta* in the present study, the remaining four (RMNH.PISC. 620–623) being identified as *S. miostoma* (see also Nakabo 2002), with 15–16 pectoral-fin rays, embedded scales on the anteroventral surface of the body and pectoral-fin base, and lacking a dermal flap on pectoral-fin axil. Temminck and Schlegel (1843: pl. xvii fig. 4) provided an illustration of the head of *S. neglecta* but gave no other information on the specimen or size. The illustration was probably based on RMNH.PISC. 619, due to the large space shown between the postorbital and tympanic spines (vs. spines close together in *S. miostoma*) and forward curving posterior profile of the occipital pit (vs. more or less straight in *S. miostoma*). For nomenclatural stability, the largest syntype

RMNH.PISC. 619 is designated as lectotype of *S. neglecta*, the remaining five syntypes (RMNH.PISC. 618 and RMNH.PISC. 620–623) therefore becoming paralectotypes.

Scorpaena fimbriata was originally described by Döderlein in Steindachner and Döderlein (1884) on the basis of four syntypes from Tokyo, Japan, registered as MZS 1145, NMW 22249, NMW 75383 and NMW 77248. Although *S. fimbriata* was described as new, Steindachner stated in the last paragraph of the description that the species was possibly conspecific with *S. neglecta*, having an identical head form with the latter. Subsequently, Lindberg and Krasyukova (1987) regarded *S. fimbriata* as a junior synonym of *S. neglecta*, treating it as a valid subspecies *S. neglecta fimbriata* Döderlein (1884). Examination of the four syntypes showed them to be conspecific with the lectotype and non-type specimens of *S. neglecta* (characterized by 19 pectoral-fin rays, 43–45 scale rows in longitudinal series, 23 pored lateral-line scales, 15–17 total gill rakers, the lower jaw smooth without tentacles, and a dermal flap on the pectoral-fin axil, and lacking scales on the pectoral-fin base and anteroventral surface of the body, a median ridge on the lateral surface of the maxilla, and the lateral lacrimal spine and median interorbital ridge). Therefore, *S. fimbriata* is regarded as a junior synonym of *S. neglecta*.

Scorpaena izensis was originally described by Jordan and Starks (1904) on the basis of the holotype (USNM 50909, 191.6 mm SL) and two paratypes (CAS 107366, 160.5–155.7 mm SL), all from Suruga Bay, Japan. Although many authors have subsequently treated *S. izensis* as a valid species (e.g., Yatou 1985; Lindberg and Krasyukova 1987; Motomura and Iwatsuki 1997; Poss 2000; Fricke et al. 2018), examination herein of the holotype and paratypes revealed them to be conspecific with *S. neglecta* (see also Nakabo 2002). In addition, two and one Jordan and Starks' non-type specimens (CAS 107398, 144.6–145.4 mm SL, with the same data as the holotype and USNM 51392, 50.9 mm SL, collected from

Sagami Bay) were also identified as *S. neglecta* and *Neomerinthe erostris* (Alcock 1896), respectively.

Scorpaena hemilepidota and *Scorpaenopsella armata* were both described as new by Fowler (1938), each being based on single specimens from the Philippines, the former collected off Tubig Point, between Samar and Masbate, and the latter off Sombrero Island, Balayan Bay, Verde Island Passage, and registered as USNM 98884 (150.6 mm SL) and USNM 98893 (65.7 mm SL), respectively. *Scorpaena hemilepidota* and *S. armata* remained poorly known, there having been no subsequent records based on voucher specimens since their original descriptions. Nevertheless, several authors, including Poss (1999), Randall and Greenfield (2004) and Fricke et al. (2018), recognized them as valid species. Because the characters of both holotypes were consistent with those of the lectotype and other specimens of *S. neglecta*, *S. hemilepidota* and *S. armata* are regarded as junior synonyms of *S. neglecta*.

***Scorpaena onaria* Jordan and Snyder 1900**

[Standard English name: Western Scorpionfish; standard Japanese name: Fusakasago]

(Figs. 14, 30, 34, 43c; Tables 1, 4, 11)

Scorpaena onaria Jordan and Snyder 1900: 365, pl. 16 (type locality: Misaki, Japan).

Scorpaena pele Eschmeyer and Randall 1975: 320, figs. 24, 25a (type locality: north coast of Oahu Island, Hawaiian Islands).

Holotype. USNM 49405, 157.7 mm SL, Misaki, Japan, coll. by K. Otaki.

Paratypes. CAS 106275, 2 specimens, 136.6–144.8 mm SL, Tokyo, Japan, coll. by K. Otaki.

Other type specimens. USNM 214046, holotype of *Scorpaena pele*, 123.9 mm SL, north coast of Oahu, 21°40′N, 158°08′W, 176–202 m, 7 July 1972. Seventeen paratypes of *S. pele*: BPBM 13735, 74.8 mm SL, Penguin Bank, Molokai, 21°09.7′N, 157°25′–29.8′W, 177–188 m, shrimp trawl, P. Struhsaker, 7 Apr. 1968; BPBM 17247, 2 specimens, 87.4–101.5 mm SL, off Maui, 20°59.0′–21°2.1′N, 156°44.0′–44.4′W, 238 m, P. Struhsaker, 18 Nov. 1968; BPBM 29363, 133.9 mm SL, purchased at Honolulu market by J. Thompson, 1898–1927; CAS 15707, 81.2 mm SL, Pailolo Channel (21°01′12″N, 156°44′06″W), Hawaiian Islands, 210 m depth, shrimp trawl, coll. by RV *T. Cromwell*; CAS 30236, 88.0 mm SL, Pailolo Channel, Hawaiian Islands, c. 220 m depth, coll. by RV *T. Cromwell*; CAS 30237, 2 specimens, 112.2–113.3 mm SL, off Maui Island (21°01′42″N, 156°43′06″W), Hawaiian Islands, coll. by RV *T. Cromwell*, 28 Mar. 1968; CAS 30238, 3, 86.1–119.2 mm SL, same data as CAS 30237, except date 17 Nov. 1968; CAS 30239, 118.8 mm SL, off north coast of Oahu Island (21°40′N, 158°08′W), Hawaiian Islands, 176–202 m depth, trawl, coll. by RV *T. Cromwell*, 7 July 1972; USNM 214042, 134.2 mm SL, off Maui, 21°03.1′–01.4′N, 156°45.5′–50.8′W, 198–223 m, 20 Nov. 1968; USNM 214043, 91.3 mm SL, off Maui, 20°58.9′–21°02.5′N, 156°44′–49′W, 229–243 m, 18 Nov. 1968; USNM 214044, 2, 75.8–108.8 mm SL, off Maui, 21°03.0′–01.2′N, 156°45.4′–50.2′W, 199–230 m, 19 Nov. 1968; USNM 214045, 87.0 mm SL, Pailolo Channel, Maui, 20°57.3′–21°01.6′N, 156°43.0′–47.4′W, 223 m, 18 Nov. 1968.

Non-type specimens. 51 specimens, 56.5–265.2 mm SL, as listed in Motomura et al. (2005b, 2007). 1 specimen, 150.0 mm SL, as listed in Motomura and Peristiwady (2010). Twenty five additional specimens (53.5–201.6 mm SL): CSIRO H 751-6, 129.2 mm SL, CSIRO H 751-7, 158.6 mm SL, north of Dampier Archipelago, Western Australia, Australia, 19°08′S, 116°54′E, 196 m, 24 Oct. 1986; KAUM–I. 9225, 141.5 mm SL, off Nagasakibana, Ibusuki, Kagoshima, Japan, 31°08′34″N, 130°35′07″E, 190 m, line-fishing, Y. Nakamura, 9 Apr. 2008; KAUM–I. 9226, 156.1 mm SL, off Kaimon, Ibusuki, Kagoshima, Japan, 150 m,

line-fishing, Y. Nakamura, 8 Apr. 2008; KAUM–I. 9423, 164.8 mm SL, KAUM–I. 9649, 133.0 mm SL, KAUM–I. 9651, 121.0 mm SL, 180–190 m, line-fishing, Y. Nakamura and G. Ogihara, 22–30 Apr. 2008, other data same as KAUM–I. 9225; KAUM–I. 13830, 145.7 mm SL, off Kawajiri Fishing Port, Ibusuki, Kagoshima, Japan, 31°10′N, 130°32′E, 190 m, line-fishing, G. Ogihara, 27 Jan. 2009; KAUM–I. 15949, 168.4 mm SL, KAUM–I. 15950, 150.5 mm SL, off westside of Kaimon, Ibusuki, Kagoshima, Japan, 31°11′13″N, 130°30′36″E, 100–140 m, set net, G. Ogihara and T. Yoshida, 10 Mar. 2009; KAUM–I. 20695, 160.0 mm SL, KAUM–I. 20696, 162.2 mm SL, 128 m, line-fishing, G. Ogihara, 2 Dec. 2008, other data same as KAUM–I. 15950; KAUM–I. 39299, 110.0 mm SL, off Tashi, Yilan, Taiwan, 300 m, trawl, KAUM Fish Team (purchased at Tashi Fishing Port, Yilan), 6 July 2011; KAUM–I. 50032, 113.7 mm SL, East China Sea, Japan, 32°09′14″–07′32″N, 128°01′32″–01′33″E, 147–148 m, trawl, Seikai National Fisheries Research Institute (SNFRI), 18 June 2012; KAUM–I. 50042, 143.6 mm SL, East China Sea, Japan, 27°45′29″–44′13″N, 126°06′01″E, 191–192 m, trawl, SNFRI, 14 June 2012; KAUM–I. 60700, 188.0 mm SL, off Nha Trang, Khánh Hòa, Vietnam, 12°15′N, 109°11′E, H. Motomura (purchased at Dam Market, Nha Trang), 23 Apr. 2014; KAUM–I. 64286, 96.8 mm SL, East China Sea, Japan, 152 m, trawl, M. Okamoto, 4 June 2014; KAUM–I. 64298, 53.5 mm SL, East China Sea, Japan, 27°27′20″N, 126°03′21″E, 136 m, trawl, M. Okamoto, 25 May 2014; KAUM–I. 87342, 156.5 mm SL, East China Sea, Japan, 32°09′07″N, 128°02′01″E, 147–148 m, RV *Kumamoto-maru*, bottom trawl, M. Matsunuma, 10 May 2015; KAUM–I. 109947, 183.7 mm SL, Koshiki Islands, Kagoshima, Japan, line-fishing, H. Hata (purchased at Kagoshima City Central Fish Market), 17 Nov. 2017; KAUM–I. 115207, 151.4 mm SL, off Ke-tzu-liao, Ziguan District, Kaohsiung, Taiwan, K. Koeda et al. (purchased at Ke-tzu-liao Fishing Port, Kaohsiung), 10 May 2018; KAUM–I. 149152, 165.4 mm SL, Kakeroma-jima Island, Itoshima, Fukuoka, Japan, M. Nakashimada, 6 Nov. 2020 ; KAUM–I. 200147, 201.6 mm SL, KAUM–I. 200150, 140.0 mm SL, KAUM–I.

200151, 138.4 mm SL, off Makurazaki, Kagoshima, Japan, line-fishing, H. Iwatsubo and K. Mori (purchased at Makurazaki Fish Market), 8 and 22 June 2015.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9 (rarely 8 or 10); pectoral-fin rays 16–18 (mode 17); scale rows in longitudinal series 42–47 (45); pored lateral-line scales 22–24 (23); scale rows above lateral line 4–6 (5), below 14–17 (15 or 16), between 6th dorsal-fin spine base and lateral line 7 or 8, between last dorsal-fin spine base and lateral line 6–9 (7 or 8); pre-dorsal scale rows 3–6 (5); gill rakers 14–17 (16); embedded scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine with 1 (rarely 0 or 2] additional spinous points; posterior lacrimal spine simple (rarely with 1 additional spinous point); lateral lacrimal spine present, with single spinous point; anterodorsal lacrimal and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; postorbital spine absent; median interorbital ridge present or absent (if present, short, ending anterior to margin of preocular spine bases, its highest portion lower than interorbital ridges); posterior margin of maxilla usually located below eye level, between center of pupil and posterior margin of orbit; lateral line sloping steeply downward above anterior half of pectoral fin; relatively deep body (depth 35.8–45.1% of SL); small black spots usually absent on head, present on body and fins; largest recorded specimen 265.2 mm SL.

Distribution. *Scorpaena onaria* is distributed in the northern central Pacific, off the Hawaiian Islands, West-Pacific, ranging from Japan to eastern Australia (Motomura et al. 2005b; Motomura and Peristiwady 2010; this study), and eastern Indian Ocean, in the Andaman Sea (Kyushin et al. 1977) and off northwestern Australia (Gloerfelt-Tarp and Kailola 1984; this study) at depths of 95–500 m (Figs. 30, 34b).

The distribution of *S. onaria* in the southwestern Pacific was previously reported by Motomura et al. (2005b), on the basis of their examination of specimens initially believed by Paulin (2004) to represent an undescribed species. In addition, the distribution of the species in the Andaman Sea was also recognized by Motomura et al. (2005b), following the re-identification of a color figure previously reported as *S. neglecta* by Kyushin et al. (1977).

Remarks. In the original description of *S. pele*, Eschmeyer and Randall (1975) compared their new species only with the co-occurring species in the Hawaiian Islands, *S. colorata*. Although Motomura et al. (2005b, 2007) treated *S. pele* as valid, differing from the most similar species (*S. onaria*) in the absence of a median interorbital ridge (vs. present in the latter), examination of type and non-type specimens of both species in this study disclosed that the median interorbital ridge was variable, being present or absent (if present, short, ending anterior to the margin of the preocular spine bases, its highest portion lower than the interorbital ridges). All other spination and head ridges, and counts and measurements of the type specimens of *S. pele* agreed with the type and non-type specimen data of *S. onaria* examined in the present and previous studies (Motomura et al. 2005b: table 1, 2007: table 1; this study: Table 4). Consequently, *S. pele* is regarded here as a junior synonym of *S. onaria*.

***Scorpaena orgila* Eschmeyer and Allen 1971**

[Standard English name: Bold Scorpionfish]

(Figs. 15, 32, 34; Table 1)

Scorpaena orgila Eschmeyer and Allen 1971: 517, figs. 1a, 2 (type locality: off Ahu Akapu, Easter Island, Chile).

Holotype. CAS 24809, holotype of *Scorpaena orgila*, 246.8 mm SL, off Ahu Akapu, Easter Island, Chile, 21 m, spear, coll. by J. Randall, 3 Feb. 1969.

Paratypes. 5 specimens, 47.9–125.6 mm SL. BPBM 6774, 125.6 mm SL, boat channel at Hanga Piko, Easter Island, Chile, 2 m, J. Randall, 18 Jan. 1969; BPBM 6776, 47.9 mm SL, offshore of Ahu Akapu, Easter Island, Chile, 24 m, J. Randall and G. Allen, 5 Feb. 1969; CAS 24810, 2 specimens, 59.8–109.7 mm SL, off south end of Hanga Roa, Easter Island, Chile, J. Randall and G. Allen, 10 Feb. 1969; CAS 24811, 75.5 mm SL, wreck c. 20 m offshore between Hanga Roa and Hanga Piko, Easter Island, Chile, 3–4.6 m, J. Randall and G. Allen, 27 Jan. 1969.

Non-type specimens. BPBM 39229, 218.8 mm SL, off Ahu Tahai, Easter Island, Chile, 18 m, J. Randall and A. Egaña, 15 Feb. 1985.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9; pectoral-fin rays 17; scale rows in longitudinal series 50–59; pored lateral-line scales 23–25; scale rows above lateral line 6–10, below 16–19, between 6th dorsal-fin spine base and lateral line 8 or 9, between last dorsal-fin spine base and lateral line 8 or 9; pre-dorsal scale rows 4–6; gill rakers 17–20; exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine with 1 or 2 additional spinous points; posterior lacrimal spine simple or with 1 or 2 additional spinous points; lateral lacrimal spine present, with 2 or 3 spinous points; anterodorsal lacrimal and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge present; largest recorded specimen 246.8 mm SL.

Distribution. *Scorpaena orgila* is currently known only from Easter Island, Chile, in depths of 0–55 m (Figs. 32, 34b).

Remarks. *Scorpaena orgila*, described by Eschmeyer and Allen (1971) on the basis of specimens collected from Easter Island, southeastern Pacific, has not been further collected since its original description. In the original description, Eschmeyer and Allen (1971) noted that the species was most similar to eastern Pacific species of *Scorpaena*. Comparisons of the type specimens of *S. orgila* with all type and non-type specimens of all Indo-Pacific species of *Scorpaena* showed that the species is most similar to the Australasian species *S. cardinalis* and *S. jacksoniensis*.

***Scorpaena papillosa papillosa* (Schneider and Forster 1801)**

(Standard English name: Red Scorpionfish)

(Figs. 16–18, 33, 34, 38, 42b, 43b; Tables 1, 5–7, 11)

Synanceia papillosus Schneider and Forster *in* Bloch and Schneider 1801: 196 (based on G. Forster drawing labelled "*Scorpaena cottoides*"; original locality: New Zealand; type locality: New Zealand, based on neotype); regarded as type subspecies of *S. papillosa* by Wibowo and Motomura (2020)].

Scorpaena cruenta Solander *in* Richardson 1842a: 217 (type locality: Cape Kidnappers, New Zealand).

Neotype. NMNZ P.028043, 164.6 mm SL, Matatuahu Point, Tawharanui Peninsula, Hauraki Gulf, North Auckland, North Island, 36º23′S, 174º49′E, 0–5 m, A. Stewart and C. Paulin, 8 Apr. 1992.

Non-type specimens. 93 specimens, 18.4–208.4 mm SL. All specimens from New Zealand. **Three Kings Islands:** NMNZ P.014922, 1 of 5 specimens, 139.4 mm SL, west coast of Great Island, 34°08′30″S, 172°09′06″E, 5–7 m, G. Hardy and A. Stewart, 28 Nov. 1983;

NMNZ P.014910, 5, 80.2–175.4 mm SL, northwest of South West Island, 34°10′12″S, 172°04′09″E, 9–12 m, G. Hardy and A. Stewart, 26 Nov. 1983; NMNZ P.014934, 1 of 2, 115.9 mm SL, northeast of Great Island, 34°09′00″S, 172°09′30″E, 12–15 m, G. Hardy and A. Stewart, 25 Nov. 1983. **North Island:** AMS I. 18282-010, 4 of 5, 73.2–114.2 mm SL, Goat Island, B. Russell; BMNH 1872.4.26.3, 159.0 mm SL, off Wellington; CAS 13449, 3, 18.2–56.2 mm SL, off Lottin Point, J. Moreland; CAS 13450, 6, 26.7–76.0 mm SL, Bay of Islands, J. Moreland, 1–28 Feb. 1919; NMNZ P.001062, 191.7 mm SL, Wellington Harbour, 41°30′S, 174°50′E, J. Toft, 9 June 1952; NMNZ P.002696, 183.9 mm SL, off Island Bay, Wellington, 41º21′S, 174º46′E, 27–28 m, line-fishing, D. Wilson and J. Moreland, 19 Jan. 1959; NMNZ P.003413, 58.7 mm SL, Spirits Bay, Northland, 34º27′S, 172º 50′E, 3–4 m, R. Dell and J. Moreland, 14 Nov. 1963; NMNZ P.008042, 1 of 3, 81.3 mm SL, Wahine Wreckage, off Barretts Reef, Wellington Harbour, 41º21′S, 174º50′E, 7–12 m, F. Climo, 17 Sep. 1973; NMNZ P.009810, 1 of 3, 40.6 mm SL, Ranfurly Bank, East Cape, Gisborne, 37°38′24″S, 178°51′42″E, 79–83 m, dredge, RV *Tangaroa*, 22 Jan. 1981; NMNZ P.014104, 4, 128.9–177.7 mm SL, Scorching Bay, Wellington, 41º18′S, 174º50′E, 5 m, G. Hardy and A. Stewart, 14 June 1983; NMNZ P.017112, 190.2 mm SL, Seal Rock, Sugar Loaf Islands, New Plymouth, 39°03′30″S, 174°00′12″E, 23 m, D. Gibson, 23 Mar. 1985; NMNZ P.018263, 1 of 10, 89.7 mm SL, Tauranga Bay, Mayor Island, Bay of Plenty, 37°18′24″S, 176°15′48″E, 12 m, A. Stewart and C. Roberts, 18 Feb. 1986; NMNZ P.021674, 1 of 29, 80.4 mm SL, pools between Jackson and Fantail Bays, Coromandel, 36º32′S, 175º20′E, 0–3 m, G. Hardy et al., 8 Dec. 1987; NMNZ P.026291, 4 of 29, 108.5–161.2 mm SL, Mangakino Channel, Pourerere, Hawke's Bay, 40°08′12″S, 176°52′00″E, 0–2 m, 17 Jan. 1991; NMNZ P.026325, 1 of 9, 134.1 mm SL, east coast of Mangakuri, Hawke's Bay, 39°56′30″S, 176°56′12″E, 0–2 m, 20 Jan. 1991; NMNZ P.028313, 65.5 mm SL, Onepoto Bay, Hicks Bay, East Cape, Gisborne, 37°35′30″S, 178°18′15″E, 0–1 m, East Cape Field Trip Team, 3 May 1992; NMNZ P.031644,

92.5 mm SL, off East Cape, Gisborne, 38°16′17″S, 178°45′16″E, 140 m, 7 Jan. 1995; NMNZ P.033382, 117.9 mm SL, off Cape Runaway, Gisborne, 37°32′57″S, 178°00′59″E, 100 m, C. Paulin et al., 3 May 1996; NMNZ P.044459, 24.8 mm SL, west coast of Paratutae Island, Whatipu, North Auckland, 37°02′47.5″S, 174°30′32.1″E, 0–1 m, C. Struthers et al., 8 Apr. 2008; NMNZ P.044467, 82.3 mm SL, Daniel Bay, Cornwallis Peninsula, North Auckland, 37°01′02.4″S, 174°36′01.2″E, 6–7 m, C. Struthers and T. Trnski on RV *Tuatini*, 9 Apr. 2008; NMNZ P.045788, 1 of 7, 124.8 mm SL, between Oruaiti Beach and Waihau Bay, East Cape, Gisborne, 37°37′00″S, 177°55′15″E, G. Hardy and M. Hardy, 22 Dec. 1982; NMNZ P.046117, 58.6 mm SL, Piha Beach, North Auckland, 36°57′39.3″S, 174°27′44.5″E, 0–2 m, C. Struthers and T. Trnski, 11 Apr. 2008; NMNZ P.046289, 75.7 mm SL, east coast of North Cape, North Auckland, 34°23′48.6″–24′05.4″S, 173°06′07.2″–06′21.6″E, 116–119 m, epibenthic sled, Oceans 20/20-RV *Tangaroa*, 14 July 2009; NMNZ P.046317, 63.5 mm SL, east of Elizabeth Reef, Whananaki, Bay of Islands, North Auckland, 35°30′00.6″–29′43.8″S, 174°32′29.4″E–32′21.6″E, 64–66 m, epibenthic sled, Oceans 20/20-RV *Tangaroa*, 4 July 2009; NMNZ P.013251, 1 of 2, 68.1 mm SL, Henderson Bay, North Auckland, 34°46′S, 173°08′E, G. Hardy and M. Hardy, 30 Dec. 1982; NMNZ P.018380, 1 of 3, 64.7 mm SL, Motupao Island, Northland, 34°28′30″S, 172°38′00″E, 0–4 m, G. Hardy and E. Nannestad, 9 Feb. 1986; NMNZ P.026362, 1 of 4, 129.8 mm SL, Pauanui Point Reef, Hawke's Bay, 40°04′24″S, 176°53′48″E, 7–10 m, 16 Jan. 1991; NMNZ P.028119, 1of 28, 131.3 mm SL, Onepoto Bay, Hicks Bay, East Cape, Gisborne, 37°35′15″S, 178°18′00″E, 0–3 m, East Cape Field Trip Team, 4 May 1992; NMNZ P.028374, 1 of 16, 46.1 mm SL, north of Tokomaru Bay, Gisborne, 38°06′54″S, 178°20′24″E, 0–1 m, East Cape Field Trip Team, 5 May 1992; NMNZ P.029866, 1 of 15, 75.9 mm SL, between Te Araroa and Horoera, East Cape, Gisborne, 37°37′36″S, 178°25′00″E, 0–3 m, East Cape Field Trip Team, 24 Jan. 1993; NMNZ P.031645, 1 of 2, 153.9 mm SL, off East Cape, Gisborne, 38°25′49″S, 178°23′32″E,

28 m, B. Lee, 10 Jan. 1995; USNM 177058, 141.2 mm SL, off Auckland, J. Howard, 6 Jan. 1953; USNM 339211, 2, 102.9–110.4 mm SL, off Cape Rodney, 36°17′S, 174°49′E, 4–5 m, T. Willis et al., 12 Nov. 1994; USNM 339350, 3, 62.8–113.1 mm SL, off Cape Rodney, 36°17′S, 174°49′E, 3–5 m, T. Willis and R. Taylor, 3 Nov. 1994; USNM 422095, 96.4 mm SL, Bay of Plenty, J. Moreland, 17 Mar. 1965. **South Island:** BMNH 1886.11.18.16, 160.1 mm SL, off Otago; NMNZ P.010581, 119.1 mm SL, off north Otago, 45º15′S, 171º00′E, 51–52 m, J. Graham, Aug. 1963; NMNZ P.019813, 171.4 mm SL, Balleny Reef, Fiordland, Southland, 46°06′54″S, 166°34′00″E, 12–18 m, 10 May 1986; NMNZ P.030265, 208.4 mm SL, Acheron Passage, Fiordland, Southland, 45°39′53″S, 166°44′47″E, 0–10 m, Fiordland Field Trip Team, 21 Mar. 1993; NMNZ P.030425, 175.4 mm SL, south of Cunaris Sound, Chalky Inlet, Fiordland, Southland, 45°58′09″S, 166°42′32″E, 2–31 m, Fiordland Field Trip Team, 24 Mar. 1993; NMNZ P.030927, 112.4 mm SL, Nelson Cable Bay, Nelson, 41°09′30″S, 173°24′30″E, 2–8 m, Cape Campbell Field Trip Team, 18 Nov. 1993; NMNZ P.035979, 196.1 mm SL, Open Bay Island, Popotai Islet, Westland, 43°51′49″S, 168°52′29″E, 14–19 m, MoNZ Jackson-Haast Field Trip Team, 14 Feb. 1999; NMNZ P.035999, 186.9 mm SL, Jackson's Bay, Westland, 43°57′38″S, 168°37′28″E, 8–12 m, MoNZ Jackson-Haast Field Trip Team, 9 Feb. 1999; NMNZ P.042853, 192.8 mm SL, Flowerpot Rock, Jackson's Bay, Westland, 43°57′52″S, 168°37′21″E, 0–3 m, MoNZ Jackson-Haast Field Trip Team, 9 Feb. 1999; NMNZ P.047824, 165.8 mm SL, southeastern of Kaikoura Peninsula, Canterbury, 42°26′26.3″S, 173°42′58.4″E, 48 m, fish trap, MoNZ/MARS Kaikoura Field Trip Team, 18 Nov. 2010; NMNZ P.021221, 1 of 2, 107.9 mm SL, Lighthouse Point, Kaikoura, Marlborough, 42°25′30″S, 173°42′54″E, 6–10 m, G. Hardy and D. Gibson, 23 Feb. 1987; NMNZ P.030239, 2, 79.2–80.2 mm SL, Pickersgill, Dusky Sound, Fiordland, Southland, 45°47′47″S, 166°35′06″E, 2–18 m, Fiordland Field Trip Team, 27 Mar. 1993; NMNZ P.036267, 1 of 9, 145.2 mm SL, north side of Smoothwater Bay, Westland, 43°57′59″S,

168°35′28″E, 2–3 m, MoNZ Jackson-Haast Field Trip Team, 8 Feb. 1999; NMNZ P.036451, 1 of 10, 151.0 mm SL, off Homminy Cove, 43°58′28″S, 168°34′14″E, 0–3 m, MoNZ Jackson-Haast Field Trip Team, 11 Feb. 1999; NMNZ P.036576, 2, 19.0–24.4 mm SL, Mock-Maker Reef, Jackson's Bay, 43°58′53″S, 168°37′16″E, 0–3 m, MoNZ Haast-Buller Field Trip Team, 14 Feb. 1999; NMNZ P.037390, 1 of 2, 148.8 mm SL, Black Reef, off Westport, 41°43′29.0″S, 171°28′11.4″E, 0–3 m, MoNZ Haast-Buller Field Trip Team, 24 Feb. 2000; USNM 039664, 144.1 mm SL, precise locality unknown, Otago Univ. Museum, 1888. **Stewart Island:** NMNZ P.027582, 157.6 mm SL, Harrold's Bay, Halfmoon Bay, 46°53′45″S, 168°09′15″E, 2–5 m, Stewart Island Field Trip Team, 4 Mar. 1992; NMNZ P.027759, 142.0 mm SL, Port Pegasus, 47°10′12″S, 167°41′06″E, 13–18 m, Stewart Island Field Trip Team, 11 Mar. 1992. **Snares Islands:** NMNZ P.006828, 117.0 mm SL, Hoho Bay, Snares Island, 48º01′S, 166º35′E, 40 m, D. Horning, 9 Dec. 1974; NMNZ P.016331, 1 of 3, 182.8 mm SL, Hoho Bay, Snares Island, 48°01′30″S, 166°36′42″E, 9 m, line-fishing, G. Scrimgeour et al., 30 Nov. 1984; NMNZ P.016333, 2, 160.3–167.3 mm SL, west coast of Snares Island, 48°03′30″S, 166°29′00″E, 140 m, craypot, FV Savannah, 1 Dec. 1984; NMNZ P.016334, 3 of 6, 118.7–174.2 mm SL, Hoho Bay, Snares Island, 48°01′30″S, 166°36′42″E, 6 m, G. Hardy and A. Stewart, 1 Dec. 1984. **Auckland Islands:** NMNZ P.031135, 125.6 mm SL, Campbell Plateau, 48°46′35.4″–45′18.0″S, 167°19′27.6″–23′34.8″E, 135–145 m, bottom trawl, RV *Tangaroa*, 3 Mar. 1994. **Chatham Islands:** NMNZ P.026583, 163.6 mm SL, Heaphy Shoal, Chatham Island, 43°58′12″S, 176°36′36″W, 14–15 m, craypot, A. Stewart, 9 Feb. 1991; NMNZ P.026755, 1 of 2, 49.3 mm SL, Te Raki Bay, Chatham Island, 43°48′36″S, 176°53′00″W, 8–10 m, A. Stewart, 11 Feb. 1991.

Diagnosis. A subspecies of *Scorpaena* with the following combination of characters (all morphometrics based on specimens less than 70 mm SL): dorsal-fin soft rays 10 (rarely 9 or 11); pectoral-fin rays 15–17 (mode 16); scale rows in longitudinal series 42–48 (44 or 45);

pored lateral-line scales 23 or 24; scale rows above lateral line 6–8 (7), below 13–18 (14), between 6th dorsal-fin spine base and lateral line 6–8 (7), between last dorsal-fin spine base and lateral line 6–8 (7); pre-dorsal scale rows 2–7 (4); gill rakers 13–19 (16); exposed (sometimes embedded) scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine simple or with 1–3 (rarely 3) additional spinous points; posterior lacrimal spine simple; lateral lacrimal spine present, with a single spinous point; anterodorsal lacrimal and coronal spines present; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge present; body depth 30.4–37.2% of SL; upper jaw length 16.8–20.4% of SL; maxilla depth 4.8–6.3% of SL; postorbital length 17.8–20.3% of SL; least distance between interorbital ridges 0.8–1.8% of SL; 1st anal-fin spine length 8.9–12.7% of SL; largest recorded specimen 208.4 mm SL.

Distribution. Distributed throughout New Zealand waters, from the Three Kings Islands (34°S) to the Campbell Plateau and Auckland Islands (48°S). Specimens examined in this study had been collected from shallow rocky reef to deep water habitats at depths between 0–151 m, most commonly in depths less than 25 m (Figs. 33, 34b).

Remarks. *Scorpaena papillosa* Schneider and Forster *in* Bloch and Schneider (1801) was originally described as *Synanceia papillosus* on the basis of a G. Forster sketch (Fig. 17) labelled as "*Scorpaena cottoides* (nomen nudum)" from New Zealand. However, Richardson (1842b, 1843) and Lichtenstein (1844) treated "*S. cottoides*" as a valid species, giving it senior synonymy over *S. papillosus*. Subsequently, McCulloch (1929) regarded *S. papillosus* as a valid species of the genus *Helicolenus* Goode and Bean, 1896, but Paulin (1982) returned it to *Scorpaena*, being followed by many authors (e.g., Kuiter 1993, 1997; Motomura et al. 2005a, b; Allen et al. 2006; Fricke et al. 2018).

The following three nominal species of *Scorpaena* currently synonymized with *S. papillosa* were described in the same year, viz., *S. cruenta* Solander *in* Richardson 1842a, *S. ergastulorum* Richardson 1842a, and *S. militaris* Richardson 1842b. The first-mentioned was originally described from Cape Kidnappers, New Zealand (no type specimens known), whereas *S. ergastulorum* and *S. militaris* (based on a holotype and two syntypes, respectively, present whereabouts unknown) were described from Port Arthur, Tasmania, Australia. Since their original description, the taxonomic status of the three nominal species has been dynamic. Richardson (1845) considered them as a single species, selecting *S. militaris* as a senior synonym of *S. cruenta* and *S. ergastulorum*, whereas Gunther (1860), also regarding the three nominal species as conspecific, placed *S. ergastulorum* and *S. militaris* as junior synonyms of *S. cruenta*. Similarly, McCulloch (1929) recognized the three nominal species as a single species, but selected *S. ergastulorum* as a senior synonym of the others. On the other hand, Whitley (1968) regarded *S. cruenta* and *S. militaris* as junior synonyms of *Ruboralga cardinalis* (Solander and Richardson *in* Richardson 1842a). Currently, *S. cruenta*, *S. ergastulorum* and *S. militaris* are regarded as junior synonyms of *Scorpaena papillosa* by many authors (e.g., Paulin 1982; Allen and Cross 1989; Allen et al. 2006; Fricke et al. 2018). In addition, *Ruboralga* Whitley 1968 is now considered as a junior synonym of *Scorpaena* (see Motomura et al. 2011b). *Ruboralga cardinalis*, reported by Graham (1974: 349, unnumbered fig.) from Otago Harbour, New Zealand, is reidentified here as *S. papillosa*.

In addition, Fricke (2018) also regarded "*Scorpaena miles* Richardson 1842a: 18" as an available name, and included it as a junior synonym of *S. papillosa*. However, Richardson's (1842a) publication did not include "*S. miles*" as a new species, that name appearing in Richardson (1843 [dated 1842]: 18) as "*The following members of the cottoid family frequent the coasts of New Holland: Scorpaena miles (Zool. Tr. 3.); Sc. jacksoniana (Quoy et Gaim.); Sc. burra (Annals, ix. p. 215);...*", [*S. miles* published in Zool. Tr. 3.]. This was most likely a

reference to the original description of *S. militaris*, "*miles*" being an error for "*militaris*" and having no taxonomic significance.

Although examination of available type specimens and original descriptions of all nominal species of Indo-Pacific species of *Scorpaena* currently regarded as valid confirmed *S. papillosa* as a senior synonym of *S. cruenta*, *S. ergastulorum*, and *S. militaris*, examination of numerous non-type specimens regarded as *S. papillosa* from throughout its distributional range revealed intraspecific geographic variations in several meristic characters between the southeastern Australian and New Zealand populations. *Scorpaena ergastulorum*, the oldest name of nominal species from southeastern Australia, is therefore regarded as a valid subspecies of *S. papillosa*, distinct from the New Zealand nominotypical subspecies of *S. papillosa*. [See Comparisons for detailed distinguishing characters between the two subspecies.]

No type specimen of *Synanceia papillosa* is known. Moreover, the specimen on which G. Forster's sketch was based is also unknown. Accordingly, for nomenclatural stability and to avoid future confusion, NMNZ P.028043 (164.6 mm SL; Fig. 16b), collected from Matatuahu Point, Tawharanui Peninsula, Hauraki Gulf, North Auckland, New Zealand is designated as the neotype of *Synanceia papillosus*.

***Scorpaena papillosa ergastulorum* Richardson 1842a**

[Standard English name: Southern Red Scorpionfish]

(Figs. 18, 19, 33, 34, 38; Tables 1, 5–7, 11)

Scorpaena ergastulorum Richardson 1842a: 217 (type locality: Port Arthur, Tasmania, Australia); regarded as valid subspecies of *S. papillosa* by Wibowo and Motomura (2020).

Scorpaena militaris Richardson 1842b: 90 (type locality: Port Arthur, Tasmania, Australia).

Non-type specimens. 85 specimens, 24.5–148.7 mm SL. **New South Wales:** AMS I. 6747, 78.3 mm SL, Port Jackson, 33°51′S, 151°16′E, 10 July 1886; AMS I. 16849-024, 2, 81.1–99.1 mm SL, Murrays Head, Jervis Bay, 35°08′S, 150°45′E, 2–9 m, D. Pollard et al., 30 Oct. 1971; AMS I. 16851-034, 47.0 mm SL, southwest of Bowen Island, Jervis Bay, 35°07′S, 150°46′E, D. Pollard and P. Straw, 2 May 1972; AMS I. 16898-001, 1 of 5, 92.7 mm SL, off Darling Road, Jervis Bay, 35°03′S, 150°44′E, 18–20 m, D. Pollard, 22 Sep. 1971; AMS I. 19258-001, 85.8 mm SL, off Sydney, 34°00′S, 151°14′E, R. Kuiter, 3 Oct. 1976; AMS I. 21774-037, 57.8 mm SL, south of Batemans Bay, 35°47′S, 150°13′E, 0–1 m, D. Hoese et al., 21 Feb. 1976; AMS I. 25280-002, 8, 91.9–130.2 mm SL, off Green Cape, 37°16′48″S, 150°04′48″E, 84–95 m, bottom trawl, FRV *Kapala*, 22 Nov. 1984; AMS I. 28556-002, 3, 59.2–63.6 mm SL, Jervis Bay and Murrays Beach, 35°03′00″S, 150°43′48″E, bottom trawl, M. Lincoln-Smith, May 1988; AMS I. 28732-007, 5 of 7, 26.7–90.5 mm SL, Bittangabee Bay, 37°13′12″S, 150°01′06″E, 1.5 m, AMS Party, 6 Apr. 1989; AMS I. 28738-002, 10, 24.5–102.5 mm SL, Bittangabee Bay, 37°13′S, 150°00′E, 0–4 m, AMS Party, 8 Apr. 1989; AMS I. 30425-002, 108.4 mm SL, northeast of Tathra, 36°37–40′S, 150°09–10′E, 108–111 m, FRV *Kapala*, 23 Nov. 1984; AMS I. 34520-001, 2, 96.6–128.4 mm SL, off Green Cape, 37°19–22′S, 150°17–18′E, 137–141 m, FRV *Kapala*, 14 Mar. 1993; AMS I. 45027-036, 1 of 5, 76.0 mm SL, AMS I. 45027-037, 3 of 5, 28.8–69.1 mm SL, Mollymook, Jones Beach, 35°19′19″S, 150°29′00″E, 0–4 m, M. McGrouther, 11 Mar. 2010; AMS I. 45133-003, 2, 56.9–68.5 mm SL, Sydney Harbour, 33°50′52.8″S, 151°17′06.0″E, Macquarie University Fish Class, 23 Sep. 1972; CSIRO A 826, 82.6 mm SL, Eden, 37°05′S, 149°55′E, 23 May 1950; CSIRO CA 602, 52.8 mm SL, Botany Bay, Oct. 1977; CSIRO H 3537-02, 2, 79.6–102.7 mm SL, south of Disaster Bay, 37°22–24′S, 149°58′E, 42–44 m, A. Graham, FRV *Southern Surveyor*, 13 Aug. 1993; CSIRO H 4251-04, 2, 80.4–85.9 mm SL, precise locality unknown;

KAUM–I. 47217, 86.3 mm SL, KAUM–I. 47218, 81.2 mm SL, KAUM–I. 47219, 74.7 mm SL, Kianinny Boat Ramp, Tathra, 36°44′15″S, 149°58′59″E, 0.5–4.5 m, AMS Party, 9 Apr. 2008. **Victoria:** AMS I. 19248-007, 109.9 mm SL, Port Phillip, 38°19′S, 144°43′E, 5 m, S. Parish and R. Kuiter, 16 June 1976. **Tasmania:** AMS IA. 4107, 81.2 mm SL, AMS IA. 4108, 66.3 mm SL, d'Entrecasteaux Channel, 43°15′S, 147°16′E, 9 m, M. Ward, Oct. 1929; AMS I. 9260, 119.7 mm SL, Port Arthur, 43°09′S, 147°51′E, C. Hedley, 1908; AMS I. 14197, 66.9 mm SL, Wedge Bay, Hobart, 43°07′S, 147°41′E, 9–18 m, C. Hedley, 13 Apr. 1917; AMS I. 17193-009, 1 of 4, 81.0 mm SL, Wedge Bay, off Maydeena, 43°07′S, 147°40′E, 7 m, T. Garrard, May 1966; AMS I. 17550-011, 5, 46.7–141.3 mm SL, north of Port Arthur, 43°00′S, 147°46′E, 0–2 m, D. Hoese and W. Ivanstoff, 2 Dec. 1972; AMS I. 17551-012, 1 of 5, 115.5 mm SL, Port Arthur, 43°09′S, 147°51′E, 1 m, D. Hoese and W. Ivanstoff, 2 Dec. 1972; AMS I. 17554-010, 2, 56.9–57.3 mm SL, south of Boat Harbour, Bicheno, 41°53′S, 148°18′E, 1 m, D. Hoese and W. Ivanstoff, 5 Dec. 1972; AMS I. 17576-009, 116.3 mm SL, the Gardens, north of Binalong Bay, 1 m, D. Hoese and W. Ivanstoff, 6 Dec. 1972; AMS I. 17905-001, 107.0 mm SL, off Erith Island, 39°27′S, 147°18′E, 5 m, N. Coleman, 10 May 1974; BMNH 1875.11.12.26, 148.7 mm SL, precise locality unknown; BMNH 2004.8.2.1, 116.6 mm SL, Port Arthur; CSIRO B 1531, 4, 72.8–82.9 mm SL, east of Cape Barren Island, 40°19′S, 148°41′E, 60 m, 12 Nov. 1978; CSIRO H 678-1, 72.2 mm SL, off Rocky Cape, 46 m, 16 Oct. 1986; CSIRO T 1071, 147.2 mm SL, off Fossil Island, 43°02′S, 147°57′E, M. McGeary 14 Sep. 1980; CSIRO T 1115, 66.5 mm SL, Frederick Henry Bay, S. Bell; CSIRO T 1281, 2, 72.8–77.0 mm SL, northeast coast of Flinders Island, R. Green, 24 Apr. 1980; CSIRO T 1402-02, 132.8 mm SL, southern Tasmania, K. Harris, 2 Feb. 1980; CSIRO T 1705, 3, 65.0–90.5 mm SL, Point Home Lookout, Mercury Passage, 42°33′S, 147°57′E, B. Hutchins, 19 Feb. 1982; CSIRO T 2001-01, 61.7 mm SL, Waterhouse Point, Dusky Reef, 40°49′S, 147°11′E, 3 m, P. Last, 6 Jan. 1974.

Diagnosis. A subspecies of *Scorpaena* with the following combination of characters (all morphometrics based on specimens less than 70 mm SL): dorsal-fin soft rays 10 (rarely 9 or 11); pectoral-fin rays 15–17 (mode 16); scale rows in longitudinal series 41–47 (44 or 45); pored lateral-line scales 22–24 (23); scale rows above lateral line 4–7 (6), below 10–14 (12), between 6th dorsal-fin spine base and lateral line 5–7 (6), between last dorsal-fin spine base and lateral line 4–7 (5); pre-dorsal scale rows 1–4 (2); gill rakers 14–17 (16); exposed (sometimes embedded) scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine simple or with 1–3 (rarely 3) additional spinous points; posterior lacrimal spine simple; lateral lacrimal spine present, with a single spinous point; anterodorsal lacrimal and coronal spines present; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge present; body depth 29.0–37.6% of SL; upper jaw length 16.8–20.0% of SL; maxilla depth 4.4–6.1% of SL; postorbital length 17.0–20.2% of SL; least distance between interorbital ridges 0.8–1.7% of SL; 1st anal-fin spine length 9.3–11.8% of SL; largest recorded specimen 148.7 mm SL.

Distribution. Distributed off southeastern Australia, from Port Jackson, New South Wales (33°S) to the south coast of Tasmania (43°S) (based on specimens examined in this study; Fig. 33). The westernmost specimen-based record of the subspecies (NMV A 11578) is Port Lincoln, Spencer Gulf, South Australia (34°44′25″S, 135°53′04″E) (M. Gomon, pers. comm.). Specimens examined in this study had been collected from shallow rocky reef to deep water habitats at depths between 0–141 m (most commonly in depths less than 25 m) (Fig. 34b).

Remarks. *Scorpaena ergastulorum* was regarded as a valid subspecies of *S. papillosa* and a senior synonym of *S. militaris* by Wibowo and Motomura (2020), following examination of a large number of specimens.

***Scorpaena pepo* Motomura, Poss, and Shao 2007**

[Standard English name: Pumpkin Scorpionfish; standard Japanese name: Kabocha-fusakasago]

(Figs. 20, 30, 34; Table 1)

Scorpaena pepo Motomura, Poss, and Shao 2007: 36, figs. 1, 2a (type locality: northeastern coast of Taiwan).

Holotype. ASIZP 65020, 244.3 mm SL, northeastern coast of Taiwan, hook and line fishing, ca. 200 m depth; H. Motomura (purchased at Taipei Fish Market), 19 May 2005.

Paratypes. 3 specimens. AMS I. 43631-001, 223.1 mm SL, same data as for holotype except date, 18 May 2005; ASIZP 65021, 245.1 mm SL, same data as holotype; NTUM 4555, male, 172.9 mm SL, Nanfangao, Ilan, NE Taiwan, 25 Dec. 1981.

Non-type specimens. 3 specimens, 222.4–238.0 mm SL, as listed in Motomura et al. (2009). Fourteen additional specimens (106.6–239.0 mm SL): KAUM–I. 9927, 192.7 mm SL, north of Taipei, Taiwan, H. Motomura and M. Meguro (purchased at fish market in Keelung), 28 May 2008; KAUM–I. 9936, 106.6 mm SL, Da-xi, Yilan county, northeastern Taiwan, 24°59′N, 122°06′E, 400 m, bottom trawl, H. Motomura and H. Ho, 29 May 2008; KAUM–I. 13246, 239.0 mm SL, off Matsugaura, Chiran, Kagoshima, Japan, 31°22′N, 130°39′E, 110–130 m, line-fishing, M. Meguro, 6 Jan. 2009; KAUM–I. 16276, 222.8 mm SL, off Nomaike, Minamisatsuma, Kagoshima, Japan, KAUM Fish Team [purchased at Kagoshima City Central Market (KCCM)], 17 Mar. 2009; KAUM–I. 17643, 228.0 mm SL, off Yamagawa, Ibusuki, Kagoshima, Japan, KAUM Fish Team (purchased at KCCM), 25 Mar. 2009; KAUM–I. 17777, 128.1 mm SL, Nan-fang-ao, Yilan county, Taiwan, trawl, H.-C. Ho, 22 Feb. 2009; KAUM–I. 24812, 186.8 mm SL, off Nishiumi, Ainan, Ehime, Japan, 32°55′N, 132°32′E, 50 m, line-fishing, S. Nakata, 17 Aug. 2009; KAUM–I. 27667, 232.8 mm SL, off

Osumi Islands, Kagoshima, Japan, purchased at KCCM, 19 Mar. 2010; KAUM–I. 33952, 219.0 mm SL, probably off Kyushu Island, Kagoshima, Japan, 18 Dec. 2010; KAUM–I. 54213, 233.1 mm SL, off Akuseki-jima Island, Tokara Islands, Japan, 29°27′N, 129°36′E, ca. 100 m, line-fishing, M. Matsunuma (purchased at KCCM), 1 May 2013; KAUM–I. 54481, 208.6 mm SL, off Takara-jima Island, Tokara Islands, Kagoshima, Japan, 29°08′N, 129°12′E, ca. 100 m, line-fishing, M. Matsunuma (purchased at KCCM), 18 May 2013; KAUM–I. 55848, 216.4 mm SL, KAUM–I. 55849, 178.5 mm SL, off Tanega-shima to Yaku-shima Islands, Japan, ca. 100 m, line-fishing, Y. Sakurai and M. Meguro (purchased at KCCM), 31 July 2013; KAUM–I. 97926, 210.0 mm SL, north of Kuchino-shima Island, Tokara Islands, Kagoshima, Japan, 30°01′N, 130°11′E, ca. 100 m, line-fishing, H. Hata and K. Kawama (purchased at KCCM), 17 Feb. 2017.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9 (rarely 10); pectoral-fin rays 16 (rarely 17); scale rows in longitudinal series 45–48; pored lateral-line scales 22 or 23; scale rows above lateral line 4–7 (mode 5 or 6), below 14–17 (16 or 17), between 6th dorsal-fin spine base and lateral line 7–9 (8), between last dorsal-fin spine base and lateral line 7–9 (7 or 8); pre-dorsal scale rows 4–7; gill rakers 14–16 (15); embedded scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior and posterior lacrimal spines simple; lateral lacrimal spine present, with a single spinous point; anterodorsal lacrimal and coronal spines absent; lateral surface of maxilla without a longitudinal ridge; postorbital spine usually present; median interorbital ridge present, its highest part higher than interorbital ridges, ending behind posterior end of preocular or supraocular spine bases; posterior margin of maxilla just reaching or extending well beyond vertical through posterior margin of orbit; lateral line sloping steeply downward above anterior half of pectoral fin; body relatively deep (depth 36.4–42.6% of SL); numerous

small distinct black spots usually scattered over head, body and fins; largest recorded specimen 245.1 mm SL.

Distribution. *Scorpaena pepo* was previously known from the type locality, Taiwan, and Kagoshima and Wakayama prefectures, Japan (Motomura et al. 2007, 2009; Nakabo and Kai 2013), from depths of 100–200 m. The additional specimens examined in this study, from Japan (Kagoshima, Miyazaki, and Ehime), were collected in depths of 50–400 m, representing a distributional range extension, and the shallowest and deepest recorded habitats for the species (Figs. 30, 34b).

Remarks. In the original description of *Scorpaena pepo*, based on seven specimens collected from Taiwan, Motomura et al. (2007) included two characters (length of the median interorbital spine and presence of a postorbital spine) as diagnostic characters, although noting that examination of more specimens was needed for character confirmation. Examination of 14 additional specimens of *S. pepo* in this study confirmed the validity of both, the median interorbital ridge of all of the additional specimens ending behind the posterior end of the preocular (7 specimens) or supraocular (7 specimens) spine bases, as noted by Motomura et al. (2007). Although the postorbital spine in specimens of *S. pepo* examined here was shorter than the sphenotic spine (longer in specimens examined by Motomura et al. 2007), the former was usually present (9 of 14 specimens examined).

***Scorpaena regina* Wibowo, Johnson, and Motomura 2019**

[Standard English name: Eastern Queen Scorpionfish]

(Figs. 21, 29, 31, 34, 35, 39; Tables 1, 8, 10, 11)

Scorpaena regina Wibowo, Johnson, and Motomura 2019: 297, figs. 1, 3 (type locality: Tangalooma Wrecks, Moreton Bay, Queensland, Australia).

Holotype. QM I. 37447, holotype of *Scorpaena regina*, 63.4 mm SL, Tangalooma Wrecks, Moreton Bay, Queensland, 27°10′S 153°22′E, 3–9 m, coll. by J. Johnson, 6 June 1994.

Paratypes. 58 specimens, 22.5–64.5 mm SL, all from the east coast of Queensland (Qld), Australia. AMS I. 34323-001, 42.0 mm SL, northwest of Quoin Island, 22°33′42.0″S, 150°47′40.8″E, AMS Party; AMS I. 34324-026, 28.4 mm SL, off Dome Island, 3 m, AMS Party; AMS I. 34326-013, 35.2 mm SL, south of Quoin Island, 22°34′01.2″S, 150°47′52.2″E, AMS Party; AMS IA. 3841 (2 specimens), 22.5–32.8 mm SL, off Whitsunday Passage, 20°18′S, 149°54″E, M. Ward; CSIRO H 7372-01, 33.5 mm SL, east of Great Keppel Island, 23°16′S, 151°09″E, 25 m, D. Gledhill, FRV *Gwendoline May*, 24 Apr. 2004; KAUM–I. 132015, 63.5 mm SL, KAUM–I. 132016, 53.8 mm SL, KAUM–I. 132017, 45.5 mm SL, KAUM–I. 132018, 41.3 mm SL, Curtin Artificial Reef, Moreton Bay, 27°07′S, 153°21′E, 21 m, J. Johnson, 5 Apr. 1995; QM I. 21339, 49.4 mm SL, southeast of Lady Elliot Island, 46–55 m, trawl, G. Lowe, 9 Mar. 1982; QM I. 23083, 48.9 mm SL, off Swain Reefs, 21°13.8′S, 150°43.1′E, 47 m, trawl, Queensland Fisheries Service, 16 Sept. 1986; QM I. 29123, 47.7 mm SL, off Whaling Jetty, Tangalooma, Moreton Bay, 27°11′S, 153°22′E, 15 m, J. Johnson and J. Short, 28 Apr. 1994; QM I. 29155 (4), 26.4–55.7 mm SL, Tangalooma Wrecks, Moreton Bay, 27°10′S, 153°22′E, 3–6 m, J. Johnson and J. Short, 28 Apr. 1994; QM I. 29562, 46.3 mm SL, Gneering Shoals, off Mooloolaba, 26°40′S, 153°12′E, 21 m, J. Johnson, 30 Jan. 1995; QM I. 30365 (2) 39.2–46.1 mm SL, Myora Reef, Moreton Bay, 27°28′S, 153°25′E, 3–6 m, J. Johnson, 5–7 Mar. 1996; QM I. 31139, 55.1 mm SL, off Southport Seawall, 27°56′S, 153°26′E, 2–4 m, J. Johnson, 29 May 1998; QM I. 34098 (5), 38.9–44.1 mm SL, off Burnett Heads, 24°31′S, 152°44′E, 30 m, trawl, Queensland Fisheries Service, 8 Oct. 2000; QM I. 34099, 49.8 mm SL, off Burnett Heads, 24°36′S, 152°32′E, 20 m, trawl, Queensland Fisheries Service, 9 Oct. 2000; QM I. 34172, 54.1 mm SL, off Keppel Islands, 23°07′S, 151°11′E, 29

m, trawl, Queensland Fisheries Service, 3 Oct. 2000; QM I. 36171, 42.1 mm SL, Broad Sound Channel, 22°10.5′S, 150°27.9′E, 33 m, dredge, Seabed Biodiversity Project Team, 10 May 2004; QM I. 36308 (2), 34.5–36.3 mm SL, east of Palm Islands, 18°42.3′S, 146°48.3′E, 30 m, dredge, Seabed Biodiversity Project Team, 30 Apr. 2004; QM I. 36311, 37.9 mm SL, east of Curtis Island, 23°39.9′S, 151°24.3′E, 23 m, dredge, Seabed Biodiversity Project Team, 20 May 2004; QM I. 36344 (2), 37.0–38.8 mm SL, southeast of Great Keppel Island, 23°15.9′S, 151°9.9′E, 28 m, dredge, Seabed Biodiversity Project Team, 21 May 2004; QM I. 36370 (11), 24.7–40.3 mm SL, west of North West Island, 23°21.3′S, 151°29.1′E, 35 m, dredge, Seabed Biodiversity Project Team, 22 May 2004; QM I. 36557, 32.6 mm SL, northwest of Percy Isles, 21°14.1′S, 150°07.5′E, 55 m, dredge, Seabed Biodiversity Project Team, 29 Sept. 2004; QM I. 36563, 46.1 mm SL, east of Redbill Island, 20°59.7′S, 150°16.5′E, 57 m, dredge, Seabed Biodiversity Project Team, 29 Sept. 2004; QM I. 36718, 36.8 mm SL, off Northumberland Islands, 21°27.9′S, 149°47.7′E, 23 m, dredge, Seabed Biodiversity Project Team, 28 Sept. 2004; QM I. 36773 (2), 34.0–53.3 mm SL, west of North West Island, 23°17.7′S, 151°35.7′E, 37 m, dredge, Seabed Biodiversity Project Team, 20 Sept. 2004; QM I. 36815 (3), 37.0–49.3 mm SL, west of Lady Musgrave Island, 23°53.1′S, 152°06.3′E, 41 m, dredge, Seabed Biodiversity Project Team, 21 Sept. 2004; QM I. 36836, 34.5 mm SL, northeast of Stanage Bay, 22°03.9′S, 150°05.1′E, 19 m, dredge, Seabed Biodiversity Project Team, 5 Oct. 2004; QM I. 37446, 61.1 mm SL, Bandicoot Wreck, Amity Point, 27°24′S, 153°26′E, 2–9 m, J. Johnson, 14 Mar. 1995; QM I. 40982 (3), 34.8–64.5 mm SL, same data as holotype.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9; pectoral-fin rays 13–17 (mode 16); scale rows in longitudinal series 39–46 (41 or 42); pored lateral-line scales 21–24 (23); scale rows above lateral line 5–7 (6), below 11–14 (12), between 6th dorsal-fin spine base and lateral line 5 or 6, between last dorsal-fin spine

base and lateral line 5 or 6; pre-dorsal scale rows 4–7 (4 or 5); gill rakers 13–17 (14); exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior and posterior lacrimal spine simple; lateral lacrimal, anterodorsal lacrimal, and coronal spines absent; bases of parietal spines distinctly medial to tympanic spines; occipital pit bordered laterally only by tympanic and parietal spines; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge absent; body width, and 9th and 10th dorsal-fin spine lengths 15.4–22.0 (mean 17.8) % of SL, 8.9–13.3 (10.6) % of SL, and 6.5–9.9 (8.1) % of SL, respectively, (in specimens less than 45 mm SL); largest recorded specimen 64.5 mm SL.

Description. Data for holotype presented first, followed by paratype data in parentheses (if different). Morphometrics and meristics given as percentages of SL in Table 8. Dorsal fin with 12 spines and 9 soft rays; all soft rays branched; fourth (sometimes fifth) spine longest, slightly shorter than upper-jaw length; fourth to eleventh spines progressively shorter; second (sometimes third) soft ray longest, slightly longer than longest dorsal-fin spine; posterior branch of last soft ray joined by membrane to caudal peduncle for approximately four-fifths (two-thirds) its length. Anal fin with 3 spines and 5 soft rays; all soft rays branched; second soft ray longest; posterior branch of last soft ray joined by narrow membrane to caudal peduncle for approximately one-seventh its length. Pectoral fins each with 16 rays [left side 13–17, usually 16, one specimen with 13 rays; right side 11–17, usually 16, three specimens with 11–13 rays]; single uppermost ray and 11 lower rays unbranched, remaining 4 branched [1 or 2 upper rays and 8–12 (usually 10) lower rays unbranched in larger paratypes over 33.1 mm SL; all rays unbranched (7 specimens) or 2–4 upper rays and 11–12 lower rays unbranched (7 specimens) in smaller paratypes less than 32.8 mm SL]; 7th (or 8th) ray longest, shorter than head length; lower unbranched rays thickened; posterior margin of fin rounded. Pelvic fin with 1 spine and 5 branched soft rays; second soft ray longest, longer than

upper-jaw length; last soft ray joined by membrane to abdomen for approximately two-thirds its length. Caudal fin with 13 principal rays, posterior margin of fin slightly rounded. Gill rakers on upper limb 4 (5), lower limb 10 (9–12) [8 (7–9) and 2 (1–3) on ceratohyal and hypobranchial, respectively], total rakers 14 (13–17), short and spinous, length of longest raker on first gill arch shorter than gill filaments around angle of gill arch; fourth gill slit closed by membrane. Branchiostegal rays 7. Vertebrae 24. Swimbladder absent.

Body moderately compressed anteriorly, progressively more compressed posteriorly. Nape and anterior body arched. Body relatively shallow, depth less than head length. Numerous small to tiny papillae on upper half of head, including upper outer margin of eye membrane, interorbital space, occipital pit, and behind orbit extending to an area between upper and lower opercular spines. A short, slender, fleshy tentacle (supraocular tentacle), its length approximately equal to pupil diameter (largest, right side tentacle damaged in holotype; length variable, longest tentacle approximately equal to eye diameter) on posterior end of supraocular spine base; supraocular tentacle lacking (with several) short branches along margin. A short but distinct slender tentacle (parietal tentacle) on posterior end of parietal spine base, shorter than nuchal spine length (usually extending beyond tip of nuchal spine when laid back). A short slender tentacle between tympanic and pterotic spines. A short slender tentacle (preocular tentacle) on posterior end of preocular spine base, its length one-seventh (to one-third) of supraocular tentacle length. A pair of narrow tentacles on anterior margins of lacrimal (frontal view). Several short distinct tentacles on upper and anterior outer margins of eye membrane. A short tentacle, with several short branches along distal margin, on upper posterior edge of low membranous tube associated with anterior nostril, its length approximately equal to preocular tentacle length. Anterior lacrimal spine associated with a short slender tentacle, length of latter approximately equal to (or less than) that of anterior nostril tentacle; one (or two) much smaller tentacles posteriorly on base of large tentacle.

Posterior lacrimal spine associated with a short, broad, fleshy tentacle, the latter longer than anterior nostril tentacle; a much smaller tentacle posteriorly on base of large tentacle; posterior lacrimal spine tentacle linked posteriorly to head by fringed skin. A short slender tentacle (or flap) usually on posterior end of supplemental preopercular spine (damaged in holotype); a thin skin flap near tips of 3rd–5th preopercular spines. A short slender tentacle centrally on cheek. Tentacles absent from occipital pit, mid-interorbital space, maxilla (some paratypes with 1 or 2 tiny tentacles on dorsolateral surface), lips, underside of lower jaw, and opercle. Several slender tentacles associated with pored lateral scales, scattered on lateral surface of body, length variable, longest less than length of supraorbital tentacle. Distinct tentacles absent on spines, soft rays, and all fin membranes. Pectoral-fin axil without skin flaps.

Well exposed, weakly ctenoid scales (changing from cycloid with growth) covering area enclosed by opercular margin, and tips of upper and lower opercular spines. Well exposed ctenoid scales on lateral surface of trunk, becoming cycloid and sometimes embedded in thin skin ventrally. Body scales not extending onto fin rays or membranes, except basal caudal fin. Exposed (or embedded in thin skin) cycloid scales covering pectoral-fin base and ventral body surface, including between pelvic fins. Lateral line above opercle tip or pectoral fin not sloping strongly downward. Numerous small sensory pores on upper half of head, including posterior of head to occipital pit, upper and lower suborbital ridge, and behind orbit on to space between upper and lower opercular spines. Underside of dentary with three well developed sensory pores, first pore slightly posterior to vertical through anterior lacrimal spine tip, second between anterior and posterior lacrimal spine tips, third on posterior margin of dentary. A pair of pores behind lower jaw symphysial knob. A pore on each side of symphysial knob.

Mouth large, slightly oblique, forming an angle of ca. 25 (25–30) degrees to horizontal axis of head and body. Posterior margin of maxilla beyond a vertical through posterior margin of pupil (just reaching posterior margin of orbit). Upper edge of posterior maxilla swollen laterally, forming a distinct ridge; central part of maxilla slightly convex (relatively flat in small individuals), but not forming a ridge. Width of symphysial gap separating premaxillary teeth bands slightly less than width of each band. Upper jaw with a band of short, incurved, conical teeth, with pointed tips. About 9 tooth rows at front of upper jaw, band narrowing posteriorly. Teeth band of upper jaw similar in extent to that of lower jaw. Lower jaw with a band of short, incurved, conical teeth, with pointed tips; most teeth shorter than those of upper jaw. About 4 (3–5) rows of small teeth anteriorly on vomer, reducing to 2 rows posteriorly, forming a V-shaped patch. Width of vomerine plate approximately equal to length of palatine plate. About 3 (3–5) teeth rows on palatine. Underside of lower jaw without ridges.

Dorsal profile of snout steep, forming an angle of about 55 (50–60) degrees to horizontal axis of head and body. Nasal spine simple, sharp, directed dorsally, its length greater than anterior nostril diameter. Ascending process of premaxilla not intruding into interorbital space, its posterior margin just reaching level with posterior margin of posterior nostril in dorsal view. Median interorbital ridge absent. Other interorbital ridges well developed, anteriorly and posteriorly divergent in dorsal view, originating posterior to nasal spines, initially separated by a moderately deep channel but conjoined level with posterior end of postocular (sometimes tympanic) spine bases, forming a distinct broad ridge (more distinct with growth) to anterior angular edge of occipital pit; least distance between ridges slightly anterior to vertical midline through eye. Interorbital space moderately deep, ca. one-third of orbit above dorsal head profile. Preocular spine simple, directed dorsoposteriorly; tip extending beyond level of upper margin of pupil in lateral view; flattened anteriorly and posteriorly; anterior surface without a median vertical ridge. Supraocular spine simple, its tip

slightly beyond vertical midline of eye in lateral view; its length approximately equal to that of postocular spines. Postocular spine simple, slightly canted laterally; base wider than tympanic spine base, joined to (sometimes separated by) interorbital ridge, separated from tympanic spine base. Tympanic spine simple, with narrow base, strongly pointed, slightly canted laterally; base separated from interorbital ridge (sometimes joined) or parietal spine base. Interorbital, coronal and pretympanic spines absent. A distinct transverse ridge anterior to occipital pit (becoming more distinct with growth) formed from interorbital ridges, slightly curved posteromedially in dorsal view. Occipital pit relatively shallow, central area slightly convex. A low transverse ridge (formed from posterior bases of nuchal spines) posteriorly in occipital pit between bases of parietal and nuchal spines. Occipital pit bordered laterally only by tympanic and parietal spines; no ridges on sides of pit anterior to tympanic spines (ridge sometimes present) or between tympanic and parietal spines in dorsal view. Parietal spine simple, its base curving strongly into occipital pit. Nuchal spine simple, joined with parietal spines at base. Sphenotic with a small spine (2 spines; rarely 3, in 3 paratypes). Postorbital smooth, without pointed spines (rarely with 1 or 2 small pointed spines, in 4 paratypes). Pterotic spine simple (with 2 points in one paratype), located below parietal and nuchal spines. An indistinct oblique low ridge (with a small spine in one paratype) in region surrounded by parietal, nuchal, pterotic and lower posttemporal spines. Upper posttemporal spine small, simple, pointed (with 2 points and point absent in 1 and 5 paratypes, respectively), slightly oblique, much shorter than lower posttemporal spine. Lower posttemporal spine simple, its base length similar to that of pterotic spine. Supracleithral spine simple, flattened, pointed. Cleithral spine flattened, strongly pointed with a low median ridge.

Lateral surface of lacrimal with a distinct ridge centrally, but lacking spines. Anterior lacrimal spine simple (one small spinous point on posterior margin in one paratype), directed forward, its tip reaching dorsal margin of upper lip. Posterior lacrimal spine simple, directed

ventroposteriorly, its tip reaching upper lip; longer than anterior lacrimal spine. Suborbital ridge with three spines (two spines in one paratype), first spine midway below midline and posterior margin of pupil, second spine extending slightly beyond orbit, third spine at end of suborbital ridge. Space between ventral margin of eye and suborbital ridge very narrow. Suborbital pit absent. Preopercle with 5 spines; uppermost spine largest, linked to lateral surface of opercle by fringed skin, with a supplementary preopercular spine on its base; second spine with a narrow base and low median ridge; third to fifth spines without a distinct median ridge. Preopercle, between uppermost preopercular spine and upper end of preopercle, without serrae or spines. Upper opercular spine simple, with a low median ridge, relatively thin skin covering entire spine, except tip; lower opercular spine simple, with a distinct median ridge, not covered by thick skin. Space between upper and lower opercular spines without ridges or scales, covered with thin skin. Posterior tip of upper opercular spine not reaching opercular margin; posterior tip of lower opercular spine just reaching (or short of) opercular margin.

Origin of first dorsal-fin spine above lower posttemporal spine. Posterior margin of opercular membrane reaching a vertical through anterior (or posterior) margin of fourth dorsal-fin spine base. Posterior tip of pectoral fin not reaching a vertical through first anal-fin spine base. Origin of pelvic-fin spine slightly posterior to origin of pectoral fin. Posterior tip of depressed pelvic fin extending beyond anus, but not reaching first anal-fin spine base. Origin of first anal-fin spine slightly posterior to origin of last dorsal-fin spine.

Color of preserved specimens. Blackish and yellowish color forms were apparent. Blackish form [Fig. 21 (26 specimens)] - head brownish dorsolaterally, yellowish with irregular dark markings ventrally; broad dark bars radiating from outer margin of eye, lowest bar most obvious, descending to cheek; upper and lower lips mottled with narrow whitish and brownish bars. Body brownish, with four irregular blackish saddles on lateral surface;

anteriormost saddle extending from nape to 7th dorsal-fin base, descending obliquely to below pored-lateral line scales; second short, descending from 9th to 11th dorsal-fin base to above pored-lateral line scales; third descending from dorsal-fin soft ray base to posterior half of anal-fin base; posteriormost narrow, on caudal peduncle; interspaces between saddles with indistinct whitish blotches, each smaller than eye diameter; many small indistinct yellowish (or whitish) spots (size slightly larger than body scale) scattered on lower lateral half of body. All tentacles on head and body generally whitish. Spinous portion of dorsal fin whitish (or translucent) with irregular dark markings (a black blotch in males on posterior portion of dorsal fin, usually from 7th to 10th spines); membrane covering all spines with small mottled brownish bars. Soft-rayed portion of dorsal fin whitish (or translucent), a bar descending obliquely from about middle of first ray to last ray base and a blotch descending obliquely from first ray from above level of last dorsal-fin spine to fifth ray (sometimes continuing to last ray). Pectoral fin grey to yellowish (or whitish), some small dark spots on distal half of rays; insertion brownish with whitish upper and lower blotches. Pelvic and anal fins yellowish, with small scattered brownish spots along rays. Caudal peduncle with whitish upper and lower blotches anteriorly on fin base, diameter of each less than pupil diameter. Caudal fin whitish distally; blackish basally, divergent dorsally and ventrally at about one-third of its length; a large blackish blotch posteriorly on caudal fin.

Yellowish form (33 specimens) - head and body mostly yellowish; all fins translucent, all bars, blotches, spots, and scattered melanophores indistinct or faded.

Distribution. Currently known only from the east coast of Queensland, Australia, ranging from Palm to Stradbroke islands (Fig. 31). Collection data of blackish specimens indicates a coral reef habitat, usually at depths less than 20 m, whereas yellowish specimens were collected from deeper sandy bottom areas below 30 m depth (Fig. 34b).

Etymology. The species name *regina*, meaning queen, is derived from the type locality of the species (Queensland, Australia).

Remarks. Recently described by Wibowo et al. (2019), *S. regina* is most similar to the western Australian new species *S. sororreginae* described in this study.

***Scorpaena scrofa* Linnaeus 1758**

[Standard English name: Bigscale Scorpionfish]

(Figs. 22, 31, 34; Table 1)

Scorpaena scrofa Linnaeus 1758: 266 (type locality: Mediterranean Sea).

Scorpaena lutea Risso 1810: 190 [type locality: Nice; synonymized by Eschmeyer (1969)].

Scorpaena natalensis Regan 1906: 5, pl. 5 (type locality: coast of Natal, South Africa).

Type specimen. BMNH 1905.6.8.49, holotype of *Scorpaena natalensis*, 195.5 mm SL, Natal, South Africa, ca. 41.8 m.

Non-type specimens. 6 specimens, 98.6–267.3 mm SL. SAIAB 74672, 3 specimens, 172.6–193.4 mm SL, off Thugela River, KwaZulu-Natal, South Africa, P. Heemstra and A. Ribbink, 128–150 m, 18 Aug. 2002; USNM 23309, 267.3 mm SL, Fayal, Azores, Portugal, North Atlantic Ocean, F. Mcguire, April 1879; USNM 206527, 85.5 mm SL, Tunisia, B. Collette, Purchased at Tunis Fish Market, 22 Sep. 1971; and USNM 422254, 105.5 mm SL, Tunisia, North Atlantic Ocean, 37°05′45″N, 10°34′30″E, B. Tahar on Dauphin Vessel, 109–120 m, 5 May 1972.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9; pectoral-fin rays 18–20; scale rows in longitudinal series 44–46; pored lateral-line scales 23; scale rows above lateral line 5 or 6, below 15–18, between 6th dorsal-fin spine

base and lateral line 6–8, between last dorsal-fin spine base and lateral line 6–8; pre-dorsal scale rows 5 or 6; gill rakers 13–16; anteroventral surface of body and base of pectoral fin naked; anteroventral surface of lower jaw with tentacles; dermal flap on pectoral-fin axil; anterior lacrimal spine simple or with 1 additional spinous point; posterior lacrimal spine usually with one additional spinous point; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge absent; anterodorsal lacrimal, lateral lacrimal, and coronal spines absent; lateral surface of head usually with many small blackish spots; largest recorded specimen 267.3 mm SL.

Distribution. *Scorpaena scrofa* is common in the eastern Atlantic Ocean, and in the Indo-Pacific Ocean is known from South Africa (Smith 1957), Saya de Malha Bank (Fricke and Zhukov 2019), and the Gulf of Aqaba, Red Sea (Fricke et al. 2020), in depths of 42–400 m. (Figs. 31, 34b).

Remarks. *Scorpaena scrofa*, one of the oldest available names in the genus *Scorpaena*, was described together with *S. porcus*, type species of the genus, by Linnaeus (1758). *Scorpaena scrofa* is the only Indo-Pacific species of *Scorpaena* that is also distributed outside that area, in the eastern Atlantic and Mediterranean Sea. *Scorpaena lutea* was synonymized under *S. scrofa* by Eschmeyer (1969), and examination of the holotype of *S. natalensis* in this study has confirmed the taxonomic status of that species as a junior synonym of *S. scrofa*, as previously determined by Smith (1957), Eschmeyer (1986), and Motomura et al. (2005b).

***Scorpaena sumptuosa* Castelnau 1875**

[Standard English name: Western Red Scorpionfish]

(Figs. 23, 31, 34, 42c; Table 1)

Scorpaena sumptuosa Castelnau 1875: 17 (type locality: Fremantle, Western Australia, Australia).

Syntypes. MNHN A. 4409, 241.2 mm SL, MNHN B. 2570, 229.1 mm SL, Fremantle, Western Australia, Australia, 32°07′S, 115°43′E, coll. by F. Castelnau, 1875.

Non-type specimens. 6 specimens, 72.2–228.6 mm SL, as listed in Motomura et al. (2005a, b, 2006). Twenty five additional specimens, 39.2–250.0 mm SL, all collected from Western Australia: AMS I. 12035, 224.5 mm SL, Albany District, coll. by H. Boult; CSIRO H 6347-02, 180.9 mm SL, northeast of Rottnest Island, 31°52′42.6″–55′00.0″S, 115°38′38.4″–37′49.8″E, 25–28 m, trawl, P. Last and A. Graham on RV *Naturaliste*, 9 Apr. 2006; WAM P. 1481-001, 137.1 mm SL, Cottesloe, coll. by Fitzgerald, 23 Oct. 1935; WAM P. 1749-001, 250.0 mm SL, Buckland Hills, coll. by W. Love; WAM P. 4366-001, 214.5 mm SL, Rockingham, 32°17′S, 115°43′E, 23 Mar. 1958; WAM P. 4367-002, 98.1 mm SL, WAM P. 4391-001, 84.7 mm SL, Shark Bay, 25°21′S, 113°44′E, R. Mckay, 5 June and Nov. 1958; WAM P. 4457-001, 106.7 mm SL, WAM P. 4517-001, 124.0 mm SL, Shark Bay, R. Mckay, 26 Aug. 1958; WAM P. 5058-001, 142.1 mm SL, Pelsaert Group, Houtman Abrolhos Islands, 28°53′S, 114°02′E, 1960; WAM P. 5253-001, 90.7 mm SL, Shark Bay, 25°21′S, 113°44′E, W. Poole, June 1962; WAM P. 5721-001, 45.8 mm SL, west of Cape Saint Cricg, Dorre Island, 25°08′S, 113°05′E, 73 m, R. George, 16 May 1960; WAM P. 14809-001, 2 specimens, 103.3–133.7 mm SL, Shark Bay, 25°21′S, 113°44′E, A. Mackenzie, Aug. 1965; WAM P. 21772-001, 198.9 mm SL, coll. by B. Guest; WAM P. 23651-001, 2, 86.3–98.7 mm SL, Carnarvon, 24°53′S, 113°40′E, 29.8 m, D. Heald, 19 July 1972; WAM P. 25079-001, 143.1 mm SL, North Island, Houtman Abrolhos Islands, 28°20′S, 113°40′E, 6.1 m, craypot, M. Brown, July 1974; WAM P. 27219-014, 84.8 mm SL, Hummock Island, Houtman Abrolhos Islands, 28°48′S, 114°03′E, trawl, D. Heald, 22 Nov. 1980; WAM P. 27967-008, 126.8 mm SL, WAM P. 27970-006, 51.9 mm SL, Point Quobba, 24°29′S, 113°25′E, 4–12 m, J.

Hutchins et al., 25–26 Apr. 1983; WAM P. 28428-007, 4, 39.2–140.9 mm SL, northwest of Port Gregory Jetty, 28°12′S, 114°15′E, 1–3 m, J. Hutchins et al., 23 Jan. 1985; WAM P. 31993-001, 95.8 mm SL, northeast of Basille Island, Houtman Abrollhos Islands, 28°35′S, 113°40′E, P. Brooks, 22 Aug. 1970; WAM P. 31994-001, 117.4 mm SL, Shark Bay, 25°25′S, 113°35′E, W. Poole, May 1964; WAM P. 32041-001, 136.2 mm SL, Beacon Island, Houtman Abrollhos Islands, 28°28′S, 113°48′E, 15 m, P. Baker, June 1975; WAM P. 32311-004, 2, 52.0–63.1 mm SL, west-northwest of Cape Lesueur, Peron Peninsula, Shark Bay, 25°36′46.3″–37′17.7″S, 113°14′26.2″–28.0″E, 16.3–16.8 m, S. Morrison, 6 Oct. 2002; WAM P. 32312-005, 56.5 mm SL, west-northwest of Cape Lesueur, Peron Peninsula, Shark Bay, 25°37′05.1″–35.7″S, 113°14′20.6″–23.6″E, 16.8–17.1 m, S. Morrison, 6 Oct. 2002; QM I. 10968, 229.8 mm SL, Dunsborough, 33°36′S, 115°06′E, 16.7 m, N. Coleman, 28 Dec. 1971; QM I. 20636, 90.5 mm SL, Torbay Head, Denmark, 35°08′S, 117°38′E, 22.9 m, N. Coleman, 5 Apr. 1972; QM I. 20638, 109.8 mm SL, Gun Island, Houtman Albrolhos Islands, 28°53′S, 113°52′E, N. Coleman, 3 May 1972; QM I. 29205, 142.8 mm SL, Point Gregory, Shark Bay, 24°52′S, 113°23′E, 3.5 m, N. Coleman, 23 May 1973.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9; pectoral-fin rays 14–17 (mode 16); scale rows in longitudinal series 42–47; pored lateral-line scales 21–23 (23); scale rows above lateral line 7, below 16–18 (17), between 6th dorsal-fin spine base and lateral line 6–8 (7), between last dorsal-fin spine base and lateral line 6–8 (7); pre-dorsal scale rows 0–3 (1); gill rakers 12–15 (14); exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw with one or two pairs of tentacles; no dermal flap on pectoral-fin axil; relatively thick skin with numerous small sensory pores covering predorsal area from posterior edge of occipital pit to first dorsal-fin spine origin and extending to just above or near first pored lateral-line scale; anterior and posterior lacrimal spines simple; lateral lacrimal, anterodorsal lacrimal, and

coronal spines absent; lateral surface of maxilla with a longitudinal ridge; median interorbital ridge present; occipital pit extremely deep; 2nd, 3rd, and 4th dorsal-fin spine lengths 16.8–23.7% of SL, 21.7–29.6% of SL, and 18.6–25.9% of SL, respectively, length of third spine greater than upper jaw length; caudal peduncle depth 11.4–14.3% of SL; largest recorded specimen 250.0 mm SL.

Distribution. *Scorpaena sumptuosa* is currently known from the west coast of Australia in depths of 1–77 m (Figs. 31, 34b).

Remarks. The anterior surface of the preocular spine with three vertical or slightly oblique ridges, previously considered to be an autapomorphic character of *S. brevispina* by Motomura and Senou (2008), was also apparent in some large specimens of *S. sumptuosa*.

***Scorpaena vesperalis* Wibowo and Motomura 2020**

[Standard English name: Dwarf Red Scorpionfish]

(Figs. 18, 24, 33, 34, 40; Tables 1, 5–7, 11)

Scorpaena vesperalis Wibowo and Motomura 2020: 532, figs. 1c, d, 2b, c, 3e, f (type locality: Busselton Jetty, Western Australia, Australia).

Holotype. WAM P. 28521-003, 58.7 mm SL, Busselton Jetty, Western Australia, 33°39′S, 115°21′E, 8 m, J. Hutchins, 12 Apr. 1885.

Paratypes. 56 specimens, 16.2–67.6 mm SL, all from the southwestern coast of Western Australia, Australia. AMS I. 20233-014, 6 specimens, 18.5–25.5 mm SL, Canal Rocks, Cape Naturaliste, 33°40′12″S, 115°00′00″E, 1–15 m, B. Russell, 1 Apr. 1978; AMS I. 20245-031, 5, 20.2–31.7 mm SL, Horse Shoe Reefs, Rottnest Island, 32°00′S, 115°28′E, 12–15 m, B. Russell, 12 Apr. 1978; AMS I. 20247-009, 5, 21.1–38.0 mm SL, Kingston Reefs, Rottnest

Island, 31°58′48″S, 115°33′00″E, 8 m, B. Russell, 12 Apr. 1978; AMS I. 20347-001, 67.6 mm SL, off Yallingup, 33°39′00″S, 115°01′12″E, 2 m, N. Coleman, 26 Mar. 1971; CSIRO A 1696, 51.5 mm SL, Strickland Bay, Rottnest Island, 32°00′S, 115°32′E, 21 Jan. 1954; KAUM–I. 142982, 54.7 mm SL, WAM P. 25798-011, 2, 38.0–44.7 mm SL, Eagle Bay, Geographe Bay, 33°33′S, 115°04′E, 0–4 m, G. Allen et al., 21 Oct. 1976; KAUM–I. 142983, 36.7 mm SL, KAUM–I. 142985, 35.4 mm SL, KAUM–I. 142986, 38.1 mm SL, Rocky Bay, Rottnest Island, 32°00′S, 115°28′E, J. Hutchins et al., 6 June 1980; KAUM–I. 142984, 34.1 mm SL, WAM P. 28520-009, 4, 28.9–48.9 mm SL, Canal Rocks, 33°39′S, 115°01′E, 3–4 m, J. Hutchins et al., 16 Apr. 1985; WAM P. 25806-003, 2, 31.9–41.2 mm SL, off Fremantle, Flinders, 32°18′S, 115°30′E, 37 m, N. Sarti et al., 29 June 1977; WAM P. 26600-007, 28.6 mm SL, Torbay Head, Albany, 35°08′S, 117°38′E, 3 m, J. Hutchins, 12 Apr. 1980; WAM P. 26608-014, 2, 30.4–30.5 mm SL, Cheyne Beach, east of Albany, 34°53′S, 118°25′E, 12–15 m, J. Hutchins, et al., 19 Apr. 1980; WAM P. 26617-005, 3, 29.6–34.9 mm SL, Rocky Bay, Rottnest Island, 32°00′S, 115°30′E, 8 m, J. Hutchins, 9 June 1980; WAM P. 27616-012, 2, 30.1–31.6 mm SL, Fish Hook Bay, Rottnest Island, 32°00′S, 115°30′E, 3–4 m, J. Hutchins, et al., 1 June 1982; WAM P. 27951-009, 45.8 mm SL, Osprey Islet, Jurien Bay, 34°53′S, 118°25′E, 2–5 m, J. Hutchins et al., 10 Apr. 1983; WAM P. 27988-004, 24.0 mm SL, Hamelin Bay, 34°12′S, 115°01′E, 1 m, N. Sarti, 21 Jan. 1979; WAM P. 28521-012, 58.8 mm SL, same data as holotype; WAM P. 29250-001, 2, 33.3–44.5 mm SL, Southern Group, Houtman Abrolhos, 1960; WAM P. 32040-001, 48.1 mm SL, northwestern coast of Rottnest Island, 183–188 m, J. Hutchins et al. on FV Bluefin, 14 Aug. 1962; WAM P. 32776-003, 10, 16.2–46.1 mm SL, North Ronsard Rocks, Cervantes, 30°28′42″S, 115°02′48″E, 3–4.7 m, G. Moore, 10 Mar. 2006; WAM P. 26620-001, 55.9 mm SL, Geordie Bay, 32°00′S, 115°30′E, 5 m, J. Hutchins et al., 14 June 1980.

Non-type material examined. 8 specimens, 34.3–57.3 mm SL, all collected from Western Australia. CSIRO H 6470-05, 57.3 mm SL, CSIRO H 6470-06, 6 specimens, 34.3–39.1 mm SL, southeast of Albany, 35°20′10″–20″S, 118°17′64″–40″E, 99–100 m, Sherman benthic sled, CSIRO at FRV *Southern Surveyor*, 22 Nov. 2005; CSIRO H 8594-01, 34.8 mm SL, south of Geraldton, 29°48′17″–23″S, 114°26′34″–16″E, 85–92 m, Sherman benthic sled, CSIRO at FRV *Southern Surveyor*, 2 Dec. 2005.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 10 (rarely 9); pectoral-fin rays 14–16 (15); scale rows in longitudinal series 37–41 (40); pored lateral-line scales 22–24 (23); scale rows above lateral line 4–6 (5), below 9–12 (11), between 6th dorsal-fin spine base and lateral line 4–6 (5), between last dorsal-fin spine base and lateral line 4–6 (5); pre-dorsal scale rows 0–3 (2); gill rakers 14–18 (16); exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior and posterior lacrimal spines simple; lateral lacrimal spine present, with a single spinous point; anterodorsal lacrimal and coronal spines present; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge present; body depth 32.3–39.5% of SL; upper jaw length 19.6–22.5% of SL; maxilla depth 5.7–7.3% of SL; postorbital length 18.2–21.3% of SL; least distance between interorbital ridges 1.4–2.7% of SL; 1st anal-fin spine length 7.2–10.0% of SL; largest recorded specimen 67.6 mm SL.

Description. Data for the holotype are given first, followed by paratype data (if different) in parentheses. Selected meristics and morphometrics, expressed as percentages of SL, are shown in Tables 5, 6. Body moderately compressed anteriorly, width at pectoral-fin base 20.1 (14.2–22.2) % SL, progressively more compressed posteriorly; relatively shallow, depth much less than head length [body depth and head length 39.0 (32.3–39.5) % SL and 41.4 (39.2–45.7) % SL, respectively]. Tiny papillae on snout, interorbital space, occipital pit, dorsal

surface of head, outer margin of eye membrane, and behind orbit to an area between upper and lower opercular spines. A single tentacle (its length greater than half pupil diameter) on posterior end of supraocular spine base. Several tiny tentacles on upper part of outer eye margin. A short tentacle, with several short branches along distal margin, associated with anterior nostril, its length approximately equal to nasal spine length. Anterior lacrimal spine associated with tiny fleshy tentacles. Posterior lacrimal spine associated with a small and several tiny fleshy tentacles, its lengths shorter than anterior nostril tentacle, posteriorly continuous with head via fringed skin. Tips of preopercular spines without skin flaps (sometimes tips of 3rd–5th spines with tiny flap). Several (sometimes absent) tentacles occasionally scattered on lateral body surface (associated with pored-lateral line, recognized from left side of body in holotype). Underside of lower jaw smooth, without tentacles. Pectoral-fin axil without skin flaps.

Dorsal fin with 12 spines and 10 (rarely 9, only 4 of all paratypes) soft rays; fourth (sometimes third) spine longest; fifth to eleventh spines becoming progressively shorter; length of last spine about equal to (or slightly greater than) that of second spine; second (sometimes third) soft ray longest; all soft rays branched, posterior branch of last soft ray joined by membrane to caudal peduncle for about four-fifths (two-thirds to four-fifths) its length. Anal fin with 3 spines and 5 soft rays; first spine shortest, located slightly posterior to vertical through last dorsal-fin spine base; second longest, its length greater than 4th dorsal-fin spine length; all soft rays branched; second soft ray longest. Pectoral fins each with 15 (14–16) rays, 1 (1 or 2) upper unbranched rays, 5 (2–5) branched rays, 9 (9–11) lower unbranched rays (usually all rays unbranched in specimens less than 26.3 mm SL); 8th (or 7th) ray longest, slightly elongated; posterior profile of fin pointed (or slightly rounded); tip of fin just reaching (not reaching or slightly beyond) first anal-fin spine base; lower unbranched rays thickened. Pelvic fin with 1 spine and 5 branched soft rays; second soft ray

longest; last soft ray joined by membrane to abdomen for about two-thirds its length. Caudal fin with 13 principal rays, posterior margin relatively rounded (or slightly truncate). Gill rakers on upper limb of first gill arch 5 (4–6), lower limb 11 (10–13) [9 (8–10) and 2 (2–4) on ceratohyal and on hypobranchial, respectively], total 16 (14–18), short and spinous, longest raker on first gill arch shorter than gill filaments around angle of gill arch; fourth gill slit closed by membrane. Branchiostegal rays 7. Swimbladder absent.

Area enclosed by opercular margin, and upper and lower opercular spine tips lacking scales. Well exposed ctenoid scales on lateral surface of trunk, becoming cycloid and sometimes embedded in thin skin ventrally. Body scales not extending onto fin rays or membranes, except basal caudal fin. Exposed (sometimes embedded in thin skin) cycloid scales covering pectoral-fin base and ventral body surface, including between pelvic fins. Lateral line above opercle tip and pectoral fin sloping moderately downward. Relatively thick skin with numerous small sensory pores covering predorsal area from posterior edge of occipital pit to anterior margin of predorsal scales, upper and lower suborbital ridges, behind orbit to above upper opercular spine, and between parietal and nuchal and pterotic and lower posttemporal spines. Underside of dentary with three well developed sensory pores, first pore slightly posterior to vertical through anterior lacrimal spine tip, second between anterior and posterior lacrimal spine tips, third on posterior margin of dentary. A single united pore behind lower jaw symphysial knob. A pore on each side of symphysial knob.

Mouth large, slightly oblique, forming an angle of 20 (20–25)º to horizontal axis of head and body. Posterior margin of maxilla just reaching posterior margin of orbit (usually reaching to vertical through or slightly beyond posterior margin of pupil). Upper edge of posterior maxilla swollen laterally, forming a distinct ridge; lateral surface of maxilla smooth, lacking a ridge or tentacles. Symphysial gap separating premaxillary teeth bands narrow, less than width of each band. Upper jaw with a band of short, incurved, conical teeth, about 9

tooth rows anteriorly, band slightly narrowing posteriorly. Lower jaw with a band of short, incurved, conical teeth; most teeth shorter than those of upper jaw, band distinctly narrowing posteriorly. About 6 tooth rows anteriorly on vomer, reducing to 2 rows posteriorly, forming a V-shaped patch. Width of vomerine plate distinctly shorter than length of palatine plate. Two (or 3) tooth rows on palatine plate; plate slightly narrowing posteriorly.

Anterodorsal and lateral surfaces of lacrimal with spines, the former with distinctly larger spine base (anterodorsal lacrimal spine usually indistinct in paratypes less than 26.3 mm SL). Anterior lacrimal spine simple, without small spinous points on its posterior margin, directed forward. Posterior lacrimal spine simple, without small spinous points on its anterior margin, directed ventroposteriorly. Anterior and posterior lacrimal spine sizes about equal. Suborbital ridge with three spines, first below pupil, second extending slightly beyond orbit, third at end of suborbital ridge. Space between ventral margin of eye and suborbital ridge narrow. Suborbital pit absent. Preopercle with 5 pointed spines; uppermost largest with a small supplemental preopercular spine on base; directed posteriorly. Preopercle (between upper end and uppermost preopercular spine) smooth, without serrae or spines. Upper opercular spine simple, with a low median ridge, covered by relatively thick skin with small pores. Lower opercular spine simple, with a distinct median ridge. Space between upper and lower opercular spines smooth, without ridges. Posterior tip of upper opercular spine not reaching opercular margin, posterior tip of lower opercular spine just reaching opercular margin.

Dorsal profile of snout steep, forming 50 (45–50)º angle to horizontal axis of head and body. Nasal spine simple, conical, directed upward. Ascending process of premaxilla short, its posterior margin level with (or slightly beyond) posterior end of nasal spine base. Median interorbital ridge present (or indistinct), extending from just behind posterior margin of ascending process of premaxilla onto midline slightly posterior to posterior end of preocular spine base. Interorbital ridges well developed, separated by moderately deep channel,

extending from behind nasal spines and conjoined level with coronal spines. Interorbital ridges divergent anteriorly and posteriorly in dorsal view, narrowest separation level with tip of preocular spine. Preocular spine simple, directed dorsoposteriorly, flattened anteriorly and posteriorly. Supraocular spine simple. Postocular spine simple, its length less than tympanic spine. Coronal spine simple, strongly pointed, directed dorsoposteriorly. Tympanic spine simple, strongly pointed with slightly lateral orientation. Pretympanic spines absent. Occipital pit shallow, center slightly convex with an indistinct transverse ridge at rear between bases of nuchal spines, surrounded laterally by tympanic and parietal spines. Parietal spine simple, its base curving into occipital pit. Nuchal spine simple, base continuous with parietal spine base. Sphenotic with 1 (rarely 0 or 2) small spine(s). Postorbital smooth, usually spineless (rarely with spinous points). Pterotic spine simple, located below parietal and nuchal spines. Upper posttemporal spine small, simple, pointed and directed dorsoposteriorly, its length much shorter than lower posttemporal spine. Lower posttemporal spine simple, its base length slightly less than that of pterotic spine. Supracleithral spines simple, flattened. Cleithral spine flattened, with an indistinct median ridge, strongly pointed.

Colour (based on all examined specimens). Fresh specimens vary in coloration from reddish-orange to greenish-brown, suffused with irregular dark brownish to blackish markings, males with a black blotch (absent in females) on posterior portion of spinous dorsal fin between 8th (7th) and 10th spines. Preserved specimens yellowish-brown, persistent dark brownish markings on body and dorsal fin blotch.

Distribution. Distributed off southwestern Australia, ranging from Southern Group, Houtman Abrolhos (28°S) to the Albany coast (35°S) at depths of 0–188 m (Figs. 33, 34b).

Remarks. Recently described by Wibowo and Motomura 2020, *S. vesperalis* is most similar to the southeastern Australian and New Zealand subspecies, *S. p. ergastulorum* and *S. p. papillosa*, respectively.

***Scorpaena longaecrista* Wibowo and Motomura 2021**

[New standard English name: Long-ridged Scorpionfish]

(Figs. 25, 26a, 27, 31, 34, 41; Tables 1, 9, 11)

Holotype. CSIRO H 6371-19, 55.9 mm SL, west of Geraldton, Western Australia, Australia, 28°59′24″–59′48″S, 113°45′54.0″–46′08.4″E, 389–407 m, beam trawl, FRV *Southern Surveyor*, 3 Dec. 2005.

Paratypes. 49 specimens, 14.9–50.7 mm SL, all collected from Western Australia, Australia. CSIRO H 6381-20, 50.7 mm SL, CSIRO H 6381-21, 2 specimens, 34.3–43.5 mm SL, KAUM–I. 147884, 36.5 mm SL, south west of Shark Bay, 27°03′07.2″–02′52.8″S, 113°04′51.6″–04′48.0″E, 106 m, beam trawl, FRV *Southern Surveyor*, 6 Dec. 2005; CSIRO H 6382-28, 3, 21.6–33.3 mm SL, CSIRO H 6382-29, 16.3 mm SL, CSIRO H 6382-30, 18, 14.9–36.1 mm SL, WAM P. 35213-001, 35.7 mm SL, WAM P. 35213-002, 3, 22.3–26.4 mm SL, WAM P. 35213-003, 31.3 mm SL, WAM P. 35213-004, 35.1 mm SL, north west of Shark Bay, 24°37′28.2″–43.8″S, 112°40′15.6″–08.4″E, 100 m, beam trawl, FRV *Southern Surveyor*, 8 Dec. 2005; CSIRO H 6405-13, 36.9 mm SL, KAUM–I. 147883, 41.1 mm SL, north west of Shark Bay, 24°01′43.2″–01′52.8″S, 113°02′02.4″–01′48.0″E, 100–101 m, beam trawl, FRV *Southern Surveyor*, 8 Dec. 2005; CSIRO H 6406-13, 39.7 mm SL, KAUM–I. 147889, 23.3 mm SL, KAUM–I. 147890, 25.2 mm SL, KAUM–I. 147891, 29.2 mm SL, south west of Exmouth Gulf, 22°50′55.2″–51′30.0″S, 113°30′39.6″–30′50.4″E, 100 m, beam trawl, FRV *Southern Surveyor*, 9 Dec. 2005; CSIRO H 6452-10, 28.6 mm SL, KAUM–I. 147886, 27.8 mm SL, KAUM–I. 147887, 36.6 mm SL, KAUM–I. 147888, 46.8 mm SL, west of Shark Bay, 25°54′07.8″–22.8″S, 112°49′44.4″–37.2″E, 95–100 m, beam trawl, FRV *Southern Surveyor*, 7 Dec. 2005; CSIRO H 6467-02, 22.7 mm SL, west of Geraldton, 28°58′16.8″–58′27.6″S, 113°49′55.2″–50′06.0″E, 85–86 m, Sherman benthic sled, FRV *Southern Surveyor*, 3 Dec. 2005; CSIRO H 8593-02, 41.8 mm SL, west of Gantheaume Bay, 27°48′28.8″–45.6″S,

113°17′49.2″–56.4″E, 112–123 m, Sherman bentic sled, FRV *Southern Surveyor*, 4 Dec. 2005; KAUM–I. 147885, 19.6 mm SL, west of Shark Bay, 25°54′21.0″–53′58.8″S, 112°49′40.8″–49′48.0″E, 100 m, beam trawl, FRV *Southern Surveyor*, 7 Dec. 2005; NMV A 29654-004, 31.0 mm SL, south west of Borrow Island, 21°02′09″–01′59″S, 114°53′17″–53′08″E, 80–105 m, benthic sled, FRV *Southern Surveyor*, 10 June 2007; NMV A 29660-009, 32.8 mm SL, north of Montebello Islands, 19°47′22″–47′16″S, 115°28′20″–29′01″E, 90–108 m, beam trawl, FRV *Southern Surveyor*, 12 June 2007; WAM P. 29247-001, 25.2 mm SL, south west of Exmouth Gulf, 22°59′S, 113°25′E, 130 m, CSIRO, 31 Jan. 1964; WAM P. 32044-001, 43.6 mm SL, west of Dongara, 29°15′S, 114°01′E, 146 m, R. George, 20 Mar. 1972.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9 (rarely 8 or 10); pectoral-fin rays 16–18 (mode 17); scale rows in longitudinal series 43 or 44; pored lateral-line scales 22; scale rows above lateral line 4 or 5, below 12, between 6th dorsal-fin spine base and lateral line 5 or 6, between last dorsal-fin spine base and lateral line 5 or 6; pre-dorsal scale rows 3–5; gill rakers 13–16 (14); exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior lacrimal spine usually simple (rarely with a bump or an additional spinous point on its posterior base); posterior lacrimal spine simple; anterodorsal lacrimal, lateral lacrimal, and coronal spines absent; bases of parietal spines approximately equal to those of tympanic spines; occipital pit bordered laterally with ridges; lateral surface of maxilla without a longitudinal ridge (rarely with distinct ridge or convex); median interorbital ridge absent; largest recorded specimen 55.9 mm SL.

Description. Data for holotype presented first, followed by paratype data in parentheses (if different). Morphometrics given as percentages of SL in Table 9. Scale characters based

mainly on a few paratypes, due to many scales missing on holotype and most paratypes, thereby precluding counts. Dorsal fin with 12 spines and 9 (8 and 10 in three and one paratypes, respectively) soft rays; fourth (third) spine longest; all soft rays branched, second longest; posterior branch of last soft ray joined by broad membrane to caudal peduncle; origin of dorsal fin above supracleithral spine. Anal fin with 3 spines and 5 soft rays; first spine shortest, second longest; all soft rays branched, first longest; posterior branch of last soft ray joined by narrow membrane to caudal peduncle; origin of first anal-fin spine slightly posterior to (or about level with in some paratypes) origin of last dorsal-fin spine. Pectoral fin with 1 (2) uppermost unbranched ray, 6 (3–6) branched rays, 9 (10–13, rarely 12 or 13) lower unbranched rays (all rays unbranched in two specimens 16.3–22.3 mm SL); total 17 (16–18) rays, 9th (8th) ray longest; posterior margin of fin pointed, its tip beyond anal-fin spine base. Pelvic fin with 1 spine and 5 branched soft rays; second soft ray longest; last soft ray joined by broad membrane to abdomen. Caudal fin with 13 principal rays. Scale rows in longitudinal series 43 or 44 (three paratypes). Lateral-line scales 22 (one paratype). Scale rows above lateral line 4–5 (seven paratypes), below 12 (three paratypes), between 6th dorsal-fin spine base and lateral line 5 or 6 (five paratypes), between last dorsal-fin spine base and lateral line 5 (five paratypes). Gill rakers on upper limb of first gill arch 5 (4), lower limb 11 (9–11), including 8 (7) and 3 (2) rakers on ceratohyal and hypobranchial, respectively, total rakers 16 (13–15); rakers short with small spinules, longest at angle [length approximately equal to that of gill filaments around angle or about half (two-thirds) length of longest gill filament]; fourth gill slit closed by membrane. Branchiostegal rays 7. Vertebrae 24.

Dorsal profile of snout steep, forming angle of ca. 60 degrees to horizontal axis of head and body. Body moderately compressed anteriorly, progressively more compressed posteriorly. Body relatively shallow, its depth slightly less than head length. Mouth large, slightly oblique, forming angle of 20–25 degrees to horizontal axis of head and body.

Posterior margin of maxilla just reaching (slightly beyond) a vertical through posterior margin of pupil. Posterior lateral surface of maxilla convex on left side, with distinct ridge on right side (usually smooth without ridge; very rarely convex or with ridge, only in four paratypes). Jaws with a band of short, conical teeth; about 9 tooth rows at anterior of upper jaw, 7 in lower; tooth band narrowing posteriorly. Vomer with conical teeth, forming a V-shaped patch, about 4 tooth rows anteriorly, reducing to 2 (1) rows posteriorly. A narrow teeth band on palatine with 2 (1) tooth rows.

Median interorbital ridge absent. Interorbital ridges well developed, relatively straight, not diverging anteriorly or posteriorly in dorsal view (diverging anteriorly and posteriorly in dorsal view), separated by a relatively deep channel, beginning posterior to nasal spines to form a broad ridge on anterior edge of occipital pit, continuous with low ridges laterally surrounding occipital pit, joining with parietal spine bases (joined to tympanic spine bases in some paratypes). Occipital pit very deep. A transverse ridge posteriorly in occipital pit between bases of parietal and nuchal spines. Nasal, preocular, supraocular, and postocular spines simple; postocular slightly canted laterally, base wide. Tympanic spine simple, pointed, directed dorsally. Coronal spines absent. Parietal and nuchal spines simple, joined at base; bases of parietal and tympanic spines about level. Sphenotic with 2 (1) small spines. Postorbital with weak ridge, with 1 (2 or smooth) tiny pointed spine. Pterotic spine simple, located below parietal spine. Upper and lower posttemporal spines simple, directed posteriorly, upper shorter than lower. Supracleithral spine simple, flattened, pointed. Cleithral spine flattened, pointed, with low median ridge. Upper opercular spine simple, with low median ridge. Lower opercular spine simple, with distinct median ridge, tip nearly reaching (slightly beyond) opercular margin. Suborbital ridge with 3 spines, tip of first spine below posterior margin of pupil, second spine extending slightly beyond orbit, third spine at end of suborbital ridge. Space between ventral margin of eye and suborbital ridge very narrow.

Suborbital pit absent. Preopercle with 5 spines; uppermost longest, with supplemental spine; second to fifth relatively flat (second spine sometimes with low median ridge). Lateral surface of lacrimal with distinct ridge, but lacking spines. Anterior lacrimal spine pointed, directed slightly anteroventrally; a second short spine occurring at posterior base (usually simple, with no additional spine or sometimes a bump only). Posterior lacrimal spine simple, directed posteroventrally.

Lateral surface of body covered with ctenoid scales, becoming cycloid ventrally. Cycloid scales embedded in thin skin (exposed) covering pectoral-fin base and anteroventral surface of body. Body scales not extending onto fin rays or membranes, except basally on caudal fin. Ctenoid scales covering distal area between upper and lower opercular spines. Lateral line complete, first two scales with a spine-like projection at end of sensory tube.

Underside of dentary with three sensory pores, first pore below tip of anterior lacrimal spine, second below and between anterior and posterior lacrimal spines, third located on posterior margin of dentary; a single pore on each side of symphysial knob; a pair (single) of pores behind lower jaw symphysial knob; a small pore behind nasal spine and on each mid-interorbital ridge; a pore above dorsal ridge of lacrimal, under lacrimal ridge, and between bases of anterior and posterior lacrimal spines; some pores associated with suborbital ridge and preopercular spine bases.

A tentacle on upper posterior edge of low membranous tube associated with anterior nostril, reaching posterior margin of posterior nostril when laid back. A short, slender tentacle on posterior end of preocular spine base. A fleshy tentacle associated with supraocular spine, length approximately equal to pupil diameter (usually greater than pupil, longest about equal to orbit diameter). A slender tentacle posteriorly on parietal spine base in some paratypes (absent in holotype). Anterior lacrimal spine associated with a short slender tentacle. Posterior lacrimal spine associated with a broad fleshy tentacle, its length slightly less than that of

supraocular spine tentacle; posterior lacrimal spine tentacle linked posteriorly to head by fringed skin. A thin rounded flap associated with each of 3rd–5th preopercular spines. Dermal flap on pectoral-fin axil absent. No tentacles on underside of head. A few slender tentacles associated with pored lateral-line scales and scattered on lateral surface of body.

Color when fresh (Fig. 25a). Head and body red to dark reddish, with numerous tiny spots throughout dorsal area below dorsal-fin base and poorly defined whitish blotches on lateral body surface. Caudal peduncle brownish-white. Pupil black, iris uniformly red or whitish to yellowish-red. Dorsal fin reddish-white to brownish-red, with a black blotch on spinous portion. Pectoral fin red, slightly brownish on upper lobe. Pelvic fin reddish-white. Anal fin reddish-white, with a broad red band across central region. Caudal fin reddish-white overall, red basally, a broad dark reddish band centrally.

Color of preserved specimens. Head and body greyish to pale brownish [dark brownish throughout dorsal area below dorsal-fin base (uniformly pale brownish after long preservation)]. All fins pale greyish to semi-translucent. All specimens with a black blotch on posterior portion of dorsal-fin spines, usually from 7th to 9th spines.

Distribution. Currently known from the west coast of Australia. Specimens examined here had been collected from depths of 80–407 m (Figs. 31, 34b).

Etymology. The species name, *longaecrista*, treated as a noun in apposition, taken from a combination of Latin *longus* (long) and *crista* (crest), refers to the long interorbital ridges, which continuing with low ridges laterally surrounding occipital pit and joining with the parietal spine bases.

***Scorpaena sororreginae* Wibowo and Motomura 2021**

[New standard English name: Western Queen Scorpionfish]

(Figs. 26b, 28, 29, 31, 34; Tables 1, 9, 10)

Holotype. CSIRO H 8264-02, 43.6 mm SL, north of Cape Lambert, Western Australia, Australia, 20°11′S, 117°21′E, 38 m, 20 Oct. 2017.

Paratypes. 22 specimens, 22.4–39.0 mm SL, all from the northwest coast of Western Australia, Australia. CSIRO H 1465-22, 39.0 mm SL, northwest of Port Hedland, 19°28′S, 117°52′E, 63 m, 21 Sep. 1988; CSIRO H 2786-04, 2 specimens, 22.4–25.8 mm SL, north-northeast of Port Hedland, 19°29′S, 118°51′E, 41 m, 25 Oct. 1983; CSIRO H 4199-04, 3, 27.0–32.0 mm SL, north-northeast of Port Hedland, 19°28′S, 118°55′E, 38 m, 31 Aug. 1983; CSIRO H 6780-01, 10, 22.8–33.6 mm SL, north-northeast of Port Hedland, 40 m, 11 Feb. 1983; CSIRO H 8224-25, 30.1 mm SL, west-northwest of Port Hedland, 20°10′S, 117°54′E, 34 m, 18 Oct. 2017; CSIRO H 8264-03, 23.7 mm SL, same data as holotype; KAUM–I. 10936, 26.0 mm SL, KAUM–I. 10937, 30.3 mm SL, KAUM–I. 10938, 31.5 mm SL, north-northeast of Port Hedland, 19°29′03.6″–30′01.8″S, 118°51′03″–52′12″E, 39–40 m, beam trawl, T. Ward on FRV *Soela*, 11 Feb. 1983; KAUM–I. 120860, 35.3 mm SL, north of Dampier Archipelago, 56 m, 24 Oct. 2017.

Diagnosis. A species of *Scorpaena* with the following combination of characters: dorsal-fin soft rays 9 (rarely 8 or 10); pectoral-fin rays 15–17 (mode 16); scale rows in longitudinal series 40–44; pored lateral-line scales 22–24 (23); scale rows above lateral line 4–6 (5), below 11–13 (12), between 6th dorsal-fin spine base and lateral line 5 or 6, between last dorsal-fin spine base and lateral line 5 or 6; pre-dorsal scale rows 3–5 (4); gill rakers 14–16 (rarely 14); exposed scales covering anteroventral surface of body and base of pectoral fin; anteroventral surface of lower jaw without tentacles; no dermal flap on pectoral-fin axil; anterior and posterior lacrimal spines simple; anterodorsal lacrimal, lateral lacrimal, and coronal spines absent; bases of parietal spines distinctly medial to tympanic spines; occipital pit bordered laterally by tympanic and parietal spines; lateral surface of maxilla without a longitudinal ridge; median interorbital ridge absent; body width 15.9–21.3 (mean 19.1) % of SL; 9th and

10th dorsal-fin spine lengths 11.1–13.5 (12.4) % of SL and 8.4–10.9 (9.5) % of SL, respectively; largest recorded specimen 43.6 mm SL.

Description. Data for holotype presented first, followed by paratype data in parentheses (if different). Morphometrics given as percentages of SL in Table 9. Dorsal fin with 12 spines and 9 (8 and 10 in two paratypes, respectively) soft rays; fourth spine longest; fourth to eleventh spines progressively shorter; all soft rays branched; second soft ray longest; posterior branch of last soft ray joined by broad membrane to caudal peduncle. Anal fin with 3 spines and 5 soft rays; first spine shortest, second spine longest; all soft rays branched; first (second) soft ray longest; posterior branch of last soft ray joined by narrow membrane to caudal peduncle; origin of first anal-fin spine slightly posterior to origin of last dorsal-fin spine. Pectoral fin with 16 (15–17, rarely 15 or 17, in 1 and 3 paratypes, respectively) rays; 1 (2) uppermost ray and 10 (10–12) lower rays unbranched, remaining 5 (3–5) branched; 7th (8th) ray longest; posterior margin of fin pointed, its tip nearly reaching (extending beyond) 1st anal-fin spine base. Pelvic fin with 1 spine and 5 branched soft rays; second soft ray longest; last soft ray joined by membrane to abdomen for approximately half (two-thirds) its length. Caudal fin with 13 principal rays. Scale rows in longitudinal series 42 (40–44). Pored lateral-line scales 23 (22–24). Scale rows above lateral line 5 (4–6), below 12 (11–13), between 6th dorsal-fin spine base and lateral line 6 (5), between last dorsal-fin spine base and lateral line 6 (5). Pre-dorsal scale rows 4 (3–5). Gill rakers on upper limb 5 (4), lower limb 11 (10) [9 (8) and 2 (3) on ceratohyal and hypobranchial, respectively], total rakers 16 (14–16); rakers short, spinous, longest at angle [length approximately equal to that of gill filaments around angle]; fourth gill slit closed by membrane. Branchiostegal rays 7. Vertebrae 24.

Dorsal profile of snout steep, forming angle of ca. 60 degrees to horizontal axis of head and body. Body moderately compressed anteriorly, progressively more compressed posteriorly. Body relatively shallow, its depth less than head length. Mouth large, slightly

oblique, forming angle of ca. 20 degrees to horizontal axis of head and body. Posterior margin of maxilla reaching a vertical through posterior margin of pupil (beyond posterior margin of pupil but not reaching posterior margin of orbit). Upper edge of posterior maxilla swollen laterally, forming a distinct ridge; no ridge on lateral surface of maxilla. Jaws with a band of short, conical teeth, about 9 tooth rows at anterior of upper jaw, 7 in lower, tooth band narrowing posteriorly. Vomer with conical teeth, forming a V-shaped patch, about 4 tooth rows anteriorly, reducing to 2 rows posteriorly. A narrow teeth band on palatine with 2 (1) tooth rows.

Median interorbital ridge absent. Interorbital ridges well developed, separated by a moderately deep channel, diverging anteriorly and posteriorly in dorsal view, originating above posterior nostril in lateral view, conjoined to form a distinct broad ridge on anterior edge of occipital pit; ridge slightly curved posteromedially in dorsal view. Occipital pit moderately deep. A low transverse ridge posteriorly in occipital pit between bases of parietal and nuchal spines. Occipital pit bordered laterally by tympanic and parietal spines. Nasal, preocular, supraocular, and postocular spines simple; postocular slightly canted laterally, base wide. Tympanic spine simple, pointed, slightly canted laterally. Coronal spines absent. Parietal and nuchal spines simple, joined at base; base of parietal spines distinctly medial to tympanic spines. Sphenotic with 2 (1) small spines. Postorbital with weak ridge, with 4 tiny spines (usually smooth). Pterotic spine simple, located below parietal and nuchal spines. Upper and lower posttemporal spines simple, directed posteriorly, upper shorter than lower. Supracleithral spine simple, flattened, pointed. Cleithral spine flattened, strongly pointed. Upper opercular spine simple, with low median ridge; covered with skin (except tip). Lower opercular spine simple, with distinct median ridge, tip just reaching (slightly short of) opercular margin. Suborbital ridge with 3 spines, tip of first spine level with posterior margin of pupil, second spine extending slightly beyond orbit, third spine at end of suborbital ridge.

Space between ventral margin of eye and suborbital ridge very narrow. Suborbital pit absent. Preopercle with 5 spines; uppermost spine largest, with supplemental spine; second spine with narrow base and low median ridge; third to fifth spines relatively flat. Lateral surface of lacrimal with distinct ridge, but lacking spines. Anterior lacrimal spine simple, pointed, directed forward. Posterior lacrimal spine simple, directed posteroventrally.

Well exposed ctenoid scales on lateral and ventral surfaces of body (becoming cycloid ventrally). Exposed (embedded in thin skin) weak ctenoid (cycloid) scales covering anteroventral surface of body and base of pectoral fin. Body scales not extending onto fin rays or membranes, except basally on caudal fin. Ctenoid scales covering area enclosed by opercular margin, and tips of upper and lower opercular spines. Lateral line complete, first two scales with spine-like projection at end of sensory tube.

Underside of dentary with three well developed sensory pores, first pore below a vertical through anterior lacrimal spine tip, second between anterior and posterior lacrimal spine tips, third on posterior margin of dentary; a single pore on each side of symphysial knob; a pair (single) of pores behind lower jaw symphysial knob; a small pore behind nasal spine; a pore above dorsal ridge of lacrimal; a pore under lacrimal ridge and between bases of anterior and posterior lacrimal spines; some pores associated with suborbital ridge and preopercular spine bases.

A slender tentacle on each side of premaxilla ascending process (frontal view). A tentacle on upper posterior edge of low membranous tube associated with anterior nostril, reaching posterior margin of posterior nostril when laid back. A short, slender tentacle on posterior end of preocular spine base. A fleshy tentacle on posterior end of supraocular spine base, length approximately equal to pupil diameter (about equal to eye diameter). A slender tentacle on posterior end of parietal spine base, extending beyond tip of nuchal spine when laid back. A slender tentacle between parietal and pterotic spines in some paratypes. Anterior lacrimal

spine associated with a slender tentacle. Posterior lacrimal spine associated with a broad fleashy tentacle, its length slightly less than that of supraocular spine tentacle; posterior lacrimal spine tentacle linked posteriorly to head by fringed skin. A short slender tentacle centrally on cheek in several paratypes. A short, slender tentacle, associated with supplemental preopercular spine in some paratypes (absent in holotype); a rounded, thin flap associated with each of 3rd–5th preopercular spines (absent in holotype). Dermal flap on pectoral-fin axil absent. No tentacles on underside of head. Several slender tentacles associated with pored lateral-line scales and scattered on lateral surface of body.

Color when fresh (Fig. 28). Body variegated, mottled dark reddish-brown to light red, often with a dark reddish band below soft rayed portion of dorsal fin. Pupil black, iris mottled, with radiating reddish and greyish bars. Dorsal fin with reddish to semi-translucent membrane. Pectoral fin mottled reddish and brownish. Pelvic and anal fins light red with many scattered dark reddish spots. Caudal fin overall reddish semi-translucent, dark reddish basally diverging dorsally and ventrally, a broad dark reddish band centrally.

Color in preserved specimens. Body pale brownish with irregular blackish markings dorsally, an indistinct blackish band below soft rayed portion of dorsal fin. All fins semi-translucent, with some small dark brown to blackish spots or irregular markings. After long preservation, head and body uniformly brownish. A black blotch on posterior portion of dorsal-fin spines in several paratypes, usually from 7th to 9th spines.

Distribution. Currently known from the northwest coast of Australia. Specimens examined in this study had been collected from depths of 34–63 m (Figs. 31, 34b).

Etymology. The species name, *sororreginae*, treated as a noun in apposition, formed from a combination of Latin *soror* (sister) and *regina* (queen), is derived from its similarity to the eastern Australian species, Eastern Queen Scorpionfish (*S. regina*).

Discussion

Redefinition of the genus *Scorpaena*

The Indo-Pacific genus *Scorpaena* is most closely related to *Sebastapistes*. Although Smith (1957) and Eschmeyer (1986) differentiated between *Scorpaena* and *Sebastapistes* (naked chest in former vs. scaled chest in latter) based on specimens found in the western Indian Ocean, that character is not reliably applicable to all Indo-Pacific species in both genera. The recent diagnostic characteristic of the genera in the Indo-Pacific, given by Poss (1999), Motomura et al. (2005b, 2006, 2007, 2014), and Motomura (2009), was based on occipital pit condition, *Scorpaena* having an occipital pit (vs. occipital pit absent, or occiput flat or slightly convex but never concave in *Sebastapistes*). However, although an occipital pit is consistently present in all species of *Scorpaena*, it is also distinct in *Sebastapistes ballieui* and *S. mauritiana*. In this study, the two species were confirmed truly belonged to the genus *Sebastapistes*.

Specimen comparisons of both *Scorpaena* and *Sebastapistes* found no additional characters that clearly separated the genera. Although most species of *Sebastapistes* differed from those of *Scorpaena* in having one or two suborbital spines (vs. three spines in the latter), *Sebastapistes taeniophrys* (Fowler 1943) and *Sebastapistes tinkhami* (Fowler 1946) also had three suborbital spines. However, the combination of "presence of occipital pit and number of suborbital spines" was found to be reliable for distinguishing between the genera. All species of *Scorpaena* consistently had an occipital pit and three suborbital spines, whereas neither character or at most only one was present in species included in *Sebastapistes*. As a result, the diagnostic characters of Indo-Pacific *Scorpaena* and *Sebastapistes*, previously given by Poss (1999), Motomura et al. (2005b, 2006, 2007, 2014), and Motomura (2009), are modified as follows: *Scorpaena* - "12 dorsal-fin spines; teeth on palatines; occipital pit present; some pectoral-fin rays branched; pored lateral-line scales continuing onto caudal-fin base; and 3

suborbital spines"; *Sebastapistes* - "12 dorsal-fin spines; teeth on palatines, occipital pit (except in *S. ballieui* and *S. mauritiana*) and lateral lacrimal spine absent; posterior lacrimal spine directed posteroventrally; pored lateral-line scales continuing onto caudal-fin base; and 1 or 2 (except in *S. taeniophrys* and *S. tinkhami*) suborbital spines".

Body size and habitats

The maximum body sizes of examined specimens of Indo-Pacific species of *Scorpaena*, ranging from the smallest (*S. sororreginae*, 43.6 mm SL) to the largest (*S. cardinalis*, 472.5 mm SL), are presented in Fig. 34a. Only seven species had a relatively small mature body size (less than 100 mm SL), the others being relatively large, with maximum recorded lengths between 100 to nearly 500 mm SL. In addition, the depth distributions of the Indo-Pacific species encompassed a wide overall range, from 0 to 600 m (Fig. 34b), seven species occupying shallow habitats < 100 m, and eleven ranging from depths < 100 m (some near surface) to a few hundred meters. *Scorpaena lacrimata* has been collected only from deeper water (ca. 400 m depth), and the depth distributions of *S. decemradiata* and *S. nasicornua* remain unknown.

Ontogenetic changes and sexual differences

Analysis of developmental stages ranging from 22.5–64.5 mm SL of specimens of *S. regina*, disclosed that [as previously reported in *S. bulacephala*, *S. cardinalis* and *S. jacksoniensis* (Motomura et al. 2005a, 2011b)] the number of branched pectoral-fin rays in this species tended to increase with growth (Fig. 35). Furthermore, scales enclosed by the posterior tips of the upper and lower opercular spines and opercular margin also changed with growth, from cycloid to ctenoid, all in the smallest specimen being cycloid, cycloid and ctenoid in larger specimens to 40.0 mm SL, and ctenoid only in specimens exceeding 40.0

mm SL [similar changes in these scales also reported for *S. bulacephala* and *S. onaria* by Motomura et al. (2005a, b)].

Changes in the relative lengths of some body parts with growth in Scorpaenidae have been reported by many authors, e.g., fin spines and soft rays become relatively shorter with growth in species of *Scorpaenopsis* (Randall and Eschmeyer 2002), and head length and interorbital width decrease, whereas the spinous dorsal-fin base, and eleventh and twelfth dorsal-fin spine and third anal-fin spine lengths increase in *Scorpaenodes varipinnis* (Shinohara 1998: fig. 2). Similar changes have also previously been reported in some species of *Scorpaena*, e.g., orbit diameter and second anal-fin spine length of *S. onaria* become significantly less with growth (Motomura et al. 2005b: fig. 7), pelvic-fin spine and caudal-fin lengths, and occipital pit length and width in *S. bulacephala* all decrease significantly with growth (Motomura et al. 2005a: fig. 4), and in *S. cardinalis* and *S. jacksoniensis*, the orbit diameter and all fin ray lengths decrease with growth, whereas the head, snout, upper-jaw and postorbital lengths increase significantly (Motomura et al. 2011b: fig. 10).

As found in other species of *Scorpaena*, analyses of 42 measurements in this study disclosed that some dimensions in six species of *Scorpaena* (*S. miostoma*, *S. neglecta*, *S. papillosa*, *S. regina*, and *S. vesperalis*, *S. longaecrista*) also changed noticeably relative to SL with growth. There are two common types of the changes e.g., becoming greater and shorter with growth (Table 11; selected characters presented in Figs. 36, 37, 38a–c, 39–41), but some body proportions of the two subspecies of *S. papillosa* showed interesting growth patterns with combination of the both changes, viz., interorbital width at the eye vertical midline, predorsal-fin length and head width became less in specimens < ca. 80.0 mm SL, but became relatively stable, or increased with growth thereafter (former and two latter characters, respectively). In contrast, 1st to 5th dorsal-fin spine, all anal-fin spines (except the 1st anal-fin

spine of *S. p. ergastulorum*), and longest anal-fin soft ray became longer in specimens < ca. 80 mm SL, but decreased with further growth (selected characters presented in Fig. 38d–f).

Sexual dichromatism (presence or absence of a large black blotch on the spinous portion of the dorsal fin) has been reported in 10 species (viz., *S. bulacephala*, *S. gasta*, *S. jacksoniensis*, *S. miostoma*, *S. neglecta*, *S. onaria*, *S. papillosa*, *S. pepo*, *S. regina*, and *S. vesperalis*), males and females being characterized by the presence and absence of the blotch, respectively (Motomura et al. 2005a, b, 2006, 2007, 2011b; Wibowo and Motomura 2019a, b, 2020; Wibowo et al. 2019). Specimens of *S. colorata*, *S. scrofa*, *S. sumptuosa*, and *S. sororreginae* may or may not exhibit the blotch, suggestive of sexual dichromatism in these species also. However, a blotch has not been found in either sex of *S. cardinalis* and *S. orgila* (Motomura et al. 2011b), and is possibly present in both sexes of *S. longaecrista* (all specimens examined in this study having the blotch). Since only their type specimens are currently known, the presence or otherwise of sexual dichromatism in *S. brevispina*, *S. decemradiata*, *S. lacrimata*, and *S. nasicornua* is unknown.

Species complexes

Nine of 21 valid species of Indo-Pacific genus *Scorpaena* can be grouped into four complexes as the following below on the basis of some distinct morphological characters. These complexes were defined as artificial and some of them may not represent evolutionally valid clades.

***Scorpaena cardinalis* complex.** The complex, including *S. cardinalis*, *S. jacksoniensis*, and *S. orgila*, is characterized by having the lateral lacrimal spine with two or three spinous points. Distribution of the complex is restricted only from the South Pacific, the two former species from east Australian and New Zealand waters, and the latter endemic species of Easter Island.

***Scorpaena neglecta* complex.** The complex, including the Indo-West Pacific species *S. neglecta* and the western Indian Ocean *S. scrofa*, is characterized by having dermal flap on pectoral-fin axil.

***Scorpaena papillosa* complex.** Members of the complex, resembled each other in sharing dorsal fin with 10 soft rays, coronal and anterodorsal lacrimal spines present, and lateral lacrimal spine with single spinous point, include *Scorpaena vesperalis* (southwestern Australia), *S. p. esrgastulorum* (southeastern Australia), and *S. p. papillosa* (New Zealand).

***Scorpaena sumptuosa* complex.** Two co-occuring species in the west coast of Australia, *S. gasta* and *S. sumptuosa*, form a single complex in sharing two characters: lateral surface of maxilla with a distinct longitudinal ridge and anteroventral surface of lower jaw with one or two pairs of slender tentacles in ventral view.

Comparisons

Although appearances of Indo-Pacific species of *Scorpaena* are generally similar to each other, detailed examination of numerous specimens in this study recognized that many characters, e.g., meristic, morphometric, morphology, and coloration, are useful to distinguish from each other.

Scorpaena cardinalis belongs to the *S. cardinalis* complex, including *S. jacksoniensis* and *S. orgila*. The two Australasian species, *S. cardinalis* and *S. jacksoniensis*, can be easily distinguished each other in having pored lateral-line scales 23–25 (mode 24) in the former [vs. 22–24 (mode 23) in the latter] (see Table 1); scales above lateral line 6–9 (8) [vs. 4–6 (5)]; scale rows in longitudinal series 60–74 (68) [vs. 52–61 (55)]; scale rows between sixth dorsal-fin spine base and lateral line 8 or 9 (9) [vs. 6–8 (7)], between last dorsal-fin spine base and lateral line 8–11 (10) [vs. 7–9 (9)]; pre-dorsal scale rows 4–8 (vs. 1–4); posterior lacrimal spine with 1–3 (usually 2) spinous points (vs. simple); exposed scales covering anteroventral surface of body (vs. embedded scales covering anteroventral surface of body, not visible

without dissection); two large white blotches on caudal-fin base (vs. no distinct white blotches on caudal-fin base). Furthermore, the Easter Island endemic species, *S. orgila* can be distinguished from the other two members in having fewer number of scale rows below lateral line 16–19 (vs. 20–26 in the latter). *Scorpaena orgila* is similar to *S. cardinalis* in overall body appearance, having exposed cycloid scales covering the anteroventral surface of the body (some scales covered by thin skin), thin skin without sensory pores or canals covering a space between the upper and lower opercular spines, 24 pored lateral-line scales, and 8–10 scales above the lateral line. In addition to the number of scale rows below lateral line, *S. orgila* can also be distinguished from *S. cardinalis* in having a lower number of scale rows in the longitudinal series 50–59 [vs. 60–74 (mode 68) in the latter].

The Indo-West Pacific species *Scorpaena neglecta* differs from another member of *S. neglecta* complex, the western Indian Ocean species *S. scrofa*, in having no distinct tentacles on the ventral surface of lower jaw (vs. numerous tentacles present, in the latter). The body color of preserved specimens of *S. neglecta* and *S. scrofa* were generally similar, being yellowish to pale brownish with several indistinct irregular saddles dorsally. However, the former lacked small scattered spots on the head [vs. several small distinct blackish or brownish spots usually scattered on head, including snout, nape, and upper half of preopercle and opercle; Fig. 22, see also Fricke and Zhukov 2019: fig. 1].

The southwestern Australian species *Scorpaena vesperalis* differs from other members of the *S. papillosa* complex [*S. p. papillosa* (New Zealand) and *S. p. ergastulorum* (southeastern Australia)] in having relatively fewer pectoral-fin rays 14–16 (mode 15) [vs. 15–17 (16) in the latter] and fewer longitudinal scale rows 37–41 (40) [vs. 41–48 (44 or 45)] (Tables 1, 5). In addition, *S. vesperalis* can be distinguished from *S. p. papillosa* by having fewer numbers of scale rows above and below the lateral line 4–6 (5) and 9–12 (11), respectively, [vs. 6–8 (7) and 13–18 (14), respectively, in the latter] and between the 6th dorsal-fin spine base and

lateral line, and between the posteriormost dorsal-fin spine base and lateral line 4–6 (5) and 4–6 (5), respectively, [vs. 6–8 (7) and 6–8 (7), respectively] (Table 5). *Scorpaena vesperalis* apparently attains a smaller adult maximum size than either subspecies of *S. papillosa*, the maximum recorded length of *S. vesperalis* being 67.6 mm SL (vs. 148.7 mm SL and 208.4 mm SL in *S. p. ergastulorum* and *S. p. papillosa*, respectively). In addition, several morphometric characters of *S. vesperalis* also differ significantly based on independent sample t-test ($p \leq 0.01$) from those of both of the latter (specimens less than 70 mm SL), being characterized by a relatively deeper body and maxilla, longer upper-jaw and postorbital, greater distance between the interorbital ridges, and a shorter 1st anal-fin spine (Fig. 18; Table 7). Furthermore, *S. vesperalis* can be distinguished from other congeners in the complex by the following: anterior lacrimal spine simple, without additional small spinous points posteriorly (vs. simple or with 1–3 small additional spinous points posteriorly in the latter) (Table 5); a single united pore behind the lower jaw symphysial knob (vs. single united or two separated pores) (Table 5); relatively large supraocular tentacle, its length greater than half pupil diameter [vs. usually tiny]. Moreover, although no differences on fresh coloration between *S. vesperalis* and *S. papillosa* (body variegated), and the head and body coloration of preserved specimens of the species are generally similar (yellowish-brown with dark brown or blackish markings), all fins of preserved specimens of the former usually uniformly whitish to translucent (vs. all fins usually pale yellowish-brown, with many small blackish spots on soft rayed portions).

The two subspecies of *S. papillosa* are similar to each other, sharing all body proportions, head spination, and coloration. However, *S. p. ergastulorum* is distinguished from *S. p. papillosa* in several meristics, viz., relatively fewer numbers of scale rows above and below the lateral line [4–7 (mode 6) and 10–14 (12), respectively, [vs. 6–8 (7) and 13–18 (14), respectively, in the latter] and between the 6th dorsal-spine base and lateral line, and between

the last dorsal-fin spine base and lateral line 5–7 (5 or 6) and 4–7 (5), respectively, [vs. 6–8 (7) and 6–8 (7), respectively]; and pores behind the lower jaw symphysial knob united or separated (vs. usually separated) (Table 5). Although the populations of *S. papillosa* from southeastern Australia and New Zealand are regarded herein as conspecific, based on morphological and molecular (CO1 gene) data, further DNA analysis is required to solidify their taxonomic status.

Scorpaena gasta, together with *S. sumptuosa*, belong to the *S. sumptuosa* complex, co-occuring in the west coast of Australia. The two species can be distinguished each other in having pectoral-fin rays 15 (rarely 14) in *S. gasta* [vs. 16 (rarely 14, 15, or 17) in *S. sumptuosa*] (see Table 1); scale rows in longitudinal series 35–42 (vs. 42–47), below lateral line 13 or 14 (vs. 16–18), between 6th dorsal-fin spine base and lateral line 5 (vs. 6–8), between last dorsal-fin spine base and lateral line 5 (vs. 6–8); 2nd, 3rd, and 4th dorsal-fin spine lengths 11.4–15.3% of SL, 15.8–18.6% of SL, and 17.9–19.0% of SL, respectively (vs. 16.8–23.7% of SL, 22.0–29.6% of SL, and 22.1–25.9% of SL, respectively in the latter); and caudal peduncle depth 10.5–11.7% of SL (vs. 11.5–14.3% of SL).

In addition to the grouping of complex species, based on the structure of lateral lacrimal region, Indo-Pacific species of *Scorpaena* can be divided into four groups: those with no lateral lacrimal spine (Fig. 43a), including 10 species (*S. bulacephala*, *S. colorata*, *S. decemradiata*, *S. regina*, *S. longaecrista*, *S. sororreginae*, and each two members of *S. neglecta* and *S. sumptuosa* complexes, respectively); those with a single spinous point on both the lateral lacrimal and anterodorsal lacrimal spines (Fig. 43b), including members of the *S. papillosa* complex; those with a single spinous point on the lateral lacrimal spine (Fig. 43c), six species (*S. brevispina*, *S. lacrimata*, *S. miostoma*, *S. nasicornua*, *S. onaria*, and *S. pepo*); and those with two or three spinous points of the lateral lacrimal spine (Fig. 43d), including members of the *S. cardinalis* complex. However, two species of this genus, *S. brevispina* and

S. decemradiata, have a unique character allowing easy differentiation from all other Indo-Pacific congeners, e.g., anterior lacrimal spine clearly directed ventrally in *S. brevispina* (see fig. 2 in Motomura and Senou 2008) [vs. directed forward or slightly canted anteroventrally (in all other Indo-Pacific species of *Scorpaena*)]; 29 or 30 pored lateral-line scales in *S. decemradiata* (vs. 21–25).

Furthermore, *S. lacrimata*, *S. miostoma* and *S. nasicornua* can be distinguished from all other members of the group characterized by lateral lacrimal spine with a single spinous point by having the following combination of characters, e.g., *S. lacrimata* (numbers of scale rows in longitudinal series 62; rows above lateral line 8, below lateral line 20, between 6th dorsal-fin spine base and lateral line 11, and between last dorsal-fin spine base and lateral line 10); *S. miostoma* [no tentacles on underside of lower jaw; scale rows in longitudinal series 42–48; pectoral-fin rays 15–17 (mode 16, rarely 15 or 17; see Table 1); gill rakers 12–15 (rarely 15; see Table 1); relatively shallow body; lateral line sloping moderately downward above the anterior 1/2 of the pectoral fin; posterior margin of maxilla just reaching a vertical through posterior margin of pupil]; and *S. nasicornua* (underside of lower jaw with many tentacles). Other two species of the group, *Scorpaena onaria* and *S. pepo*, similar each other in sharing several characters: no tentacles on underside of lower jaw; 43–48 longitudinal scale series; a high body depth (36.4–45.1% of SL); lateral line sloping steeply downward above anterior 1/2 of pectoral fin; anterior lacrimal spine directed forward; tip of pectoral fin not reaching first anal-fin spine base; occipital pit shallow, its length usually subequal to width. However, *Scorpaena onaria* can be distinguished from *S. pepo* by having pectoral-fin rays usually 17 (rarely 16 or 18) [vs. 16 (rarely 17) in the latter] (see Table 1); median interorbital ridge present or absent (if present, short, ending anterior to margin of preocular spine bases, its highest portion lower than interorbital ridges) (vs. always present, long, well developed, ending posterior to posterior margin of preocular spine bases or posterior to posterior margin

of opercular spine bases, its highest portion higher than interorbital ridges); postorbital spine absent (vs. usually present); posterior margin of maxilla usually located below eye level, between center of pupil and posterior margin of orbit (vs. well beyond a vertical through posterior margin of orbit); and small black spots usually absent on head, some present on body and fins (vs. numerous small distinct black spots scattered over head, body, and fins).

The five remaining species, non complexes and non species with unique characters discussed above (*S. bulacephala*, *S. colorata*, *S. longaecrista*, *S. regina*, and *S. sororreginae*), characterized by lacking lateral lacrimal spine (Fig. 43a), can be divided into two groups: the former three species characterized in having number of the pectoral-fin rays 16–18 (rarely 16, Table 1), bases of the parietal and tympanic spines about level, and occipital pit bordered laterally by interorbital ridges (Fig. 26a), whereas the latter two species characterized in having pectoral-fin rays 13–17 (rarely 17, Table 1), bases of parietal spines distinctly medial to tympanic spines, and occipital pit bordered laterally by tympanic and parietal spines (Fig. 26b).

The western Australian species *Scorpaena longaecrista* can be distinguished from the Tasman Sea and Vanuatu species *S. bulacephala* and the Hawaiian species *S. colorata* in having the lower number of total gill rakers 13–16 (vs. 17–20 in the latter two species) and the anterior lacrimal spine usually simple [rarely with an additional spinous point or bump (2 and 7, respectively, of examined specimens)] (vs. with 1–3 additional points in *S. bulacephala* and 1 or 2 in *S. colorata*). In addition, the following scale row counts of the *S. longaecrista* appear to be diagnostic (the low number of specimens from which counts could be obtained makes necessary future examination of additional material for character validation): scale rows below lateral line 12 (vs. 13–16 in *S. bulacephala* and 14–16 in *S. colorata*); scale rows in longitudinal series 43 or 44 (vs. 44–49 in *S. colorata*); and scale rows between 6th dorsal-fin spine base and lateral line 5 or 6 (vs. 7 or 8 in *S. colorata*). Furthermore, *S. longaecrista*

can also be distinguished from *S. bulacephala* in several morphometrics, including relatively shorter 9th to 11th dorsal-fin spine lengths, 10.4–14.3 (mean 12.4) % of SL [vs. 13.4 –16.6 (14.9) % of SL in the latter], 7.9–11.1 (9.1) % of SL [vs. 9.5–14.0 (12.3) % of SL], and 7.5–9.2 (8.3) % of SL [vs. 8.7–10.8 (9.8) % of SL], respectively, and pre-pelvic-fin length 38.1–43.3 (41.0) % of SL [vs. 40.2 –48.0 (46.0) % of SL] (Fig. 27).

The western Australian species *Scorpaena sororreginae* is most similar to the eastern Australian species *S. regina* in overall body appearance. *Scorpaena sororreginae* differs from *S. regina* in having relatively less scale rows above the lateral line and more gill rakers on the upper and lower limbs (plus total rakers), as presented in Table 10. In addition, *S. sororreginae* also differed from *S. regina* in having some relatively greater morphometric ratios [due to the ontogenetic changes noted in *S. regina*, comparisons with *S. sororreginae* (maximum body size 43.6 mm SL) were limited to individuals of the former < 45.0 mm SL]: body width 15.9–21.3 (mean 19.1) % of SL [vs. 15.4–22.0 (17.8) % of SL in *S. regina*]; 9th dorsal-fin spine length 11.1–13.5 (12.4) % of SL [vs. 8.9–13.3 (10.6) % of SL]; and 10th dorsal-fin spine length 8.4–10.9 (9.5) % of SL [vs. 6.5–9.9 (8.1) % of SL] (Fig. 29). Furthermore, S. *sororreginae* and *S. regina* are allopatrically distributed, the former being confined to the west coast of Australia in depths of 34–63 m and the latter to the east coast in depths of 2–57 m.

Acknowledgments

I greatly appreciated comments on the manuscript by H. Motomura (KAUM), R. Terada (United Graduate School of Agriculture Science, Kagoshima University), T. Yamamoto (Faculty of Fisheries, Kagoshima University), Y. Sakamaki (Faculty of Agriculture, Kagoshima University), and G. Kume (Faculty of Fisheries, Kagoshima University). I am especially grateful to M. McGrouther, A. Hay and S. Reader (AMS), S.-P. Huang (ASIZ), J. Maclaine (BMNH), L. O'Hara and A. Suzumoto (BPBM), H. Endo (BSKU), D. Catania and M. Hoang (CAS), H. Kawase (CMNH), A. Graham and J. Pogonoski (CSIRO), S. Kimura (FRLM), H. Yoshigou (HMNH), H. Senou (KPM), P. Pruvost, R. Causse, Z. Gabsi, J. Pfliger, and P. Béarez (MNHN), Y. Iwatsuki (MUFS), M.-D. Wandhammer (MZS), M. Gomon and D. Bray (NMV), C. Pollmann, A. Palandacic, B. Riedel, N. Bogutskaya, and E. Mikschi (NMW), C. Struthers and L. Moore (NMNZ), G. Shinohara and M. Nakae (NSMT), G. Dally and M. Hammer (NTM), K.-Y. Wu (NTUM), S. Matsui and K. Hatooka (OMNH), J. Johnson (QM), R. de Ruiter (RMNH), O. Gon and W. Holleman (SAIAB), K. Miyamoto (URM), J. Williams, S. Raredon, K. Murphy, S. Smith, E. Wibur, and D. Pitassy (USNM), and G. Moore and M. Allen (WAM) for opportunities to examine specimens, R. Fricke (Lauda-Königshofen, Germany) for providing photographs of *S. decemradiata* and *S. nasicornua* and his advice on new scientific names, and to G. Hardy (Ngunguru, New Zealand) for reading the manuscript and assisting with English. I also thank Y. Haraguchi, M. Itou, M. Takayama, S. Onishi, H. Tatsukawa and other volunteers, and students of KAUM for their curatorial assistance.

References

Alcock A (1896) Natural history notes from H. M. Indian marine survey steamer 'Investigator', Commander C.F. Oldham, R.N. commanding. Series II. No. 23. A supplementary list of the marine fishes of India, with descriptions of two new genera and eight new species. J Asiat Soc Bengal, Pt. 2, Nat Sci 65:301–338

Allen GR, Cross N (1989) Scorpaenidae. In: Paxton JR, Hoese DF, Allen GR, Hanley JE (eds) Zoological catalogue of Australia. Vol. 7. Pisces. Petromyzontidae to Carangidae. Australian Government Publishing Service, Canberra, pp 438–452

Allen GR, Cross NJ, Hoese DF (2006) Scorpaenidae. Lionfishes, rockfishes, scorpionfishes, stingfishes, stonefishes, waspfishes. In: Hoese DF, Bray DJ, Paxton JR, Allen GR (eds) Zoological catalogue of Australia. Vol. 35, parts 1–3: fishes. CSIRO Publishing, Collingwood, pp 876–892

Bennett ET (1828) Observations on the fishes contained in the collection of the Zoological Society. On some fishes from the Sandwich Islands. Zool J 4:31–42

Bleeker P (1849) Bijdrage tot de kennis der Scleroparei van den Soenda-Molukschen Archipel. Verh Batav Genootsch Kunst 22:1–10

Bleeker P (1852) Nieuwe bijdrage tot de kennis der ichthyologische fauna van Ceram. Natuurk Tijdschr Ned Indië 3:689–714

Bleeker P (1857) Bijdrage tot de kennis der ichthyologische fauna van de Sangi-eilanden. Natuurk Tijdschr Ned Indië 13:369–380

Bleeker P (1876) Genera familiae Scorpaenoideorum conspectus analyticus. Akad Amsterdam Verslag (Ser 2) 9:294–300

Bloch ME, Schneider JG (1801) M. E. Blochii, Systema Ichthyologiae Iconibus cx Ilustratum. Post obitum auctoris opus inchoatum absolvit, correxit, interpolavit Jo. Gottlob

Schneider, Saxo. Sumtibus Auctoris Impressum et Bibliopolio Sanderiano Commissum, Berolini

Bonnaterre JP (1788) Tableau encyclopédique et methodique des trois règnes de la nature. Ichthyologie. Panckoucke, Paris

Boeseman M (1947) Revision of the fishes collected by Burger and Von Siebold in Japan. Zoologische Mededelingen, Leiden

Castelnau F (1875) Researches on the fishes of Australia. In: Official Record, Containing Introduction, Catalogues, Official Awards of the Commissioners, Report and Recommendations of the Experts, and Essays and Statistics on the Social and Economic Resources of the Colony of Victoria, Melbourne, pp 1–52

Chen L-C (1981) Scorpaenid fishes of Taiwan. Quarterly Journal of the Taiwan Museum 34: 1–60

Chen Q, Yongzhen C, Xingming M (1997) Fishes from Nansha Islands to South China Coastal Waters. Vol. 1. Science Press, Beijing

Cuvier G, Valenciennes A (1829) Histoire Naturelle des Poissons. Tome Quatrième. Chez F. G. Levrault, Paris

Day F (1878) The fishes of India; being a natural history of the fishes known to inhabit the seas and fresh waters of India, Burma, and Ceylon. Vols 1, 2. Bernard Quaritch, London

Ebert DA, Ho H-C, White WT, de Carvalho MR (2013) Introduction to the systematics and biodiversity of sharks, rays, and chimaeras (Chondrichthyes) of Taiwan. Zootaxa 2752:5–19

Eschmeyer WN (1965) Western Atlantic scorpionfishes of the genus *Scorpaena*, including four new species. Bull Mar Sci 15:84–164

Eschmeyer WN (1969) A systematic review of the scorpionfishes of the Atlantic Ocean (Pisces: Scorpaenidae). Occ Pap Calif Acad Sci 79:1–143

Eschmeyer WN, Allen GR (1971) Three new species of scorpionfishes (family Scorpaenidae) from Easter Island. Proc Calif Acad Sci (Ser 4) 37:515–527

Eschmeyer WN, Randall JE (1975) The scorpaenid fishes of the Hawaiian Islands, including new species and new records (Pisces: Scorpaenidae). Proc Calif Acad Sci (Ser 4) 40:265–333

Eschmeyer WN (1986) Scorpaenidae. In: Smith MM, Heemstra PC (eds) Smith's Sea Fishes. Macmillan, Johannesburg, pp 463–478

Fowler HW (1935) Description of a new scorpaenoid fish (*Neomerinthe hemingwayi*) from off New Jersey. Proc Acad Nat Sci Philad 87:41–43

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 U S Natl Mus 85:31–135

Fowler HW (1943) Contributions to the biology of the Philippine Archipelago and adjacent regions. Descriptions and figures of new fishes obtained in Philippine seas and adjacent waters by the United States Bureau of Fisheries steamer ''*Albatross''*. Bull US Natl Mus 100:53–91

Fowler HW (1946) A collection of fishes obtained in the Riu Kiu Islands by Captain Ernest R. Tinkham, A.U.S. Proc Acad Nat Sci Philad 98:123–218.

Fowler HW (1955) A collection of coral-reef fishes made by Dr. and Mrs. Marshall Laird at Fiji. Trans Roy Soc New Zealand 83:373–381

Fricke R, Kulbicki M, Wantiez L (2011) Checklist of the fishes of New Caledonia, and their distribution in the Southwest Pacific Ocean (Pisces). Stuttg Beitr Naturkd 4:341–463

Fricke R, Allen GR, Andréfouët S, Chen WJ, Hamel MA, Laboute P, Mana R, Hui TH, Uyeno D (2014) Checklist of the marine and estuarine fishes of Madang District, Papua New Guinea, western Pacific Ocean, with 820 new records. Zootaxa, 3832:1–247

Fricke R, Golani D, Appelbaum-Golani B, Zajonz U (2018) *Scorpaena decemradiata* new species (Teleostei: Scorpaenidae) from the Gulf of Aqaba, northern Red Sea, a species distinct from *Scorpaena porcus*. Sci Mar 82:1–16

Fricke R, Eschmeyer WN, Van der Laan R (eds) (2019) Eschmeyer's catalog of fishes: genera, species, references. Available from: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. Accessed 28 February 2019

Fricke R, Zhukov MY (2019) New record of the red scorpionfish *Scorpaena scrofa* Linnaeus, 1758 (Teleostei: Scorpaenidae) from the Saya de Malha Bank, western Indian Ocean. Cah Biol Mar 60:465–468

Fricke R, Golani D, Appelbaum-Golani B, Zajonz U (2020) New record of the red scorpionfish, *Scorpaena scrofa* (Actinopterygii: Scorpaeniformes: Scorpaenidae) from deep waters off Israel, Gulf of Aqaba, Red Sea. Acta Ichthyol Piscat 50:357–362

Fricke R, Zhukov MY (2020) *Scorpaena nasicornua* sp. nov. (Teleostei: Scorpaenidae) from the Gulf of Aden, northwestern Indian Ocean. Cah Biol Mar 60:115–124

Gilbert CH (1905) The deep-sea fishes of the Hawaiian Islands. Part II. Section II. In: Jordan DS, Evermann BW (eds) The aquatic resources of the Hawaiian Islands. Bull US Fish Comm 23:577–713

Ginsburg I (1953) Western Atlantic scorpionfishes. Smithson Misc Coll 121:1–103

Gloerfelt-Tarp T, Kailola PJ (1984) Trawled fishes of southern Indonesia and northwestern Australia. Australian Development Assistance Bureau, Directorate General of Fisheries, Indonesia, German Agency for Technical Cooperation, Jakarta

Gmelin JF (1789) Caroli a Linné ... Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species; cum characteribus, differentiis, synonymis, locis.

Editio decimo tertia, aucta, reformata, 3 vols in 9 parts. Lipsiae, 1788–93. Systema Naturae Linné 1:1033–1516

Goode GB, Bean TH (1896) Oceanic ichthyology, a treatise on the deep-sea and pelagic fishes of the world based chiefly upon the collections made by the steamers Blake, Albatross, and Fish Hawk in the North-west Atlantic, with an atlas containing 417 figures. USNM Special Bulletin

Gosline WA, Brock VE (1960) Handbook of Hawaiian fishes. University of Hawai‘i Press, Honolulu

Graham DH (1974) A Treasury of New Zealand Fishes. 2nd Edition. A.H. & A.W. Reed, Wellington

Günther A (1860) Catalogue of the acanthopterygian fishes in the collection of the British Museum. Vol. 2. Squamipinnes, Cirrhitidae, Triglidae, Trachinidae, Sciaenidae, Polynemidae, Sphyraenidae, Trichiuridae, Scombridae, Carangidae, Xiphiidae. British Museum Trustees, London

Günther A (1874) Andrew Garrett’s fische der Südsee, band 1, heft. 3. J Mus Godeffroy 2:58–96

Günther A (1877) Preliminary notes on new fishes collected in Japan during the expedition of H. M. S. ‘*Challenger*.’ Ann Mag Natr Hist (Ser 4) 20:433–446

Hildebrand SF (1946) A descriptive catalog of the shore fishes of Peru. Bull Am Mus Nat Hist 189:1–530

ICZN (The International Commission on Zoological Nomenclature) (1999) International code of zoological nomenclature, 4th edition. Adopted by the General Assembly of the International Union of Biological Sciences. International Trust for Zoological Nomenclature, London

Jatzow R, Lenz H (1898) Fische von Ost-Afrika, Madagaskar und Aldabra. Abh Senckenberg Naturf Ges 21:497–531

Jordan DS, Snyder JO (1900) A list of fishes collected in Japan by Keinosuke Otaki, and by the United States steamer Albatross, with descriptions of fourteen new species. Proc U S Natl Mus 23:335–380

Jordan DS, Starks EC (1904) A review of the scorpaenoid fishes of Japan. Proc U S Natl Mus 27:91–175

Kanayama T (1982) Scorpaenidae. In: Okamura O, Amaoka K, Mitani F (eds) Fishes of the Kyushu-Palau Ridge and Tosa Bay. The intensive research of unexploited fishery resources on continental slopes. Japan Fisheries Resource Conservation Association, Tokyo, pp 392–397

Kim IS, Choi Y, Lee CL, Lee YJ, Kin BJ, Kim JH (2005) Illustrated Book of Korean Fishes. Kyo-Hak publishing, Seoul

Kuiter RH (1993) Coastal fishes of south-eastern Australia. University of Hawaii Press, Honolulu

Kuiter RH (1997) Guide to sea fishes of Australia. A comprehensive reference for divers and fishermen. New Holland Publishers, Frenchs Forest, New South Wales

Kyushin K, Amaoka K, Nakaya K, Ida H (1977) Fishes of Indian Ocean. Japan Marine Fishery Resource Centre, Tokyo

Lichtenstein MHC (1844) Descriptiones animalium quae in itinere ad Maris Australis terras per annos 1772, 1773 et 1774 suscepto, collegit observavit et delineavit Ioannes Reinoldus Forster Regiae Societatis Scientiarum Londinensis sodalist nunc demum editae auctoritate et impenis Academiae Litterarum Regiae Berolini curante Henrico Lichtenstein Academiae socio. Officina Accademica, Berolini

Lindberg GU, Krasyukova ZV (1987) Fishes of the Sea of Japan and adjacent parts of Okhotsk and Yellow Sea. Part 5. Nauka Publishers, Leningrad

Linnaeus C (1758) Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I. Editio decima, reformata. Laurentii Salvii, Holmiae

Macleay W (1881) Descriptive catalogue of the fishes of Australia. Part I. Proc Linn Soc NSW 5:302–444

McCulloch AR (1929) A check-list of the fishes recorded from Australia. Part 3. Mem Aus Mus 5:329–436

Motomura H, Iwatsuki Y (1997) A preliminary report of scorpaenid, synanceiid, tetrarogid and aploactinid fishes in Miyazaki waters, southern Japan. Bull Fac Agric Miyazaki Univ 44:127–138

Motomura H (2004a) New species of scorpionfish, *Scorpaena cocosensis* (Scorpaeniformes: Scorpaenidae) from the Cocos Islands, Costa Rica, eastern Pacific Ocean. Copeia 2004:818–824

Motomura H (2004b) Revision of the scorpionfish genus *Neosebastes* (Scorpaeniformes: Neosebastidae) with descriptions of five new species. Indo-Pac Fish 37:1–75

Motomura H, Last PR, Yearsley GK (2005a) *Scorpaena bulacephala*, a new species of scorpionfish (Scorpaeniformes: Scorpaenidae) from the northern Tasman Sea. Zootaxa 1043:17–32

Motomura H, Paulin CD, Stewart AL (2005b) First records of *Scorpaena onaria* (Scorpaeniformes: Scorpaenidae) from the southwestern Pacific Ocean, and comparisons with the Northern Hemisphere population. New Zealand J Mar Freshwater Res 39:865–880

Motomura H, Last PR, Yearsley GK (2006) New species of shallow water scorpionfish (Scorpaenidae: *Scorpaena*) from the central coast of Western Australia. Copeia 2006:360–369

Motomura H, Poss SG, Shao K-T (2007) *Scorpaena pepo*, a new species of scorpionfish (Scorpaeniformes: Scorpaenidae) from northeastern Taiwan, with a review of *S. onaria* Jordan and Snyder. Zool Stud 46:35–45

Motomura H, Senou H (2008) A new species of the scorpionfish genus *Scorpaena* (Scorpaenidae) from Izu Peninsula, Pacific coast of Japan. J Fish Biol 72:1761–1772

Motomura H (2009) *Sebastapistes taeniophrys* (Fowler 1943): a valid scorpionfish (Scorpeanidae) from the Philippines. Ichthyol Res 56:62–68

Motomura H, Ogihara G, Meguro M, Matsunuma M (2009) First records of the Pumpkin Scorpionfish, *Scorpaena pepo* (Scorpaenidae), from Japan. Biogeography 11:139–143

Motomura H, Peristiwady T (2010) *Scorpaena onaria* (Scorpaenidae), previously considered to have an antitropical distribution, found in northern Sulawesi, Indonesia, western central Pacific Ocean. Biogeography 12:127–131

Motomura H, Be´arez P, Causse R (2011a) 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 35:55–73

Motomura H, Struthers CD, McGrouther MA, Stewart AL (2011b) Validity of *Scorpaena jacksoniensis* and a redescription of *S. cardinalis*, a senior synonym of *S. cookie* (Scorpaeniformes: Scorpaenidae). Ichthyol Res 58:315–332

Motomura H, Aizawa M, Endo H (2014) *Sebastapistes perplexa*, a new species of scorpionfish (Teleostei: Scorpaenidae) from Japan. Spec Div 19:133–139

Motomura H, Causse R, Béarez P, Mishra SS (2015) Redescription of the Indo-West Pacific scorpionfish (Scorpaenidae), *Neomerinthe erostris* (Alcock 1896), a senior synonym of

Scorpaena gibbifrons Fowler 1938, *N. rotunda* Chen 1981, and *N. bathyperimensis* Zajonz & Klausewitz 2002. Zootaxa 4021:529–540.

Motomura H, Béarez P, Causse R (2016a) Taxonomic status of *Scorpaena rawakensis* Quoy & Gaimard, 1824 (Scorpaenidae). Cybium 40:326–328

Motomura H, Causse R, Struthers CD (2016b) Redescription of the Indo-Pacific scorpionfish *Scorpaenodes guamensis* (Quoy & Gaimard 1824) (Scorpaenidae), a senior synonym of seven nominal species. Zootaxa 4067:345–360

Motomura H (2021) List of Japan's all fish species. Current standard Japanese and scientific names of all fish species recorded from Japanese waters. Online version 9 (7 April 2021). https://www.museum.kagoshima-u.ac.jp/staff/motomura/jaf.html. Accessed 20 May 2021

Mundy BC (2005) Checklist of the fishes of the Hawaiian Archipelago. Bishop Mus Bull Zool 6:1–703

Nakabo T (2002) Scorpaenidae. In: Nakabo T (ed), Fishes of Japan with pictorial keys to the species, English edition. Tokai University Press, Tokyo, pp 565–595, 1519–1522

Nakabo T, Kai Y (2013) Scorpaenidae. In: Nakabo T (ed) Fishes of Japan with pictorial keys to the species, 3rd edition. Tokai University Press, Hadano, pp 683–705, 1939–1946 [in Japanese]

Ogilby JD (1889) Notes on some fishes new to the Australian fauna. Proc General Meetings Sci Business Zool Soc London 1889:151–158

Ogilby JD (1910) On some new fishes from the Queensland coast. Endeavour Ser 1:85–139

Paxton JR, Hoese DF, Allen GR, Hanley JE (1989) Zoological catalogue of Australia. Vol. 7. Part 1. Pisces. Petromyzontidae to Carangidae. Australian Government Publishing Service, Canberra, pp 536–542

Paulin CD (1982) Scorpionfishes of New Zealand (Pisces: Scorpaenidae). New Zealand J Zool 9:437–450

Paulin CD (2004) New Zealand scorpionfishes (genus *Scorpaena*). Seafood New Zealand 12:61–63

Playfair RL, Günther A (1867) The fishes of Zanzibar, with a list of the fishes of the whole east coast of Africa. John van Voorst, London

Poss GS (1999) Scorpaenidae. Scorpionfishes (also, lionfishes, rockfishes, stingfishes, stonefishes, and waspfishes). In: Carpenter KE, Niem VH (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). FAO, Rome, pp 2291–2352

Poss SG (2000) Scorpaenidae. In: Randall JE, Lim KKP (eds) A checklist of the fishes of the South China Sea. Raffles Bull Zool Supp, pp 569–667

Poss SG (2016) Scorpaenidae. In: Carpenter KE, Niem VH (eds) FAO Species Identification Guide for Fishery Purposes. The Living Marine Resources of the Eastern Central Atlantic. Vol. 3. Bony Fishes Part 1 (Elopiformes to Scorpaeniformes). FAO, Rome, pp 2251–2288

Randall JE, Greenfield DW (2004) Two new scorpionfishes (Scorpaenidae) from the South Pacific. Proc Calif Acad Sci 55:382–392

Randall JE (2007) Reef and shore fishes of the Hawaiian Islands. Sea Grant College Program, University of Hawai'i, Honolulu

Regan CT (1906) Descriptions of new or little-known fishes from the coast of Natal. Annals of the Natal Government Museum

Richardson J (1842a) Contributions to the ichthyology of Australia. Ann Mag Nat Hist (New Ser) 9:207–218

Richardson J (1842b) Description of Australian fish. Trans Zool Soc London 3:69–131

Richardson J (1843 [dated 1842]) Report on the present state of the ichthyology of New Zealand. Report of the 12th meeting of the British Association for the Advancement of Science. John Murray, London, pp 12–30

Richardson J (1845) Fishes. In: Richardson J, Gray JE (eds) The zoology of the voyage of H. M. S. Erebus & Terror, under the command of Captain Sir James Clark Ross, R. N., F. R. S., during the years 1839 to 1843. Vol. 2. E. W. Janson, London, pp 1–139

Risso A (1810) Ichthyologie de Nice, ou Histoire Naturelle des Poissons du Département des Alpes Maritimes, Paris

Roberts CD, Paulin CD, Stewart AL, McPhee RP, McDowall RM (2009) Checklist of New Zealand Chordata. Living lancelets, jawless fishes, cartilaginous, and bony fishes. In: Gordon GP (ed) New Zealand inventory of biodiversity. Canterbury University Press, Christchurch

Sabaj MH (2020) Codes for natural history collections in ichthyology and herpetology. Copeia 108:593–669

Sauvage HE (1878) Description de poissons nouveaux ou imparfaitement connus de la collection du Muséum d'Histoire Naturelle. Famille des Scorpénidées, des Platycéphalidées et des Triglidées. Archs Mus Hist Nat Paris (Sér 2) 1:109–158

Shimizu T (1984) *Scorpaena miostoma* and *Scorpaena neglecta*. In: Masuda H, Amaoka K, Araga C, Uyeno T, Yoshino T (eds) The fishes of the Japanese Archipelago. Tokai University Press, Tokyo, Text, pl 314, pp 280

Shimizu T, Hatooka K (1997) New records of the fishes from the Seto Inland Sea. Izu Oceanic Park Diving News 8:2–6 [In Japanese]

Shinohara G (1998) Record of a scorpaenid fish, *Scorpaenodes varipinnis* from Japan. Japanese Journal of Ichthyology, 45:37–41 [In Japanese]

Smith JLB (1957) The fishes of the family Scorpaenidae in the western Indian Ocean. Part I. The sub-family Scorpaeninae. Ichthyol Bull Rhodes Univ 4:49–72

Steindachner F, Döderlein L (1884) Beiträge zur Kenntniss der Fische Japan's (III.). Denkschr Akad Wiss Wien Math -Naturwiss Kl 49:171–212

Steindachner F (1866) Über die Fische von Port Jackson in Australien. Anzeiger K Akad Wiss Math-Naturwiss Cl 3:50–54

Streets TH (1877) Contributions to the natural history of the Hawaiian and Fanning Islands and Lower California, made in connection with the United States North Pacific Surveying Expedition, 1873–75. Bull US Nat Mus 7:1–172

Takahashi M, Imamura H, Nakaya K (2003) Records of three fish species from western Pacific northern Japan. Bull Fish Sci Hokkaido Univ, 54:17–20 [in Japanese]

Temminck CJ, Schlegel H (1843) Pisces. Parts 2–4. In: von Siebold PF (Ed), Fauna Japonica, sive descriptio animalium quae in itinere per Japoniam suscepto annis 1823–30 collegit, notis observationibus et adumbrationibus illustravit P. F. de Siebold. Apud Arnz et Socios, Leiden, pp 21–72

Vaillant LL, Sauvage HE (1875) Note sur quelques espèces nouvelles de poissons des îles Sandwich. Rev Mag Zool 3:278–287

Walbaum JJ (1792) Petri Artedi sueci genera piscium. In quibus systema totum ichthyologiae proponitur cum classibus, ordinibus, generum characteribus, specierum differentiis, observationibus plurimis. Redactis speciebus 242 ad genera 52. Ichthyologiae pars III. Ant. Ferdin. Rose, Grypeswaldiae

Wang W-H (2011) Fishes of Taiwan. National Museum of Marine Biology and Aquarium, Pingtung [In Taiwanese]

Whitley GP (1968) A check-list of the fishes recorded from the New Zealand region. Aus Zool 15:1–102

Wibowo K, Motomura H (2019a) Redescription of the Indo-West Pacific scorpionfish *Scorpaena neglecta* Temminck & Schlegel 1843, a senior synonym of four nominal species (Teleostei: Scorpaenidae). Zootaxa 4619:311–329

Wibowo K, Motomura H (2019b) *Scorpaena dabryi*, a junior synonym of *Scorpaena miostoma*, with notes on morphological ontogenetic changes (Teleostei: Scorpaenidae). Spec Div 24:169–177

Wibowo K, Johnson JW, Motomura H (2019) *Scorpaena regina*, a new scorpionfish (Teleostei: Scorpaenidae) from the east coast of Queensland, Australia. Zootaxa 4706:296–310

Wibowo K, Motomura H (2020) Review of the *Scorpaena papillosa* species complex (Teleostei: Scorpaenidae) with description of a new species from southwestern Australia. Zootaxa 4852:527–546

Wibowo K, Motomura, H (2021). Review of Indo-Pacific species of the scorpionfish genus *Scorpaena* (Teleostei: Scorpaenidae), with descriptions of two new species from the west coast of Australia. Ichthyol Res doi:10.1007/s10228-021-00827-0

Yatou T (1985) Scorpaenidae. In: Okamura O (ed), Fishes of the Okinawa trough and the adjacent waters. Vol. 2. The intensive research of unexploited fishery resources on continental slopes. Japan Fisheries Resource Conservation Association, Tokyo, pp 715–721

Tables

[Consist of 11 tables]

Table 1 Frequency distributions of numbers of pectoral-fin rays, pored lateral-line scales, and total gill rakers in Indo-Pacific species of *Scorpaena*

	Pectoral-fin rays									Pored lateral-line scales							Total gill rakers								
	13	14	15	16	17	18	19	20	21	21	22	23	24	25	29	30	12	13	14	15	16	17	18	19	20
S. brevispina					1							1										1			
S. bulacephala					8	1						4										3	1	1	2
S. cardinalis				3	35	20						9	56	1					3	4	20	18	9		
S. colorata				2	13	1						14										3	4	5	1
S. decemradiata				2											1	1					1	1			
S. gasta		1	52									10					2	10	1	1					
S. jacksoniensis				8	32	3					2	52	3						2	13	15	10	1	1	
S. lacrimata					1							1							1						
S. miostoma			4	125	8						1	86	5				6	49	61	22					
S. nasicornua					1							1								1					
S. neglecta					1	18	103	13	1		4	61	1						14	37	56	27	1	1	
S. onaria				5	85	1					3	75	5						7	30	41	12			
S. orgila					7							1	4	2								5	1		1
S. p. papillosa			6	76	12							76	8					1	4	12	36	30	9	1	
S. p. ergastulorum			14	55	2						1	50	5						8	22	36	8			
S. pepo				19	2						2	18							8	10	3				
S. regina	1		5	50	3					1	2	28	1					1	31	23	3	1			
S. scrofa						1	5	2				7						1	3	3	1				
S. sumptuosa		1	2	38	1					1		22					1	5	30	4					
S. vesperalis		2	48	1							2	29	8						2	9	27	18	3		
S. longaecrista				12	34	3					1							2	23	15	10				
S. sororreginae			1	19	3						1	8	1						1	10	12				

Table 2 Counts and measurements of the lectotype and paralectotype of *Scorpaena dabryi* and the holotype and non-type specimens of *S. miostoma*, expressed as percentages of standard length

	Scorpaena dabryi		*Scorpaena miostoma*	
	Lectotype	Paralectotype	Holotype	Non-type specimens
	MNHN 6882	MNHN 6882	BMNH 1879.5.14.235	n = 139
Standard length (mm)	75.5	71.0	106.4	21.5–133.4
Counts				
Dorsal-fin rays	XII, 9	XII, 9	XII, 9	XII, 8–10 (9)
Anal-fin rays	III, 5	III, 5	III, 5	III, 5–6 (5)
Pectoral-fin rays[a]	ii + 6 + viii = 16/17	ii + 5 + x = 17/17	i + 7 + viii = 16/16	i–iii (i) + 2–8 (6) + vii–xi (ix)
Scale rows in longitudinal series	–	–	44	43–47 (45 or 46)
Pored lateral-line scales	–	–	23	22–24 (23)
Scales above lateral line	6	–	5	5–8 (6)
Scales below lateral line	–	–	18	13–18 (14 or 15)
Scale rows between 6th dorsal-fin spine base and lateral line	–	–	7	6–9 (7 or 8)
Scale rows between last dorsal-fin spine base and lateral line	7	–	8	6–9 (7 or 8)
Pre-dorsal scale rows	5	–	4	4–7 (5 or 6)
Gill rakers[b]	4 + 8 + 2 = 14	5 + 7 + 2 = 14	5 + 8 + 2 = 15	4–6 (4 or 5) + 5–9 (8) + 0–3 (1 or 2) = 12–15 (13
Measurements (% SL)				
Body depth	33.2	–	37.5	32.3–39.9 (36.1)
Body width	19.6	18.6	24.2	19.0–28.2 (23.3)
Head length	42.6	44.4	45.2	41.7–47.2 (44.5)
Head width	15.6	15.3	15.3	14.5–16.6 (15.6)
Snout length	10.2	9.7	11.2	9.6–12.8 (11.2)

Orbit diameter	13.4	13.7	13.1	11.3–15.3 (13.5)
Interorbital width[c]	5.7	6.1	5.0	5.3–7.8 (6.5)
Interorbital width[d]	5.6	5.5	4.8	4.3–6.8 (5.7)
Upper-jaw length	21.2	20.3	21.3	18.7–23.2 (21.2)
Maxilla depth	7.2	6.5	6.9	6.3–8.8 (7.1)
Postorbital length	21.2	20.6	22.2	20.7–23.7 (22.3)
Between ventral margin of orbit and suborbital ridge	2.4	1.5	2.7	0.5–3.5 (1.6)
Between tips of opercular spines	7.4	7.0	7.7	5.3–8.2 (6.9)
Occipital pit length	4.8	5.4	5.8	4.5–7.0 (5.6)
Occipital pit width	6.4	5.4	5.9	5.3–7.6 (6.5)
Post-occipital pit	7.8	10.3	6.0	6.0–11.4 (8.3)
Predorsal-fin length	35.6	37.9	35.4	32.7–39.2 (36.4)
Preanal-fin length	75.1	71.3	73.7	67.1–77.2 (71.9)
Prepelvic-fin length	40.0	38.0	42.5	30.0–44.8 (41.0)
1st dorsal-spine length	8.1	8.7	–	7.4–12.0 (9.7)
2nd dorsal-spine length	14.7	15.8	11.1	12.9–19.7 (16.2)
3rd dorsal-spine length	–	21.0	17.4	15.5–24.0 (20.0)
4th dorsal-spine length	18.7	22.1	18.9	16.3–25.1 (20.5)
5th dorsal-spine length	18.0	20.4	18.8	16.7–24.0 (19.7)
6th dorsal-spine length	17.2	17.9	–	15.1–20.8 (18.5)
7th dorsal-spine length	15.4	18.9	–	14.7–19.4 (17.3)
8th dorsal-spine length	14.6	18.0	–	14.1–18.1 (15.9)
9th dorsal-spine length	12.3	15.2	–	10.0–15.5 (13.4)
10th dorsal-spine length	10.5	12.0	–	8.7–13.0 (10.7)
11th dorsal-spine length	8.2	8.7	9.7	7.6–11.7 (10.0)
12th dorsal-spine length	14.4	15.4	14.9	12.6–18.8 (15.6)
Longest dorsal-fin soft ray length	–	–	20.9	18.6–23.3 (20.9)
1st anal-fin spine length	10.7	11.4	9.9	8.9–14.7 (11.7)

2nd anal-fin spine length	21.2	23.7	19.9	17.4–25.8 (21.7)
3rd anal-fin spine length	–	19.6	16.5	14.4–21.7 (18.3)
Longest anal-fin soft ray length	20.9	–	20.9	20.6–25.7 (23.0)
Pectoral-fin ray length	29.7	28.6	31.7	29.0–36.7 (32.9)
Pelvic-fin spine length	17.1	19.0	15.8	14.5–21.0 (17.5)
Longest pelvic-fin soft ray length	25.0	24.8	25.5	23.5–29.5 (26.7)
Caudal-fin length	28.5	26.2	27.9	26.6–33.1 (29.6)
Caudal-peduncle length	16.6	17.5	18.0	15.7–21.6 (18.5)
Caudal-peduncle depth	9.7	10.1	10.6	9.7–12.1 (10.8)

[a] Upper unbranched rays + branched rays + lower unbranched rays = total rays on left side/total rays on right side of body
[b] Rakers on upper limb + on ceratohyal + on hypobranchial = total rakers
[c] At vertical midline of eye
[d] At posterior end of preocular spine base

Table 3 Counts and measurements, expressed as percentages of standard length, of the type and non-type specimens identified as *Scorpaena neglecta*

	Scorpaena neglecta		*Scorpaena fimbriata*				*Scorpaena izensis*			*Scorpaena hemilepidota*	*Scorpaenopsella armata*	*Scorpaena neglecta*
	Lectotype	Paralectotype	Syntypes				Holotype	Paratypes		Holotype	Holotype	Non-type specimens
	RMNH. PISC. 619	RMNH. PISC. 618	MZS 1145	NMW 75383	NMW 22249	NMW 77248	USNM 50909	CAS 107366	CAS 107366	USNM 98884	USNM 98893	n = 129
Standard length (mm)	187.4	139.8	115.8	80.8	124.5	285.0	191.6	160.5	155.7	150.6	65.7	56.2–296.4
Counts												
Dorsal-fin rays	XII, 9	XII, 9	XII, 9	XII, 9	XII, 9	XII, 9	XII, 9	XII, 9	XII, 9	XII, 9	XII, 9	XII, 8–10 (9)
Anal-fin rays	III, 5	III, 5	III, 5	III, 5	III, 5	III, 5	III, 5	III, 5	III, 5	III, 5	III, 5	III, 5
Pectoral-fin rays[a]	20	18	i + 6 + xii = 19/19	i + 7 + xi = 19/19	i + 8 + x = 19/19	i + 10 + viii = 19/19	i + 11 + vii = 19/20	i + 8 + x = 19/19	i + 8 + x = 19/19	i + 8 + x = 19/19	ii + 1 + vi = 19/19	i–ii (i) + 2–14 (8 or 9) + iv–xv (ix or x) = 17–21 (19)/17–20 (19)
Scale rows in longitudinal series	–	–	–	43	45	44	46	42	43	43	46	41–47 (44 or 45)
Pored lateral-line scales	–	–	23	–	23	23	23	23	23	23	23	22–23 (23)
Scales above lateral line	–	–	6	–	–	5	6	–	–	5	6	4–7 (5 or 6)
Scales below lateral line	–	–	14	–	15	15	16	–	–	16	–	15–20 (16)
Scale rows between 6th dorsal-fin spine base and lateral line	–	–	–	–	–	–	5	–	–	7	6	5–8 (7)
Scale rows between last dorsal-fin spine base and lateral line	–	–	–	6	7	7	7	–	–	7	6	6–8 (7)
Pre-dorsal scale rows	–	–	–	–	–	5	7	6	6	5	6	3–8 (5 or 6)
Gill rakers[b]	–	–	4 + 8 + 3 = 15	5 + 9 + 3 = 17	5 + 9 + 2 = 16	5 + 9 + 2 = 16	5 + 9 + 3 = 17	16	16	5 + 9 + 2 = 16	5 + 8 + 3 = 16	4–6 (5) + 8–10 (9) + 0–4 (2) = 14–19 (16)
Measurements												
Body depth	26.9	30.6	34.8	34.4	34.1	33.3	35.9	32.6	33.8	35.7	35.3	31.4–39.7 (34.5)
Body width	19.6	19.5	18.0	14.2	17.3	20.8	23.2	23.1	23.6	23.8	19.8	19.2–25.7 (22.6)
Head length	40.8	42.7	44.8	45.2	44.6	43.4	46.3	45.5	45.2	46.4	47.5	42.9–48.9 (45.9)
Head width	12.6	14.2	–	–	–	–	13.9	–	–	14.4	14.2	13.0–15.8 (14.1)
Snout length	11.6	11.7	11.9	12.6	12.4	11.6	13.0	12.6	12.1	12.3	12.3	11.4–14.7 (12.8)
Orbit diameter	9.2	10.9	11.3	12.3	10.2	8.9	10.3	10.7	10.1	11.5	14.2	8.8–13.5 (11.0)
Interorbital width[c]	6.8	6.5	7.5	7.2	7.6	6.4	7.2	–	–	7.1	7.5	5.9–8.9 (7.2)
Interorbital width[d]	6.4	6.2	7.2	6.9	6.5	6.2	6.4	7.0	7.0	6.7	7.2	5.2–8.0 (6.6)
Upper-jaw length	20.4	20.5	22.5	23.1	22.5	20.9	23.0	22.8	23.0	23.8	23.6	20.7–24.3 (22.6)
Maxilla depth	6.0	6.5	7.1	6.7	7.9	6.8	6.8	7.4	6.9	7.1	7.5	6.2–8.3 (7.0)
Postorbital length	20.8	21.3	23.6	22.9	23.3	23.8	24.0	23.7	22.7	23.6	22.5	21.9–25.7 (23.6)

Between ventral margin of orbit and suborbital ridge	1.0	1.4	–	1.9	1.8	3.9	2.1	4.3	4.1	1.9	1.4	0.9–3.4 (2.1)
Between tips of opercular spines	6.5	6.5	–	7.1	7.3	5.4	6.4	7.1	7.5	6.8	7.3	5.4–8.0 (6.9)
Occipital pit length	4.5	4.2	–	–	–	–	5.7	–	–	6.4	6.4	3.2–6.7 (5.2)
Occipital pit width	5.0	5.9	–	–	–	–	6.1	–	–	6.2	7.5	4.9–7.7 (6.1)
Post-occipital pit	11.2	10.4	–	–	–	–	8.1	–	–	11.2	8.2	7.5–11.7 (9.7)
Predorsal-fin length	35.4	36.1	37.0	37.5	36.9	36.5	37.1	36.9	35.5	39.5	38.4	35.4–41.8 (37.6)
Preanal-fin length	75.3	74.2	73.5	71.4	74.0	79.1	73.7	76.0	76.1	74.6	73.2	69.2–77.3 (73.4)
Prepelvic-fin length	42.3	47.6	43.0	39.1	42.6	42.4	43.1	45.5	47.8	42.4	41.4	38.5–47.3 (42.5)
1st dorsal-spine length	9.0	–	8.9	8.4	8.4	6.5	9.8	9.5	8.4	–	7.6	6.7–10.8 (8.8)
2nd dorsal-spine length	14.4	–	14.7	13.9	16.4	11.6	16.1	15.2	14.8	15.1	12.6	11.0–18.4 (14.8)
3rd dorsal-spine length	17.8	18.5	17.4	18.1	19.4	–	21.2	19.8	20.7	19.0	16.3	14.2–22.1 (18.5)
4th dorsal-spine length	17.9	19.0	18.4	19.3	20.7	–	19.5	–	20.7	18.4	15.5	15.3–22.4 (18.7)
5th dorsal-spine length	16.3	18.1	17.7	19.2	19.8	–	18.0	–	–	16.1	14.6	14.1–22.1 (17.9)
6th dorsal-spine length	15.6	17.9	18.0	17.9	19.3	12.6	16.9	–	–	15.9	14.5	13.3–19.6 (16.9)
7th dorsal-spine length	15.5	16.5	16.1	17.6	17.7	12.4	15.8	–	–	15.6	–	12.9–18.7 (15.9)
8th dorsal-spine length	14.1	14.9	15.2	15.6	15.3		14.0	–	–	–	–	12.1–16.8 (14.6)
9th dorsal-spine length	11.8	12.4	14.2	13.7	13.8	9.3	11.7	–	–	12.2	9.9	9.6–15.2 (12.5)
10th dorsal-spine length	–	9.0	11.8	9.8	11.6	6.8	9.1	–	–	9.6	8.5	7.7–12.0 (9.8)
11th dorsal-spine length	8.0	7.7	9.4	9.2	10.0	7.0	8.4	8.3	8.2	8.8	6.7	6.9–12.8 (8.6)
12th dorsal-spine length	13.7	14.5	15.4	–	15.5	11.5	14.8	15.0	13.6	14.3	13.1	10.9–16.9 (14.0)
Longest dorsal-fin soft ray length	–	–	–	23.0	21.8	18.2	–	21.3	–	23.9	–	18.2–22.9 (20.7)
1st anal-fin spine length	7.5	7.4	8.6	9.3	9.9	4.0	7.6	8.0	6.7	7.8	7.0	5.7–10.8 (8.1)
2nd anal-fin spine length	14.1	14.9	15.3	17.1	16.9	9.6	16.0	14.8	15.7	15.7	14.9	11.8–20.0 (15.5)
3rd anal-fin spine length	14.5	12.9	–	17.1	16.9	10.0	13.0	15.4	15.0	13.9	14.3	10.4–19.0 (14.9)
Longest anal-fin soft ray length	20.5	–	21.1	21.8	22.0	18.1	20.2	22.4	21.3	–	18.3	18.7–24.5 (20.9)
Pectoral-fin ray length	–	–	30.0	28.3	29.0	25.3	28.7	28.7	29.0	29.0	27.7	25.1–31.3 (28.1)
Pelvic-fin spine length	11.9	14.2	15.2	17.2	16.5	8.6	12.2	14.0	13.6	13.3	14.9	9.8–18.0 (13.7)
Longest pelvic-fin soft ray length	–	–	24.3	24.5	25.9	17.8	22.2	21.6	22.2	24.4	21.6	16.4–26.8 (21.7)
Caudal-fin length	28.8	–	32.1	32.1	31.7	28.6	–	31.9	29.4	–	28.5	27.1–32.3 (29.3)
Caudal-peduncle length	14.8	16.1	15.8	15.5	14.5	17.6	16.8	14.1	22.7	16.1	15.7	14.9–19.5 (17.8)
Caudal-peduncle depth	6.2	9.2	10.2	10.0	10.4	10.3	10.2	10.2	10.7	10.6	9.7	9.9–11.8 (10.7)

[a] Upper unbranched rays + branched rays + lower unbranched rays = total rays on left side/total rays on right side of body
[b] Rakers on upper limb + on ceratohyal + on hypobranchial = total rakers
[c] At vertical midline of eye
[d] At posterior end of preocular spine base

Table 4 Counts and morphometrics, expressed as percentages of standard length, of *Scorpaena onaria*

	Scorpaena onaria				
	Non-types n = 25		Holotype of *S. pele* USNM 214046	Paratypes of *S. pele* n = 17	
Standard length (mm)	53.5–201.6	Modes	123.9	74.8–134.2	Modes
Counts					
Dorsal-fin rays	9	9	9	9	9
Pectoral-fin rays	16 or 17	17	17	17	17
Scale rows in longitudinal series	43–46	44	45	42–46	45
Pored lateral-line scales	23	23	23	23 or 24	23
Scale rows above lateral line	4–6	5	5	5 or 6	5 or 6
Scale rows below lateral line	14–17	15	16	14–16	15
Scale rows[a]	7 or 8	7	7	6–8	7
Scale rows[b]	7 or 8	7	7	7–8	7
Pre-dorsal scale rows	3–7	6	5	4–6	5
Upper gill rakers	4 or 5	5	5	4 or 5	5
Lower gill rakers	10–12	10 or 11	11	10–11	11
Total gill rakers	14–17	16	16	15 or 16	16
Measurement (% SL)		Means			Means
Body depth	37.0–43.0	40.5	38.2	35.8–41.9	38.1
Body width	19.8–25.8	23.6	18.5	18.6–24.6	21.8
Head length	45.8–50.2	47.8	45.3	44.6–47.4	46.0
Head width	14.6–16.9	15.8	15.7	14.6–16.1	15.6
Snout length	11.8–14.0	13.0	13.2	11.5–13.1	12.4
Orbit diameter	11.4–16.0	13.2	12.6	12.6–15.1	13.7
Interorbital width[c]	6.5–8.7	7.3	6.0	5.8–7.1	6.4
Interorbital width[d]	5.2–7.0	6.2	5.6	5.1–6.4	5.6
Upper jaw length	22.4–24.6	23.4	22.9	21.9–23.7	22.9
Maxilla depth	6.5–8.5	7.3	7.0	6.7–8.1	7.3
Postorbital length	22.5–25.3	23.9	21.8	20.7–22.6	21.6
Suborbital space	1.6–5.5	3.4	7.0	3.0–4.2	4.0
Between tips of opercular spines	7.5–10.3	8.7	9.3	7.5–8.8	8.0

Occipital pit length	5.0–6.9	5.6	6.3	4.5–6.6	5.7
Occipital pit width	5.2–7.7	6.4	6.5	6.3–7.7	7.0
Post-occipital pit length	7.3–11.2	9.2	8.3	6.8–9.4	7.9
Pre-dorsal-fin length	37.5–42.1	39.7	38.3	36.7–39.9	38.4
Pre-anal-fin length	71.0–77.4	73.6	71.8	69.5–75.5	73.1
Pre-pelvic-fin length	40.4–47.2	44.4	42.3	40.1–54.6	44.8
1st dorsal-fin spine length	7.8–10.5	9.2	8.6	8.0–11.0	9.2
2nd dorsal-fin spine length	14.2–19.6	16.3	16.0	13.3–18.9	16.1
3rd dorsal-fin spine length	17.5–23.6	20.3	22.7	20.5–25.3	23.0
4th dorsal-fin spine length	16.9–22.6	19.7	23.2	19.9–23.7	22.2
5th dorsal-fin spine length	16.7–21.4	18.7	22.3	19.0–22.1	20.5
6th dorsal-fin spine length	15.0–19.9	17.6	20.7	18.4–19.9	19.5
7th dorsal-fin spine length	15.0–18.8	16.4	19.3	15.8–18.2	17.6
8th dorsal-fin spine length	13.5–16.8	14.9	17.4	13.5–16.6	15.6
9th dorsal-fin spine length	11.0–13.7	12.4	14.9	11.7–13.9	12.9
10th dorsal-fin spine length	8.5–10.8	9.6	11.9	8.2–11.1	9.7
11th dorsal-fin spine length	6.7–10.4	8.2	10.3	6.9–9.8	8.6
12th dorsal-fin spine length	11.3–17.1	14.6	15.6	14.9–17.8	16.5
Longest dorsal-fin soft ray length	18.5–22.0	20.1	21.6	20.5–24.2	21.5
1st anal-fin spine length	7.8–11.6	9.7	11.4	9.4–12.4	10.8
2nd anal-fin spine length	16.3–24.1	18.9	21.1	19.6–25.6	22.5
3rd anal-fin spine length	14.0–19.9	15.8	18.6	16.7–19.9	18.4
Longest anal-fin soft ray length	19.0–23.7	21.2	23.9	22.0–26.7	23.8
Pectoral-fin ray length	26.1–31.7	29.0	28.9	27.6–33.2	30.2
Pelvic-fin spine length	13.3–20.1	15.9	17.9	16.4–20.3	18.5
Longest pelvic-fin soft ray length	22.2–27.9	24.5	27.7	24.7–30.5	27.7
Caudal fin length	25.9–33.0	29.2	29.7	28.5–32.6	30.3
Caudal peduncle length	14.5–18.4	16.2	18.0	14.5–18.6	17.3
Caudal peduncle depth	9.5–11.4	10.4	10.7	9.7–11.3	10.5

[a] between 6th dorsal-fin spine base and lateral line, [b] between last dorsal-fin spine base and lateral line, [c] at vertical midline of eye, [d] at posterior end of preocular spine base

Table 5 Frequency distribution of selected meristics in *Scorpaena papillosa papillosa*, *S. p. ergastulorum*, and *S. vesperalis*

	Dorsal-fin rays			Anal-fin rays			SR in longitudinal series											
	XII, 9	XII, 10	XII, 11	III, 4	III, 5	III, 6	37	38	39	40	41	42	43	44	45	46	47	48
S. p. papillosa	1	87[N]	6	2	91[N]	1						2	5	24[N]	25	17	13	4
S. p. ergastulorum	3	79	3		84						1	5	8	22	23	7	2	
S. vesperalis	4	53[H]			57[H]		4	7	7	14[H]	3							

	Pectoral-fin rays (left side)				SR above LL					SR below LL										
	14	15	16	17	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
S. p. papillosa		6	76[N]	12			16[N]	24	1					17	41[N]	18	8	2	1
S. p. ergastulorum		14	55	2	1	11	25	1			1	16	32	12	3				
S. vesperalis	2	48[H]	1		1	41[H]	5			1	13	28[H]	1						

	SR between 6th DS and LL					SR between last DS and LL					Predorsal-fin SR							
	4	5	6	7	8	4	5	6	7	8	0	1	2	3	4	5	6	7
S. p. papillosa			3	73[N]	11			26[N]	59	6			11	28	33[N]	16	2	1
S. p. ergastulorum		30	38	1		1	47	23	1			9	31	25	4			
S. vesperalis	1	37[H]	5			14	27[H]	2			3	12[H]	25	9				

	Pored LL scales			Total gill rakers							Additional spinous points at ALS				Pores behind lower jaw SK	
	22	23	24	13	14	15	16	17	18	19	0	1	2	3	united	separated
S. p. papillosa		76[N]	8	1	4	12	36[N]	30	9	1	5[N]	17	11	1	5	34[N]
S. p. ergastulorum	1	50	5		8	22	36	8			18	16	9	2	33	37
S. vesperalis	2[H]	29	8		2	9	27[H]	18	3		57[H]				57[H]	

[H] Holotype,
[N] Neotype,
ALS anterior lacrimal spine,
DS dorsal-fin base,
LL lateral line,
SK symphysial knob, *SR* scale rows

Table 6 Morphometrics, expressed as percentages of standard length, of *Scorpaena papillosa papillosa*, *S. p. ergastulorum*, and *S. vesperalis*

	S. p. papillosa		*S. p. ergastulorum*	*S. vesperalis*	
	Neotype NMNZ P.028043	Non-type specimens n = 93	Non-type specimens n = 85	Holotype WAM P. 28521-003	Paratypes n = 56
Standard length (mm)	164.6	18.4 –208.4	24.5 –148.7	58.7	16.2 –67.6
Body depth	38.6	30.4–42.9 (36.7)	29.0–37.6 (33.1)	39.0	32.3–39.5 (36.0)
Body width	25.9	14.7–27.1 (21.5)	16.3–23.3 (19.4)	20.1	14.2–22.2 (18.5)
Head length	41.7	37.8–45.7 (41.9)	36.4–43.7 (40.0)	41.4	39.2–45.7 (42.0)
Head width	15.7	13.5–16.9 (14.8)	12.3–27.1 (14.5)	15.0	13.0–16.7 (14.6)
Snout length	11.8	9.2–14.7 (11.7)	9.2–12.7 (10.6)	10.6	8.4–12.0 (10.4)
Orbit diameter	10.1	9.3–15.0 (11.5)	9.9–13.1 (11.6)	12.3	11.4–15.3 (13.5)
Interorbital width[a]	7.2	5.0–9.5 (6.8)	4.6–8.1 (6.2)	7.0	6.6–9.9 (7.6)
Interorbital width[b]	5.9	4.8–7.3 (5.8)	3.9–6.7 (5.5)	5.6	5.3–7.6 (6.4)
Upper-jaw length	21.2	16.8–23.6 (20.4)	16.8–22.6 (19.4)	21.3	19.6–22.5 (20.9)
Maxilla depth	7.3	4.8–7.9 (6.1)	4.4–7.1 (5.5)	6.6	5.7–7.3 (6.4)
Postorbital length	21.9	17.0–24.5 (20.5)	17.0–23.6 (19.4)	20.4	18.2–21.3 (19.6)
Suborbital space	1.2	0.4–4.3 (1.7)	0.2–2.3 (1.0)	0.9	0.0–0.9 (0.4)
Between tips of opercular spines	5.7	4.1–7.4 (5.8)	4.1–6.9 (5.5)	6.1	4.0–6.8 (5.5)
Between interorbital ridges[c]	1.0	0.6–1.9 (1.3)	0.5–1.8 (1.2)	1.4	1.4–2.7 (1.9)
Between tips of coronal spines	2.6	1.6–5.2 (3.3)	1.1–6.5 (3.7)	2.0	1.0–3.4 (2.2)
Occipital pit length	4.4	4.3–6.4 (5.4)	4.0–6.5 (5.2)	5.1	4.0–7.6 (5.8)
Occipital pit width	6.6	5.2–7.6 (6.7)	5.0–8.3 (6.8)	6.5	6.1–9.4 (7.5)
Post-occipital pit length	7.5	4.4–8.4 (6.5)	3.7–9.4 (6.2)	5.1	4.3–8.7 (7.0)
Predorsal-fin length	33.8	30.8–38.0 (34.6)	29.9–36.7 (32.8)	32.5	31.4–37.7 (34.4)
Preanal-fin length	69.1	65.3–75.2 (70.0)	64.5–72.0 (68.4)	67.8	67.2–77.6 (70.3)
Prepelvic-fin length	41.6	36.7–48.2 (41.6)	35.9–44.8 (39.4)	40.2	37.5–53.9 (42.4)
1st dorsal-fin spine length	6.6	5.9–10.4 (8.1)	6.5–10.6 (8.9)	9.2	7.9–10.6 (9.2)
2nd dorsal-fin spine length	–	9.1–14.9 (12.1)	10.0–14.8 (13.0)	12.1	11.7–15.2 (13.4)
3rd dorsal-fin spine length	14.0	14.5–21.4 (17.1)	14.9–20.5 (18.1)	15.3	14.8–18.5 (16.6)
4th dorsal-fin spine length	–	14.0–20.5 (17.5)	15.3–21.3 (18.2)	16.0	15.2–19.1 (17.0)

5th dorsal-fin spine length	–	14.4–19.7 (16.9)	14.8–21.1 (17.3)	15.4	14.8–18.0 (16.1)
6th dorsal-fin spine length	13.1	12.2–19.4 (16.5)	13.8–18.4 (16.4)	14.3	12.7–16.9 (15.2)
7th dorsal-fin spine length	12.5	13.2–18.7 (15.7)	13.5–18.3 (15.5)	13.3	12.3–15.5 (14.2)
8th dorsal-fin spine length	–	11.1–17.5 (14.3)	11.7–16.6 (13.9)	13.1	9.0–14.9 (12.7)
9th dorsal-fin spine length	9.7	9.3–15.6 (12.2)	8.6–13.9 (11.2)	11.3	8.3–12.6 (10.2)
10th dorsal-fin spine length	7.9	6.7–12.4 (9.9)	6.7–10.7 (8.7)	7.7	7.2–10.5 (8.4)
11th dorsal-fin spine length	7.5	7.0–11.0 (9.1)	6.9–10.4 (8.4)	7.0	6.6–8.9 (8.0)
12th dorsal-fin spine length	11.6	10.8–16.4 (13.6)	11.1–16.5 (13.8)	12.3	11.5–15.2 (13.4)
Longest dorsal-fin soft ray length	19.3	17.3–22.5 (19.6)	17.9–22.3 (20.3)	17.0	16.9–21.0 (18.9)
1st anal-fin spine length	8.6	8.4–12.7 (10.7)	8.9–12.8 (10.6)	8.2	7.2–10.0 (8.7)
2nd anal-fin spine length	17.1	15.8–26.9 (20.5)	17.7–23.4 (20.5)	18.2	16.3–21.3 (18.5)
3rd anal-fin spine length	15.2	12.9–21.5 (17.1)	13.9–20.1 (17.1)	14.7	14.1–17.6 (16.1)
Longest anal-fin soft ray length	22.1	19.7–25.7 (22.9)	19.4–25.5 (23.0)	19.9	18.5–24.9 (20.7)
Pectoral-fin ray length	28.9	19.5–35.4 (30.9)	27.8–36.4 (32.8)	33.9	27.5–38.3 (33.1)
Pelvic-fin spine length	14.8	12.1–20.7 (16.6)	14.0–19.1 (16.7)	15.0	15.0–148.5 (20.3)
Longest pelvic-fin soft ray length	25.6	22.0–28.8 (26.0)	21.9–30.0 (25.8)	23.0	22.6–28.9 (25.4)
Caudal-fin length	26.9	26.1–31.0 (28.1)	26.1–32.3 (29.5)	25.9	25.2–31.3 (28.0)
Caudal-peduncle length	19.4	16.3–21.7 (18.9)	17.8–22.5 (20.4)	18.4	17.9–21.0 (19.6)
Caudal-peduncle depth	11.2	9.7–12.3 (11.0)	9.2–11.8 (10.2)	10.6	9.6–11.7 (10.7)

[a] at vertical midline of eye,
[b] at posterior end of preocular spine base,
[c] least distance between interorbital ridges

Table 7 Contrasting morphometrics, expressed as percentages of standard length, in *Scorpaena papillosa papillosa*, *S. p. ergastulorum* and *S. vesperalis* (all specimens less than 70 mm SL). All the morphometrics of *S. vesperalis* are significant difference from those of *S. p. papillosa* and *S. p. ergastulorum* based on independent sample *t*-test ($p \leq 0.01$)

	S. p. papillosa	*S. p. ergastulorum*	*S. vesperalis*
Body depth	30.4–37.2 (34.1)	29.0–37.6 (33.1)	32.3–39.5 (36.0)
Upper-jaw length	16.8–20.4 (19.4)	16.8–20.0 (18.6)	19.6–22.5 (20.9)
Maxilla depth	4.8–6.3 (5.5)	4.4–6.1 (5.0)	5.7–7.3 (6.4)
Postorbital length	17.8–20.3 (19.0)	17.0–20.2 (18.4)	18.2–21.3 (19.6)
Between interorbital ridges*	0.8–1.8 (1.3)	0.8–1.7 (1.3)	1.4–2.7 (1.9)
1st anal-fin spine length	8.9–12.7 (10.9)	9.3–11.8 (10.6)	7.2–10.0 (8.7)

* least distance between interorbital ridges

Table 8 Counts and measurements, expressed as percentages of standard length, of *Scorpaena regina*

	Holotype	Paratypes	
	QM I. 37447	*n* = 58	
Standard length (mm)	63.4	22.5–64.5	
Counts		Ranges	Modes
Dorsal-fin rays	XII, 9	XII, 9	XII, 9
Anal-fin rays	III, 5	III, 5	III, 5
Pectoral-fin rays[a]	16/16	13–17/11–17	16/16
Scale rows in longitudinal series	43	39–46	41 or 42
Pored lateral-line scales	23	21–24	23
Scales above lateral line	6	5–7	6
Scales below lateral line	13	11–14	12
Scale rows between 6th dorsal-fin spine base and lateral line	5	5–6	5 or 6
Scale rows between last dorsal-fin spine base and lateral line	5	5–6	5 or 6
Pre-dorsal scale rows	5	4–7	4 or 5
Gill rakers[b]	4 + 8 + 2 = 14	4–5 + 7–9 +1–3 = 13–17	4 or 5 + 8 + 2 = 14 or 15
Measurements (% SL)			Means
Body depth	35.8	35.6–41.7	38.3
Body width	21.9	15.4–24.6	18.8
Head length	42.4	42.2–47.6	44.7
Head width	15.9	15.5–17.5	16.4
Snout length	11.0	9.3–13.5	10.8
Orbit diameter	12.0	11.8–16.6	14.5
Interorbital width[c]	7.9	6.3–9.3	7.7
Interorbital width[d]	6.9	5.3–8.0	6.7
Upper-jaw length	21.8	21.3–24.8	22.8
Maxilla depth	7.9	6.6–8.4	7.5
Postorbital length	21.6	20.0–24.1	21.7
Suborbital space	2.1	0.3–2.4	1.1
Between tips of opercular spines	5.7	5.1–8.0	6.6

Occipital pit length	4.4	4.7–7.6	6.0
Occipital pit width	4.9	4.3–7.5	5.6
Post-occipital pit	8.0	6.0–9.8	7.7
Predorsal-fin length	35.0	34.6–41.2	37.5
Preanal-fin length	68.6	65.9–74.0	70.5
Prepelvic-fin length	38.0	36.3–43.0	39.8
1st dorsal-fin spine length	8.8	7.0–11.6	9.4
2nd dorsal-fin spine length	14.2	11.6–18.1	14.8
3rd dorsal-fin spine length	17.4	16.5–20.5	18.7
4th dorsal-fin spine length	18.6	17.0–22.2	19.8
5th dorsal-fin spine length	18.1	17.3–21.3	19.4
6th dorsal-fin spine length	17.8	14.6–21.1	18.1
7th dorsal-fin spine length	17.7	13.5–19.0	16.6
8th dorsal-fin spine length	15.5	10.6–16.8	14.2
9th dorsal-fin spine length	12.5	8.9–13.3	11.1
10th dorsal-fin spine length	9.6	6.5–10.1	8.4
11th dorsal-fin spine length	7.9	5.9–9.8	8.3
12th dorsal-fin spine length	14.0	11.5–17.9	15.1
Longest dorsal-fin soft ray length	19.2	18.6–23.1	21.2
1st anal-fin spine length	10.3	8.2–12.4	9.7
2nd anal-fin spine length	19.7	17.4–24.3	20.0
3rd anal-fin spine length	17.8	14.7–20.1	17.3
Longest anal-fin soft ray length	21.6	19.7–26.0	23.1
Pectoral-fin ray length	29.3	26.8–38.8	32.9
Pelvic-fin spine length	16.4	14.9–19.8	17.5
Longest pelvic-fin soft ray length	24.9	24.2–32.2	26.9
Caudal-fin length	27.0	27.0–33.5	29.7
Caudal-peduncle length	18.9	15.1–21.0	18.6
Caudal-peduncle depth	11.0	10.5–12.3	11.3

[a] Total rays on left side/total rays on right side of body
[b] Rakers on upper limb + on ceratohyal + on hypobranchial = total rakers
[c] At vertical midline of eye
[d] At posterior end of preocular spine base

Table 9 Morphometrics, expressed as percentages of standard length, of *Scorpaena longaecrista* and *S. sororreginae*

	Scorpaena longaecrista			*Scorpaena sororreginae*		
	Holotype CSIRO H 6371-19	Paratypes n = 49	Means	Holotype CSIRO H 8264-02	Paratypes n = 22	Means
Standard length (mm)	55.9	14.9–50.7		43.6	22.4–39.0	
Body depth	39.5	29.7–38.7	36.2	38.7	33.4–40.2	37.7
Body width	23.1	9.6–21.8	17.1	21.2	15.9–21.3	19.1
Head length	47.7	43.9–48.8	46.8	44.1	42.8–47.7	45.2
Head width	17.5	14.7–18.4	17.1	16.5	14.9–17.7	16.7
Snout length	13.2	9.7–12.2	11.2	11.7	9.7–12.5	11.1
Orbit diameter	17.6	14.5–18.3	16.7	13.9	13.7–16.7	15.0
Interorbital width[a]	7.0	5.9–11.0	7.7	7.1	7.0–8.9	8.1
Interorbital width[b]	5.4	4.9–8.9	6.2	6.2	5.9–7.4	6.6
Upper jaw length	22.1	20.4–25.4	22.8	23.1	21.3–24.4	22.9
Maxilla depth	7.1	6.3–8.4	7.3	7.1	6.0–7.9	7.2
Postorbital length	21.2	20.2–22.7	21.6	20.5	18.8–22.8	21.0
Suborbital space	0.6	0.0–1.1	0.4	0.4	0.3–1.3	0.7
Between tips of opercular spines	7.7	6.2–8.3	7.2	5.7	5.4–7.7	6.0
Occipital pit length	5.3	4.6–8.7	6.6	6.4	4.4–7.5	6.0
Occipital pit width	5.6	6.5–9.8	7.8	7.5	6.6–8.5	7.5
Post-occipital pit length	8.2	4.6–10.5	7.7	5.7	5.4–8.3	6.9
Pre-dorsal-fin length	41.3	36.7–44.0	40.0	37.7	34.5–40.2	38.0
Pre-anal-fin length	72.9	67.6–72.4	70.2	73.0	67.4–75.9	71.4
Pre-pelvic-fin length	42.1	38.1–43.3	41.0	44.5	38.9–48.5	42.2
1st dorsal-fin spine length	10.6	7.7–12.2	10.1	9.1	8.6–13.1	10.2
2nd dorsal-fin spine length	17.1	13.8–18.8	16.7	16.4	14.2–17.3	15.9
3rd dorsal-fin spine length	21.7	18.4–24.6	21.1	20.7	16.6–21.5	19.1

4th dorsal-fin spine length	22.4	18.8–23.5	21.1	20.8	18.9–23.3	20.4
5th dorsal-fin spine length	20.1	17.2–22.0	19.4	20.2	17.6–21.6	19.5
6th dorsal-fin spine length	19.5	15.2–20.7	18.0	18.9	17.2–19.8	18.6
7th dorsal-fin spine length	17.6	14.4–18.9	16.6	17.3	14.9–18.9	17.1
8th dorsal-fin spine length	16.6	13.3–17.6	15.1	14.7	12.0–17.6	15.1
9th dorsal-fin spine length	–	10.4–14.3	12.4	11.1	11.4–13.5	12.4
10th dorsal-fin spine length	9.5	7.9–11.1	9.1	9.6	8.4–10.9	9.5
11th dorsal-fin spine length	–	7.5–9.2	8.3	8.4	6.3–8.9	7.7
12th dorsal-fin spine length	16.4	14.2–18.6	16.2	15.5	14.4–16.3	15.2
Longest dorsal-fin soft ray length	20.5	18.9–22.2	20.6	–	20.2–22.9	21.5
1st anal-fin spine length	10.6	8.0–11.7	9.8	10.3	7.9–10.9	9.8
2nd anal-fin spine length	20.8	17.3–22.8	19.8	22.3	17.0–22.4	20.5
3rd anal-fin spine length	17.2	14.1–17.6	16.0	17.1	15.6–19.4	17.6
Longest anal-fin soft ray length	21.3	18.8–22.9	20.5	23.5	19.7–25.1	22.9
Pectoral-fin ray length	–	29.2–35.8	32.9	34.4	30.4–37.7	34.4
Pelvic-fin spine length	17.5	15.8–20.9	18.0	17.3	16.3–20.4	18.7
Longest pelvic-fin soft ray length	27.3	23.7–29.5	26.5	26.5	26.4–31.4	28.2
Caudal fin length	32.4	29.6–33.4	31.0	27.0	27.9–31.6	29.6
Caudal peduncle length	16.6	16.0–21.0	18.4	19.2	15.6–21.7	18.6
Caudal peduncle depth	9.9	8.9–10.6	9.7	12.0	9.3–12.5	11.2

[a] at vertical midline of eye
[b] at posterior end of preocular spine base

Table 10 Frequency distributions of numbers of gill rakers and scale rows above lateral line in *Scorpaena regina* and *S. sororreginae*

	Gill rakers on upper limb		Gill rakers on lower limb (ceratohyal + hypobranchial)			
	4	5	9	10	11	12
S. regina	40	19	1	46	11	1
S. sororreginae	9	14		3	20	

	Total gill rakers					Scale rows above lateral line			
	13	14	15	16	17	4	5	6	7
S. regina	1	31	23	3	1		23	32	1
S. sororreginae		1	10	12		1	17	4	

Table 11 Body proportion changes with growth in ten Indo-Pacific species of *Scorpaena*

	S. bulacephala	*S. cardinalis*	*S. jacksoniensis*	*S. miostoma*	*S. longaecrista*	*S. neglecta*	*S. onaria*	*S. p. papillosa* and *S. p. ergastulorum*	*S. regina*	*S. vesperalis*
Body depth					+			+		
Body width	+			+				+	+	+
Head length		+	+						–	–
Head width						–		combination of "– and +"		
Snout length	+	+	+		+			+	+	
Orbit diameter		–	–	–		–	–	–	–	–
Interorbital width[1]					–			combination of "– and +"		–
Interorbital width[2]					–					–
Upper jaw length		+	+					+		
Maxilla depth						–		+		
Postorbital length		+	+	+		+		+		
Suborbital space	+			+		+		+	+	+
Between tips of opercular spines								+		
Occipital pit length	–			–	–				–	+
Occipital pit width	–			–	–	–				+
Predorsal-fin length				–				combination of "– and +"		–
Caudal peduncle depth								+		–
Fin ray lengths	(–) in 4th, 10th, and 11th dorsal-fin spine, pectoral fin, pelvic-fin spine and caudal fin	(–) in all fin rays	(–) in all fin rays	(–) in all fin rays		(–) in all fin ray lengths (except pectoral fin)	(–) in 2nd anal-fin spine length	(–) in pectoral-fin spine combination of "+ and –" in 1st to 5th (2nd to 5th in *S. p. ergastulorum*) dorsal-fin spines, all anal-fin spines, and longest anal-fin soft ray	(–) in caudal fin (+) in 7th to 10th dorsal-fin spine	
Sources	Motomura et al. (2005a)	Motomura et al. (2011b)	Motomura et al. (2011b)	This study	This study	This study	Motomura et al. (2005b)	This study	This study	This study

"+" and "–" indicate proportional changes with growth become greater and less, respectively., [1] at vertical midline of eye, [b] at posterior end of preocular spine base

Figures

[Consist of 43 figures]

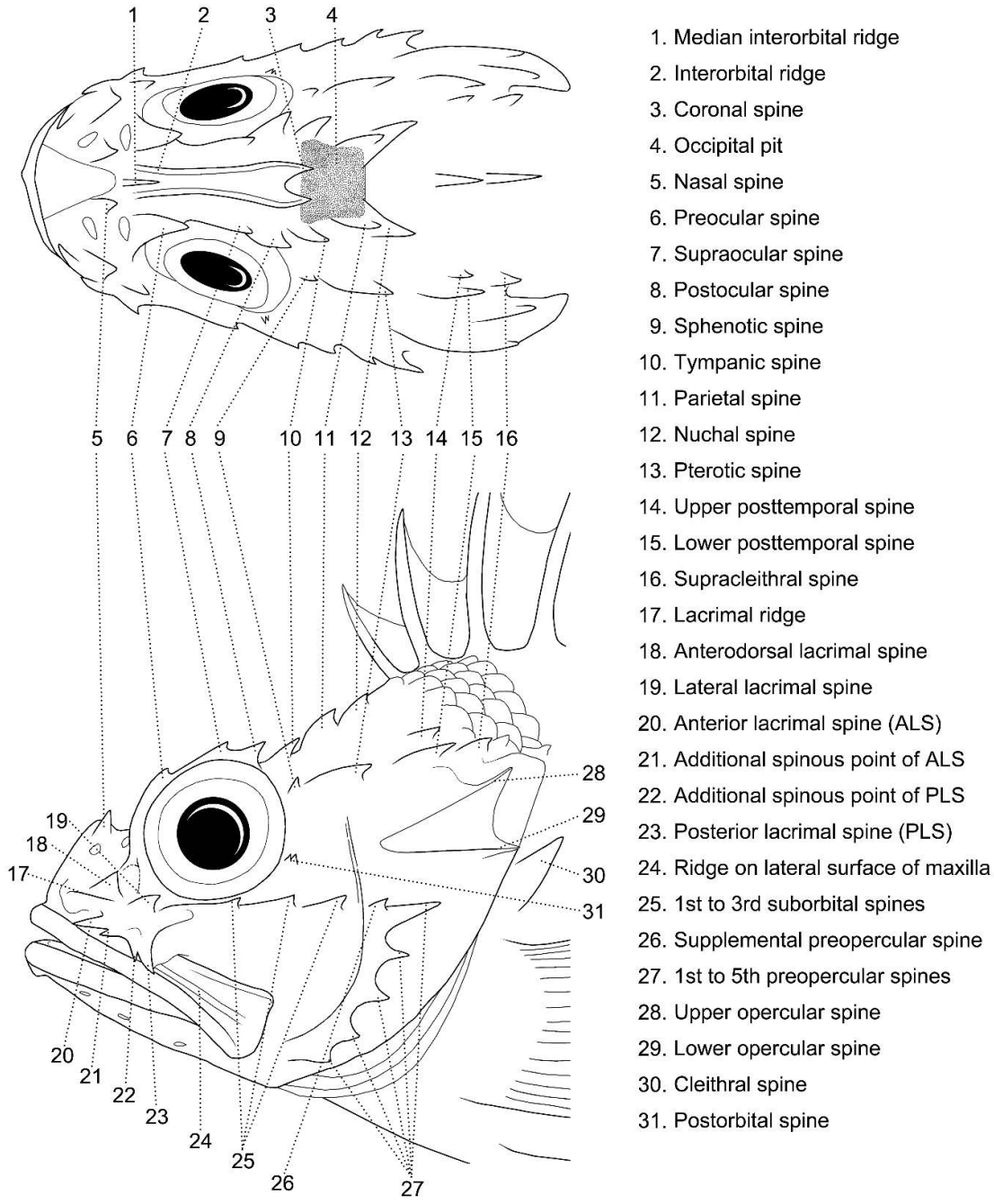

Fig. 1 Diagram of head spination in *Scorpaena*

Fig. 2 Preserved holotype of *Scorpaena brevispina*, KPM–NI 16667, 116.1 mm SL, off Futo, Ito City, Shizuoka Prefecture, east coast of Izu Peninsula, Pacific coast of Honshu Island, Japan (photo by H. Senou)

Fig. 3 Fresh holotype of *Scorpaena bulacephala*, CSIRO H 6009-05, 80.7 mm SL, south of Norfolk Island, Norfolk Ridge, Tasman Sea (photo by CSIRO)

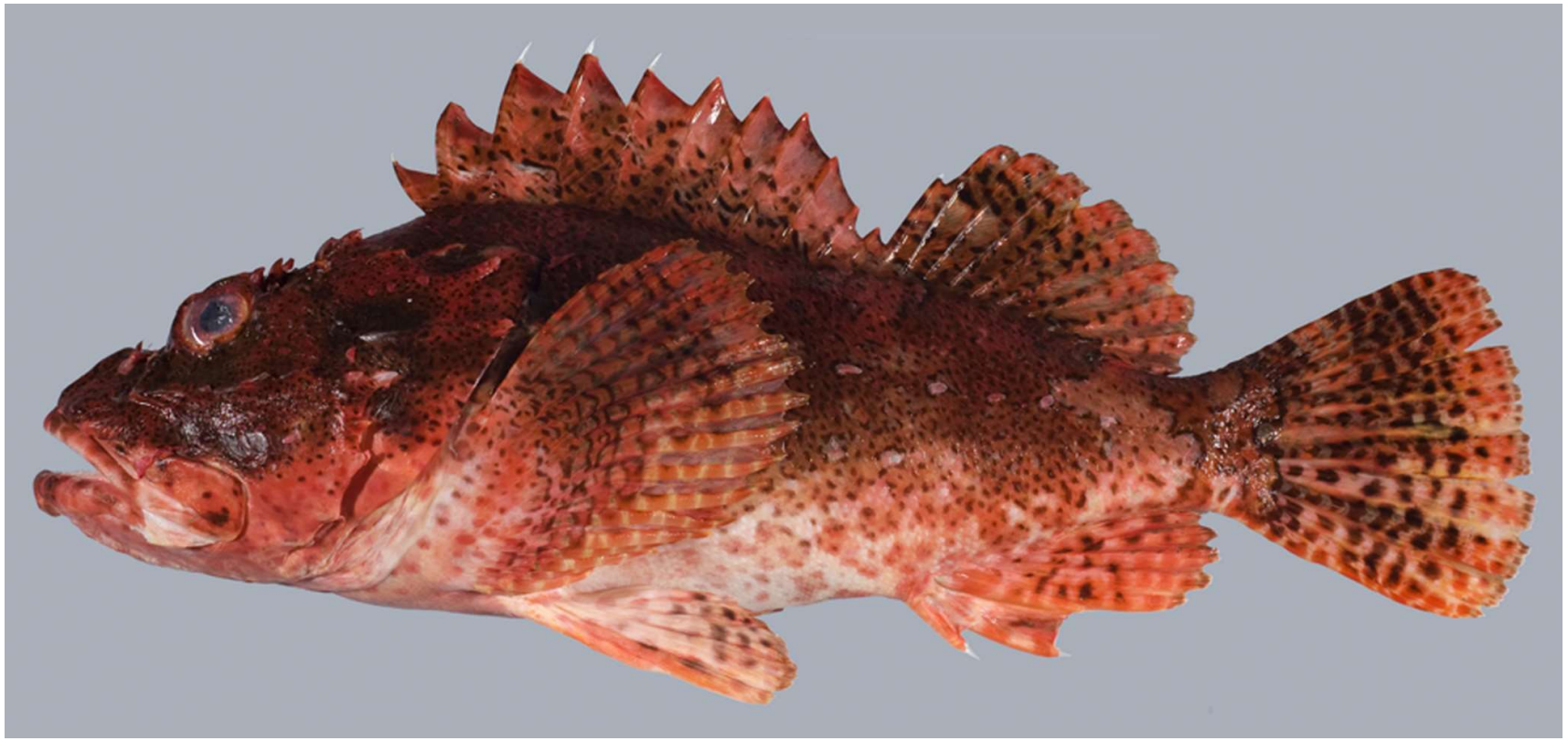

Fig. 4 Fresh neotype of *Scorpaena cardinalis*, NMNZ P.044152, 308.1 mm SL, White Island, New Zealand (photo by C. Struthers)

Fig. 5 Specimens of *Scorpaena colorata.* (**a**) BPBM 24109, preserved non-type, 59.8 mm SL, Molokai Island, Hawaiian Islands; (**b**) USNM 51631, preserved holotype of *Sebastapistes coloratus*, 58.2 mm SL, south coast of Molokai Island, Hawaiian Islands

Fig. 6 Preserved holotype of *Scorpaena decemradiata*, HUJ 2418, 123.1 mm SL, Red Sea, Gulf of Aqaba, Israel Eilat (photo by D. Golani)

Fig. 7 Fresh holotype of *Scorpaena gasta*, WAM P. 27960-006, 69.4 mm SL, off mouth of Murchison River, Kalbarri, Western Australia, Australia (photo by WAM)

Fig. 8 Preserved holotype of *Scorpaena jacksoniensis*, NMW 75379, 182.9 mm SL, Port Jackson, New South Wales, Australia

Fig. 9 Preserved holotype of *Scorpaena lacrimata*, BPBM 31706, 200.1 mm SL, Tahiti, Society Islands

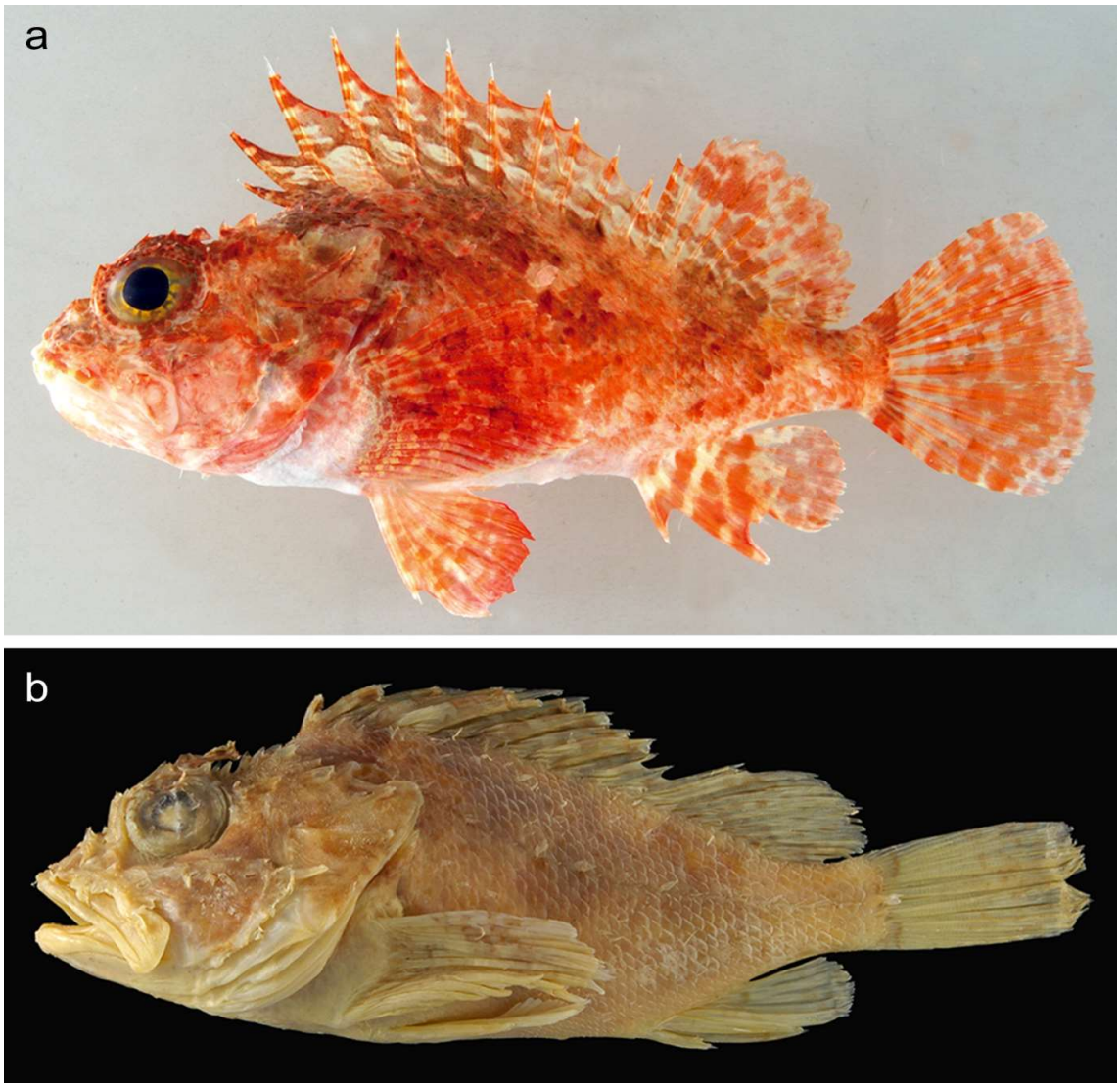

Fig. 10 Specimens of *Scorpaena miostoma*. (**a**) KAUM–I. 10015, fresh non-type, 100.3 mm SL, off Kawajiri Fishing Port, Ibusuki, Kagoshima, Japan; (**b**) BMNH 1879.5.14.235, preserved holotype, 106.4 mm SL, purchased at market in Yokohama, Kanagawa, Japan

Fig. 11 Preserved holotype of *Scorpaena nasicornua*, ZIN 56300, 175.0 mm SL, Gulf of Aden (photo by M. Zhukov)

Fig. 12 Fresh non-type of *Scorpaena neglecta*, KAUM–I. 97664, 226.9 mm SL, off Yamagawa Port, Kagoshima Bay, Kagoshima, Japan

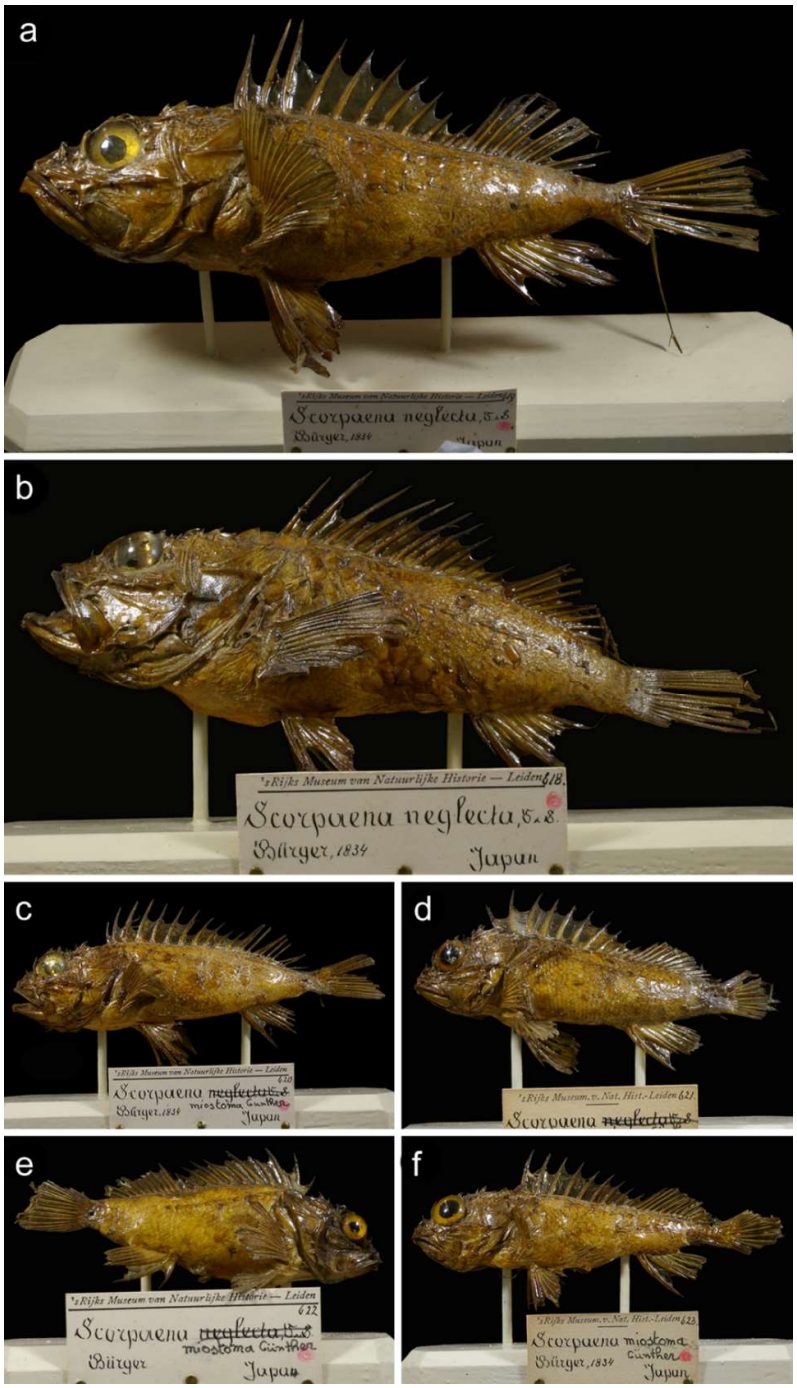

Fig. 13 Lectotype (**a**) and paralectotypes (**b–f**) of *S. neglecta*. (**a**) *S. neglecta*, RMNH.PISC. 619, 187.4 mm SL; (**b**) *S. neglecta*, RMNH.PISC. 618, 139.8 mm SL; (**c**) *S. miostoma*, RMNH.PISC. 620; (**d**) *S. miostoma*, RMNH.PISC. 621; (**e**) *S. miostoma*, RMNH.PISC. 622; (**f**) *S. miostoma*, RMNH.PISC. 623. All stuffed specimens

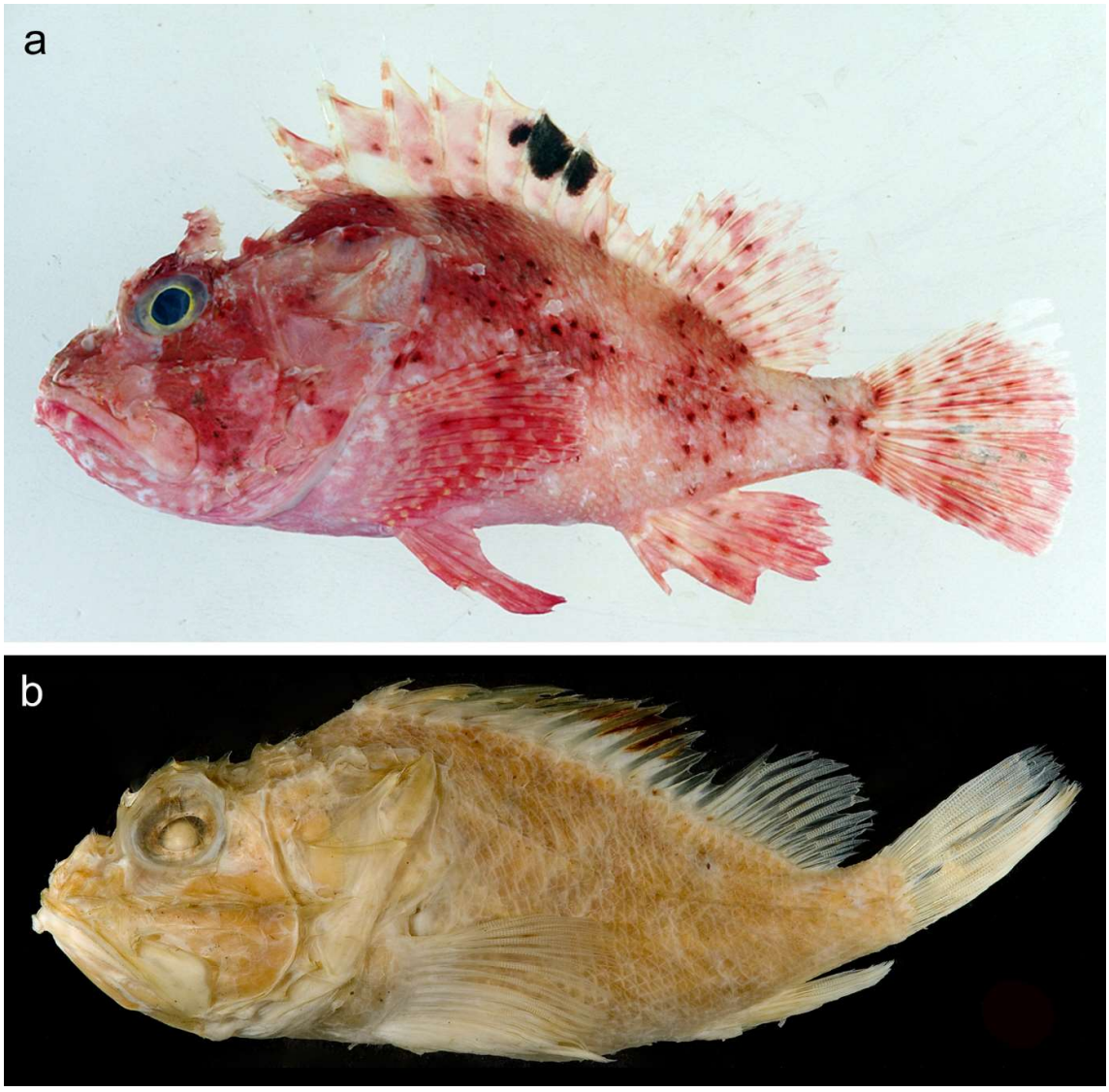

Fig. 14 Specimens of *Scorpaena onaria*. (**a**) KAUM–I. 149152, fresh non-type, 165.4 mm SL, Kakeroma-jima Island, Itoshima, Fukuoka, Japan; (**b**) USNM 49405, preserved holotype, 157.7 mm SL, Misaki, Japan

Fig. 15 Preserved holotype of *Scorpaena orgila*, CAS 24809, 246.8 mm SL, off Ahu Akapu, Easter Island, Chile (photo by CAS)

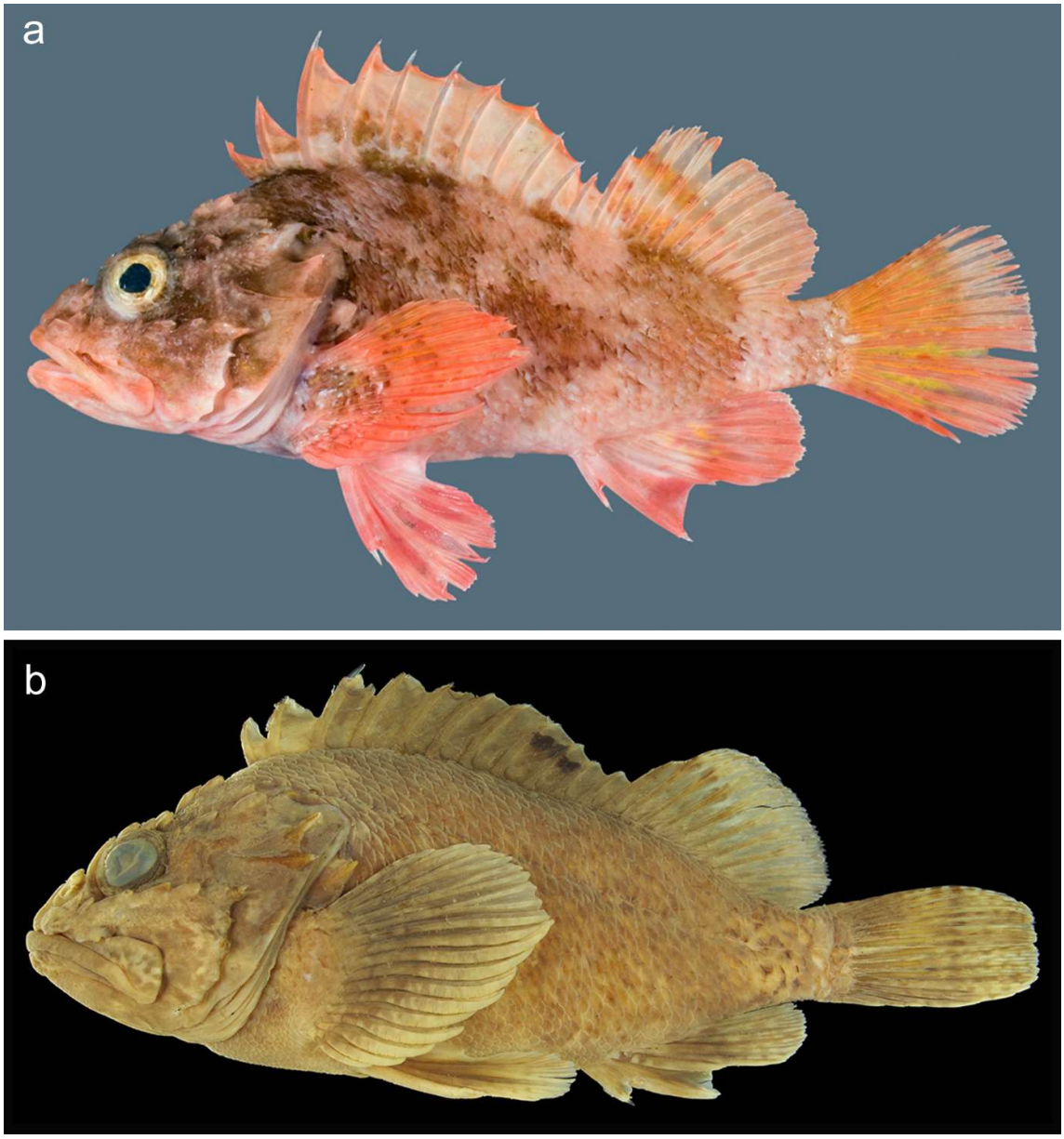

Fig. 16 Specimens of *Scorpaena papillosa papillosa*. (**a**) NMNZ P.047824, fresh non-type, 165.8 mm SL, southeastern of Kaikoura Peninsula, Canterbury, South Island, New Zealand (photo by NMNZ); (**b**) NMNZ P.028043, neotype, 164.6 mm SL, Matatuahu Point, Tawharanui Peninsula, Hauraki Gulf, North Auckland, North Island, New Zealand

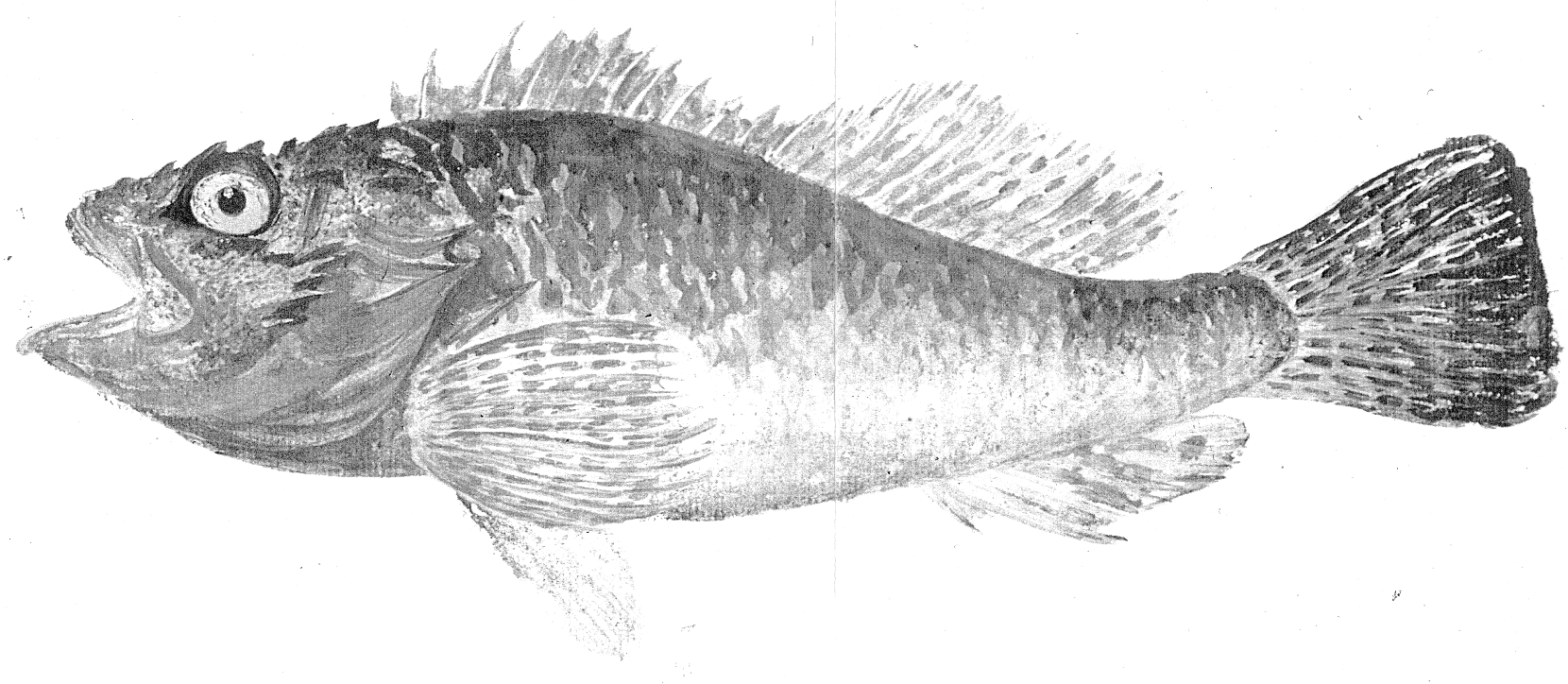

Fig. 17 Drawing by G. Forster (317.5 mm total length). Basis for original description of *Synanceia papillosus* by Schneider and Forster *in* Bloch and Schneider (1801)

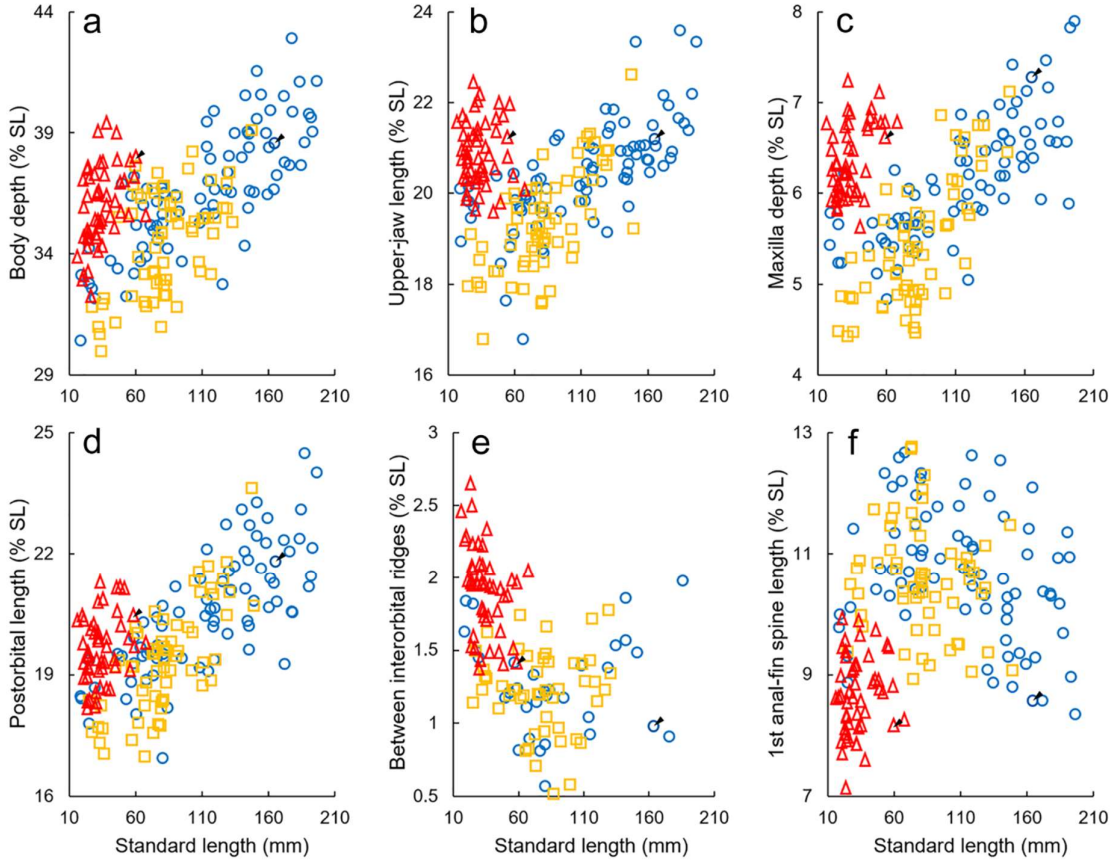

Fig. 18 Relationships of (**a**) body depth, (**b**) upper-jaw length, (**c**) maxilla depth, (**d**) postorbital length, (**e**) least distance between interorbital ridges, and (**f**) 1st anal-fin spine length (all as % SL to SL) in *Scorpaena papillosa papillosa* (blue circles), *S. p. ergastulorum* (yellow squares), *S. vesperalis* (red triangles). Arrowheads indicate neotype of *S. p. papillosa* and holotype of *S. vesperalis*

Fig. 19 Preserved non-type of *Scorpaena papillosa ergastulorum*, AMS 25280-002, 130.2 mm SL, off Green Cape, New South Wales, Australia

Fig. 20 Fresh holotype of *Scorpaena pepo*, ASIZP 65020, 244.3 mm SL, northeastern coast of Taiwan

Fig. 21 Preserved holotype of *Scorpaena regina*, QM I. 37447, 63.4 mm SL, Tangalooma Wrecks, Moreton Bay, Queensland, Australia

Fig. 22 Preserved non-type of *Scorpaena scrofa*, SAIAB 74672, 193.4 mm SL, off Thugela River, KwaZulu-Natal, South Africa

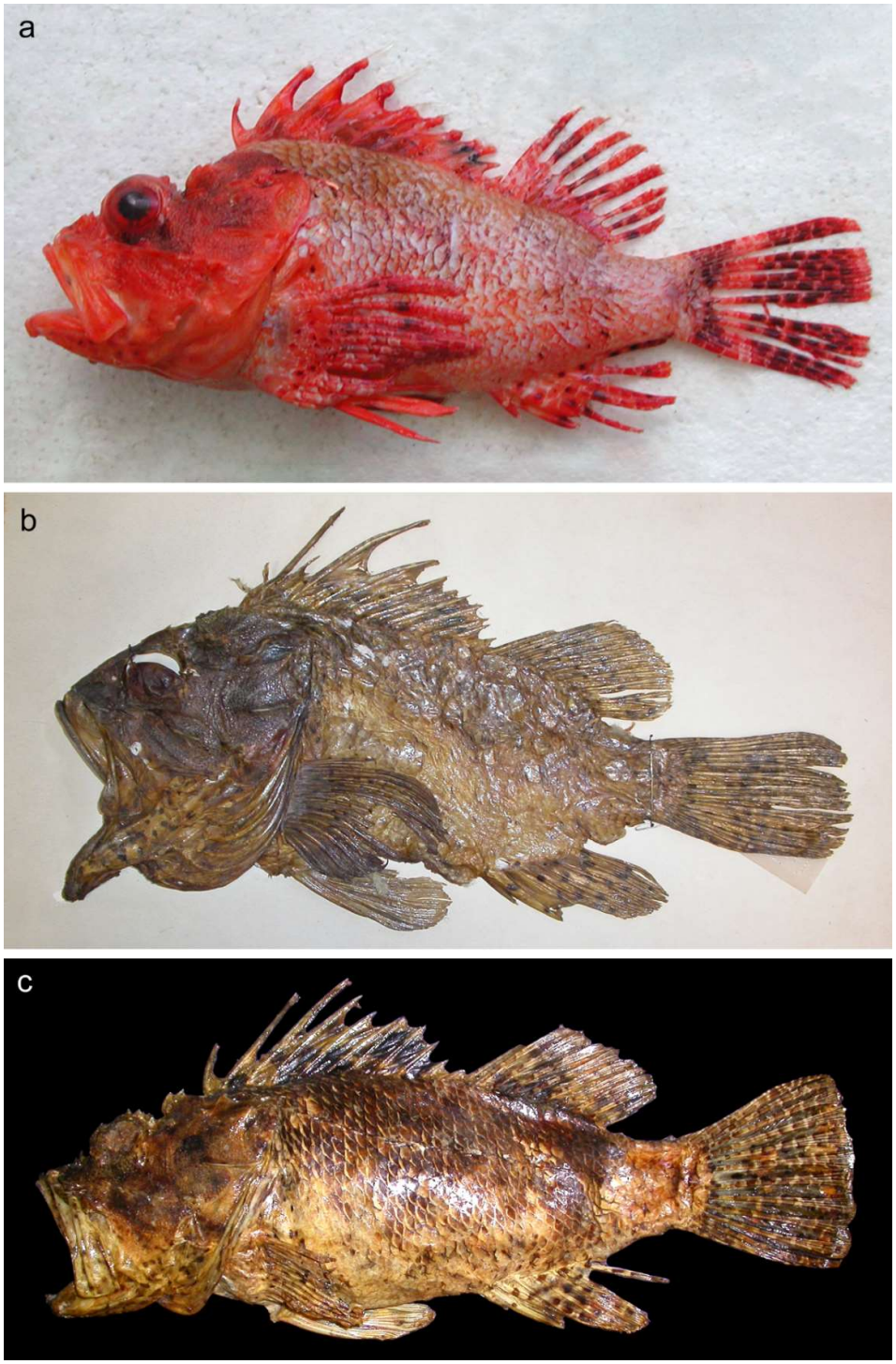

Fig. 23 Specimens of *Scorpaena sumptuosa*. (**a**) CSIRO H 6347-02, fresh non-type, 180.9 mm SL (photo by CSIRO); (**b**) MNHN A. 4409, dried syntype, 241.2 mm SL, Fremantle, Western Australia, Australia; (**c**) MNHN B. 2570, dried syntype, 229.1 mm SL, same data as MNHN A. 4409

Fig. 24 Fresh holotype of *Scorpaena vesperalis*, WAM P. 28521-003, 58.7 mm SL, Busselton Jetty, Western Australia (photo by WAM)

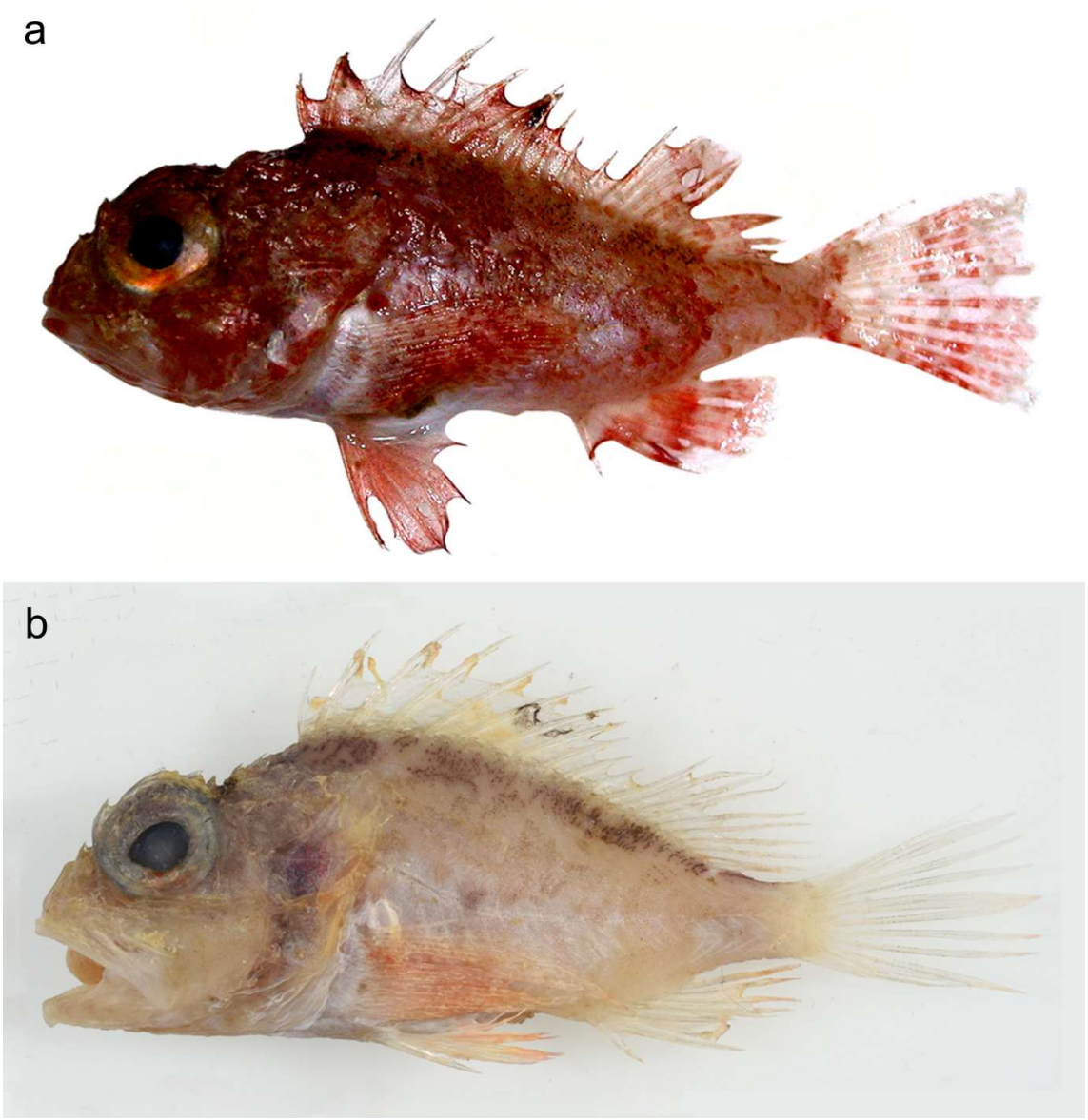

Fig. 25 Specimens of *Scorpaena longaecrista*. (**a**) NMV A 29654-004, fresh paratype, 31.0 mm SL, south west of Borrow Island, Western Australia, Australia (photo by M. Gomon); (**b**) CSIRO H 6371-19, fresh condition of holotype after ca. 15 years refrigeration, 55.9 mm SL, west of Geraldton, Western Australia, Australia (photo by J. Pogonoski)

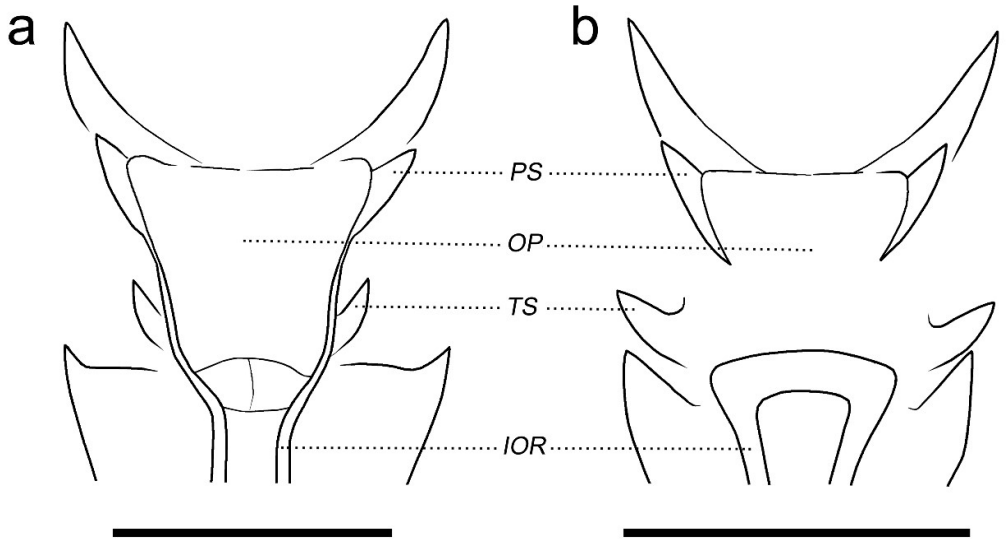

Fig. 26 Dorsal views of occipital pit regions; (**a**) *Scorpaena longaecrista* and (**b**) *S. sororreginae*. *PS* parietal spine; *OP* occipital pit; *TS* tympanic spine; *IOR* interorbital ridge. Scale bar indicates 5 mm

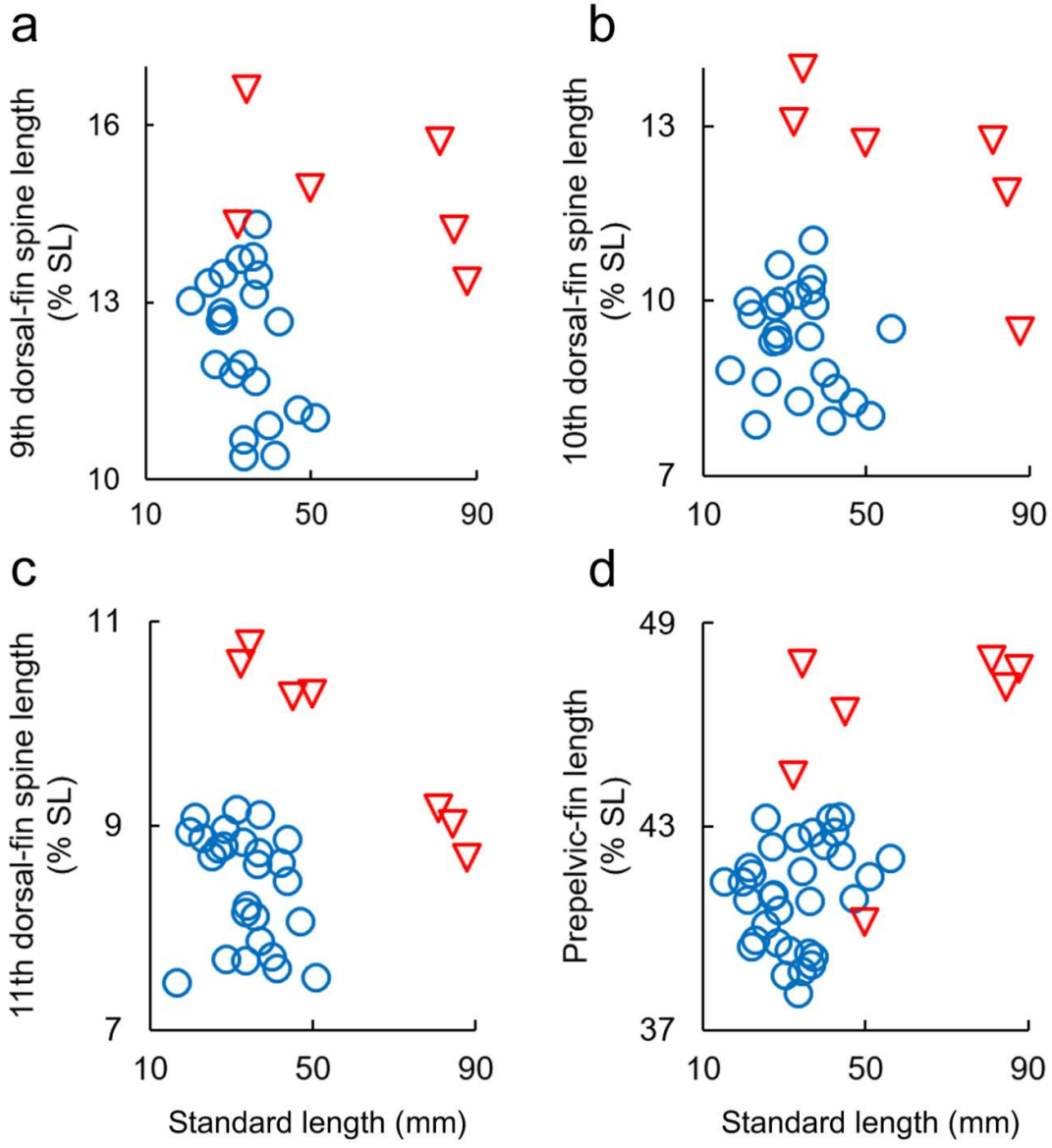

Fig. 27 Morphometric relationships (all as % SL to SL) in *Scorpaena longaecrista* (circles) and *S. bulacephala* (triangles, data based on Motomura et al. 2005a); (**a**) 9th dorsal-fin spine length, (**b**) 10th dorsal-fin spine length, (**c**) 11th dorsal-fin spine length, and (d) pre-pelvic-fin length

Fig. 28 Fresh holotype of *Scorpaena sororreginae*, CSIRO H 8264-02, 43.6 mm SL, north of Cape Lambert, Western Australia, Australia (photo by J. Pogonoski)

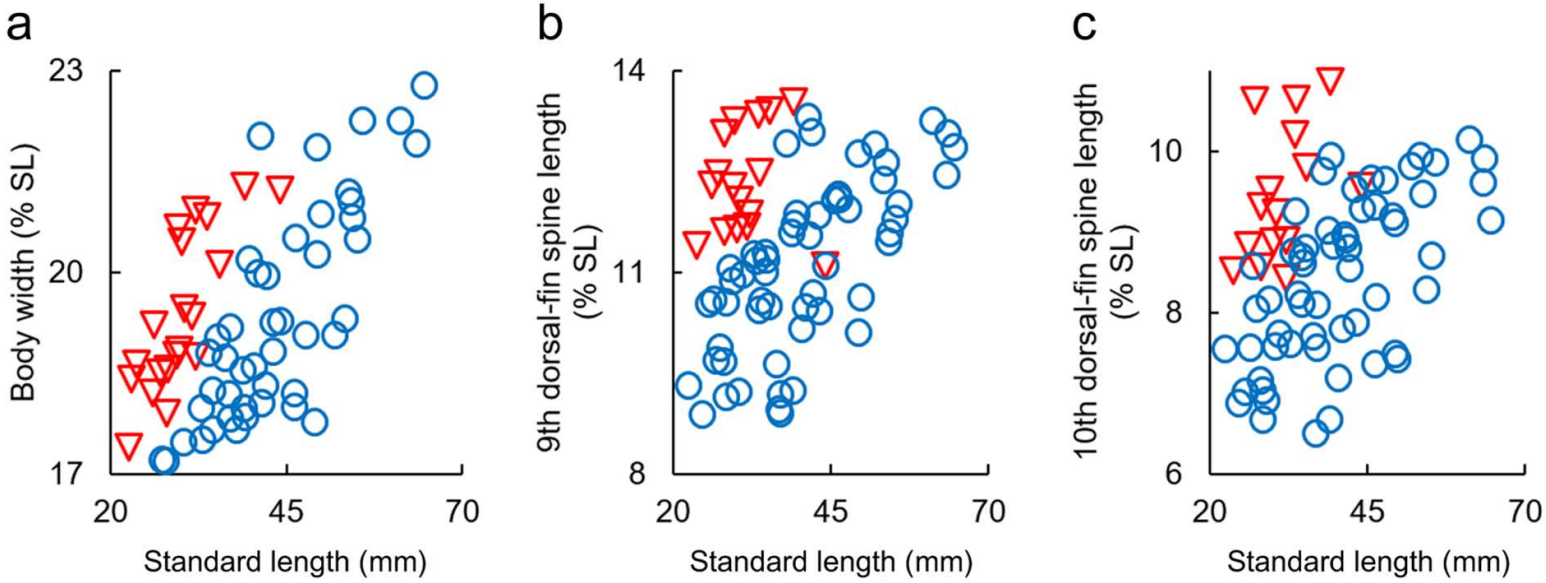

Fig. 29 Morphometric relationships (all as % SL to SL) in *Scorpaena sororreginae* (triangles) and *S. regina* (circles, data based on Wibowo et al. 2019); (**a**) body width, (**b**) 9th dorsal-fin spine length, and (**c**) 10th dorsal-fin spine length

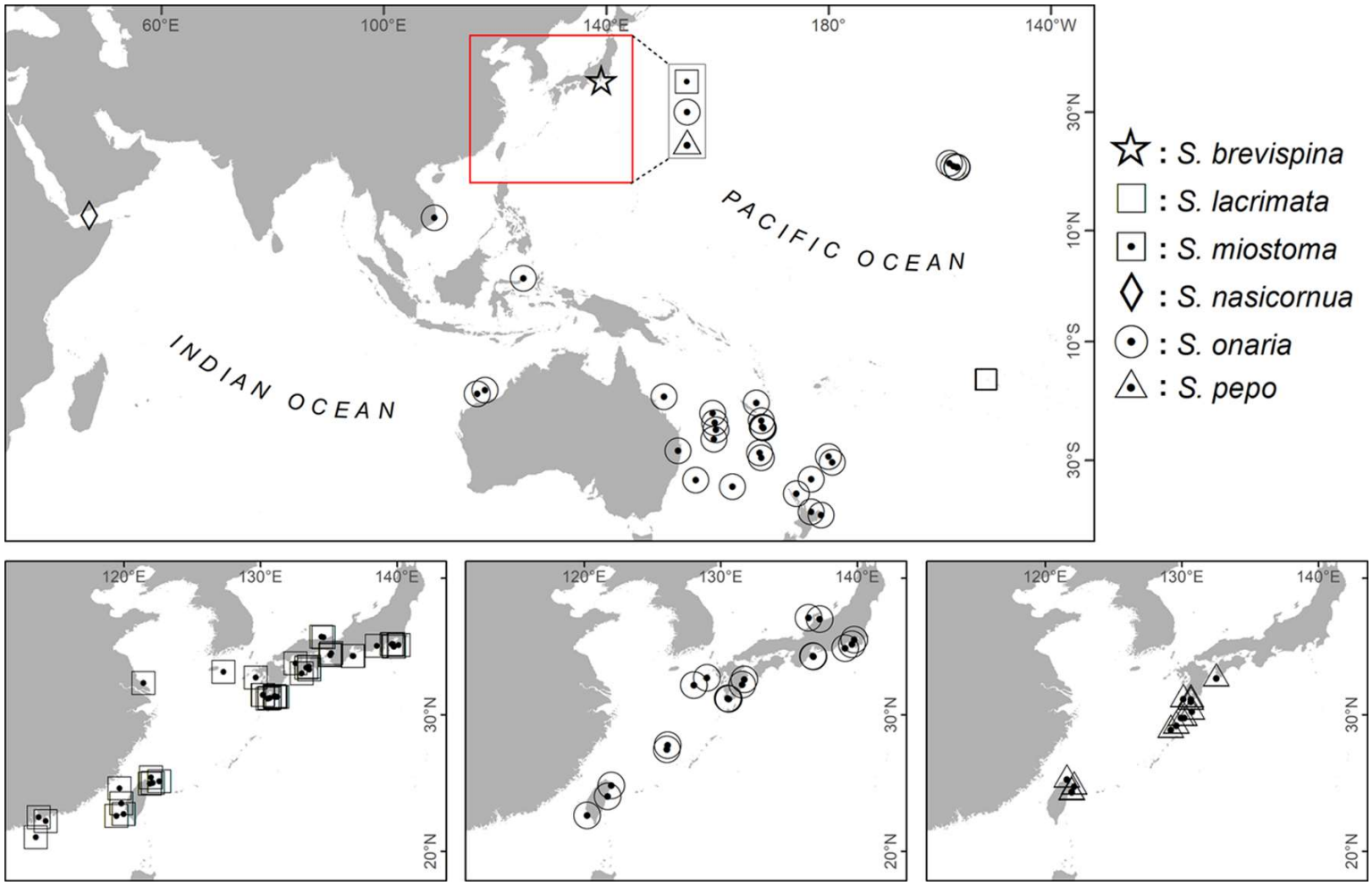

Fig. 30 Distribution of Indo-Pacific species of *Scorpaena* characterized by a single spinous point on the lateral lacrimal spine

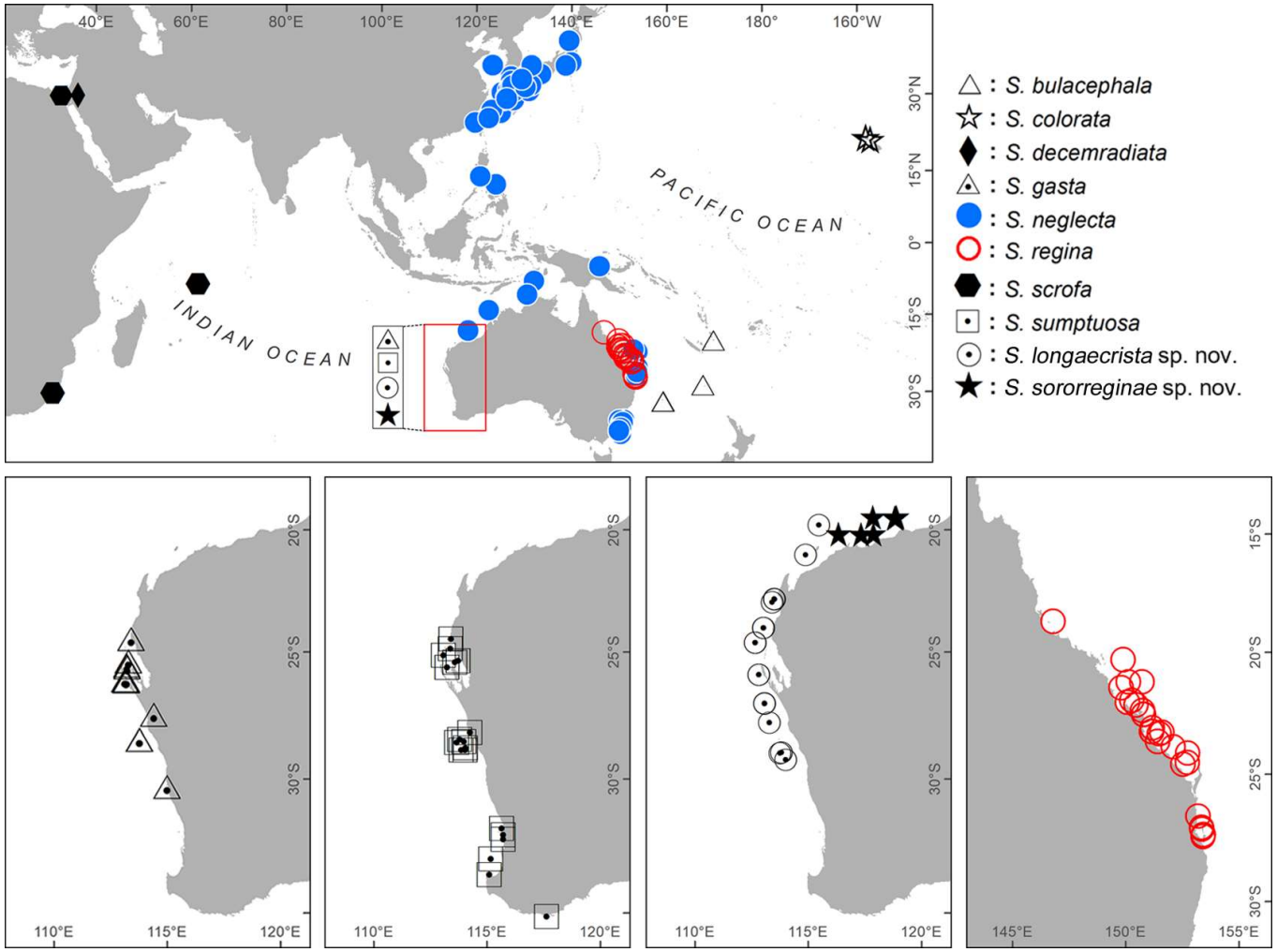

Fig. 31 Distribution of Indo-Pacific species of *Scorpaena* lacking a lateral lacrimal spine

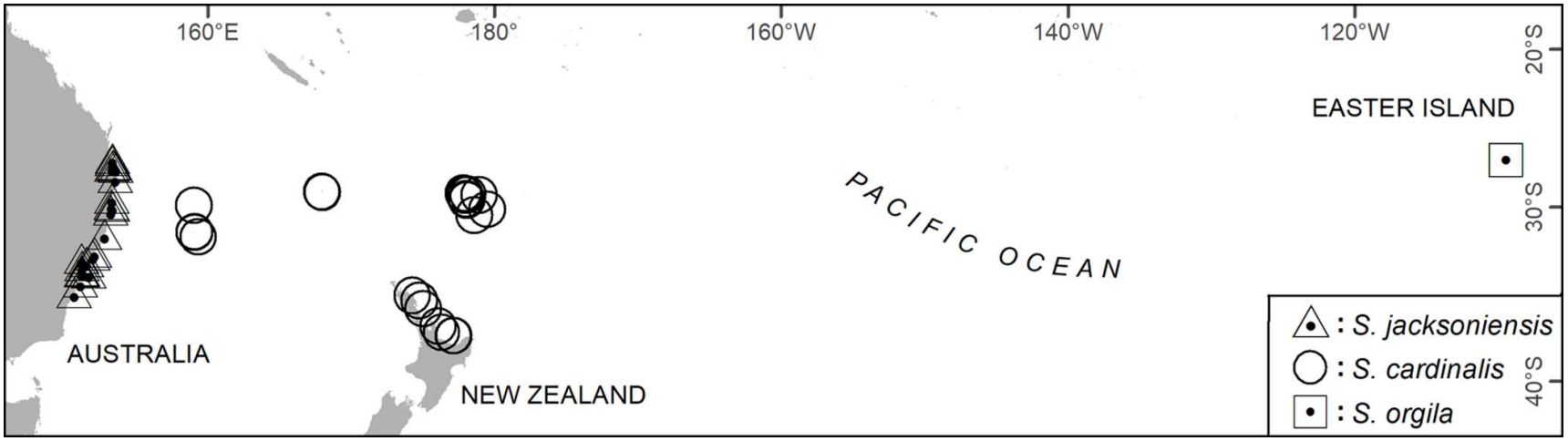

Fig. 32 Distribution of Indo-Pacific species of *Scorpaena* characterized by double spinous points on the lateral lacrimal spine

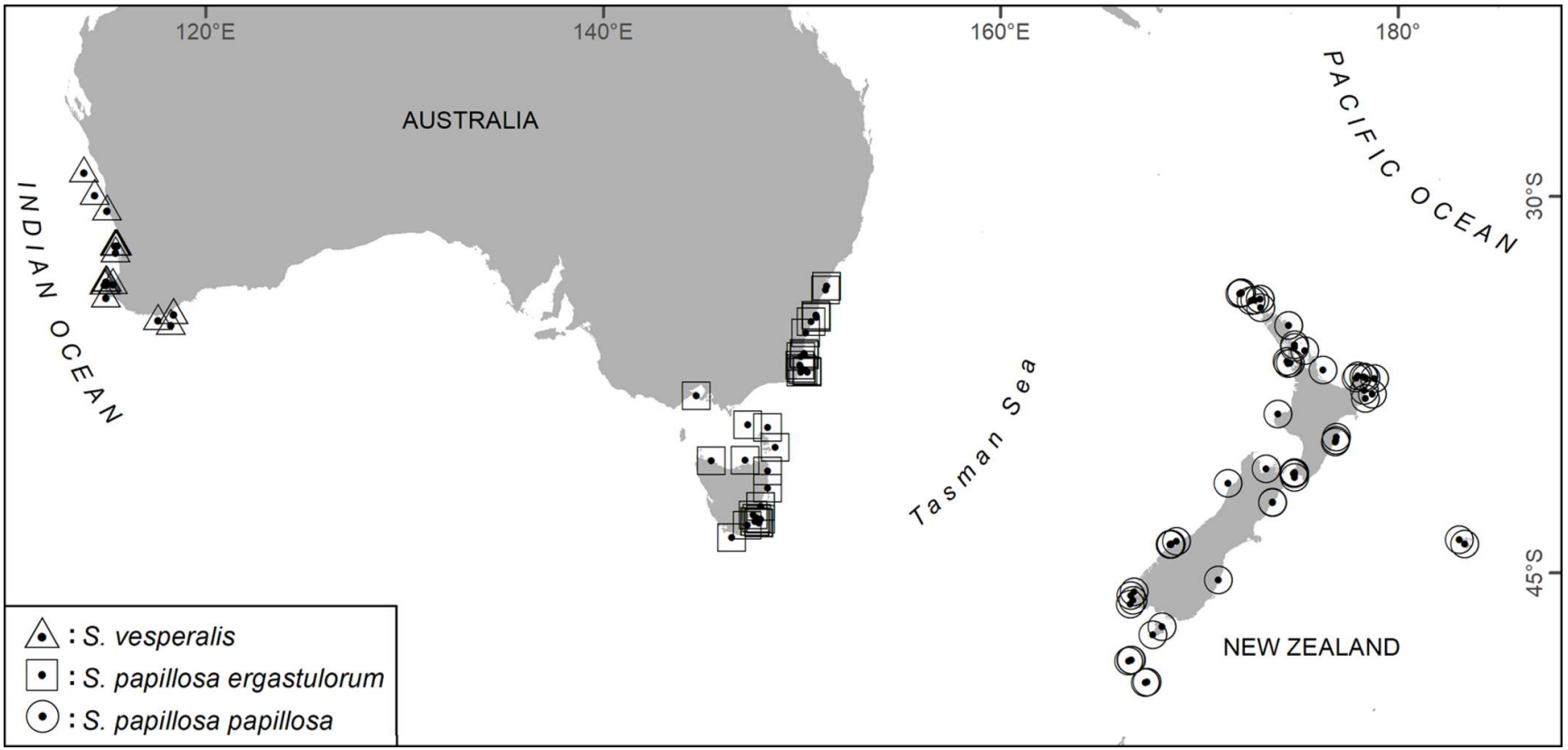

Fig. 33 Distribution of Indo-Pacific species of *Scorpaena* characterized by lateral lacrimal (with single spinous point) and anterodorsal lacrimal spines

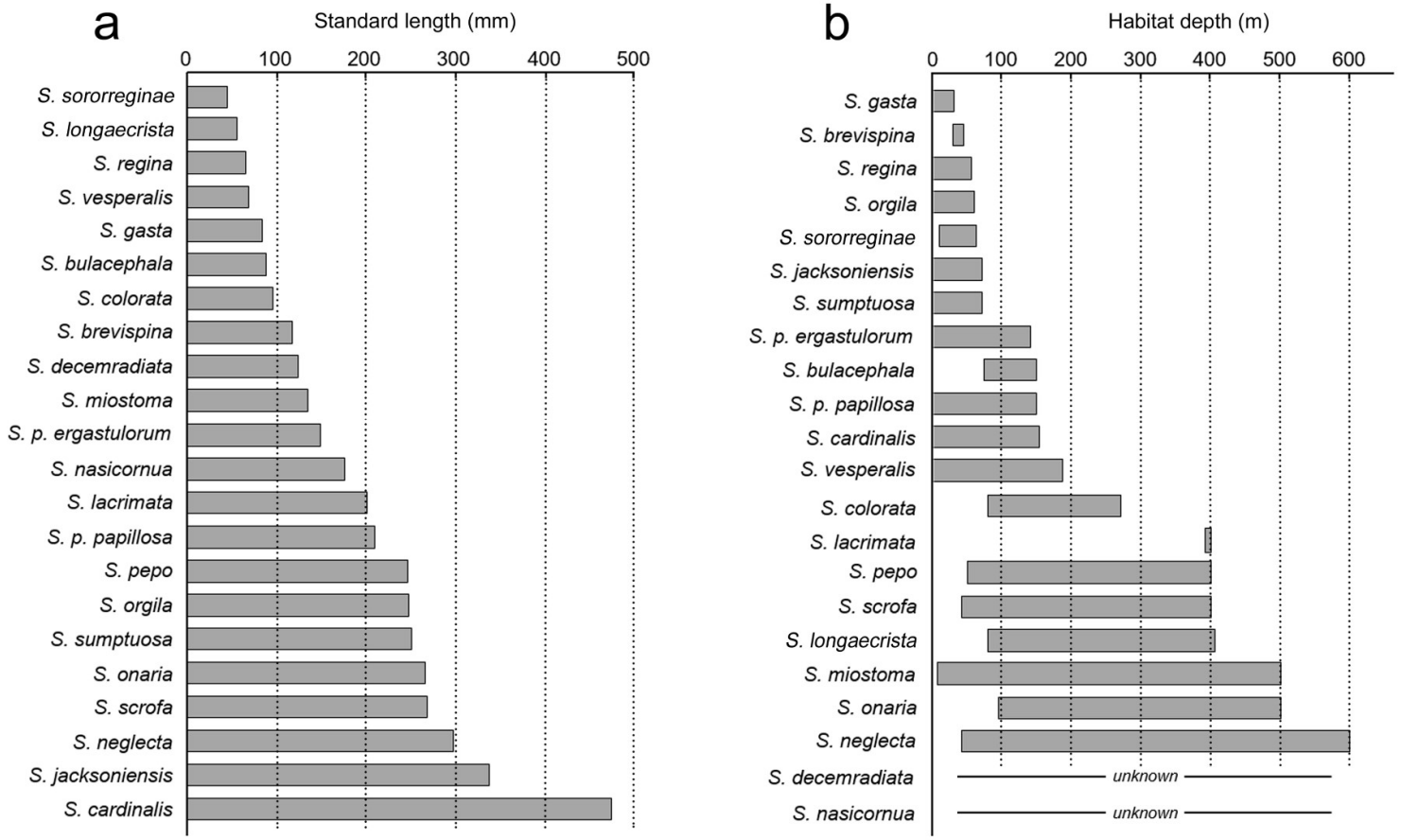

Fig. 34 Maximum body sizes (**a**) and depth distributions (**b**) of Indo-Pacific species of *Scorpaena*

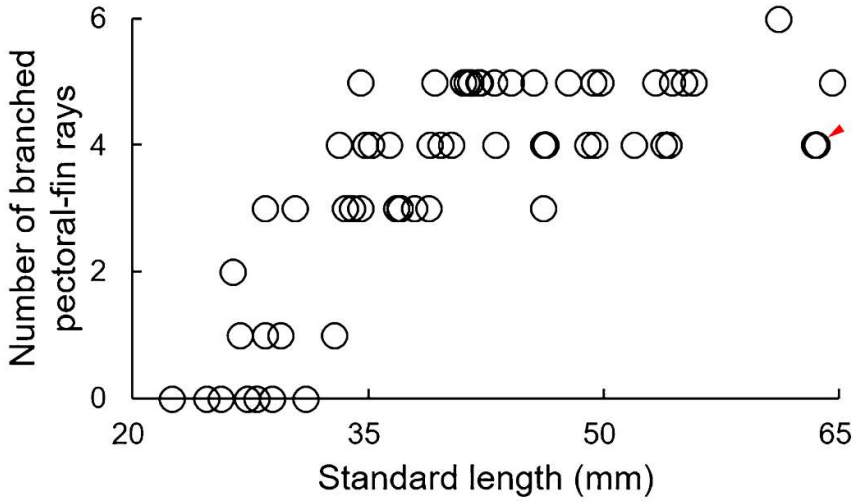

Fig. 35 Relationship of number of branched pectoral-fin rays to standard length in *S. regina.* A red arrowhead indicates holotype

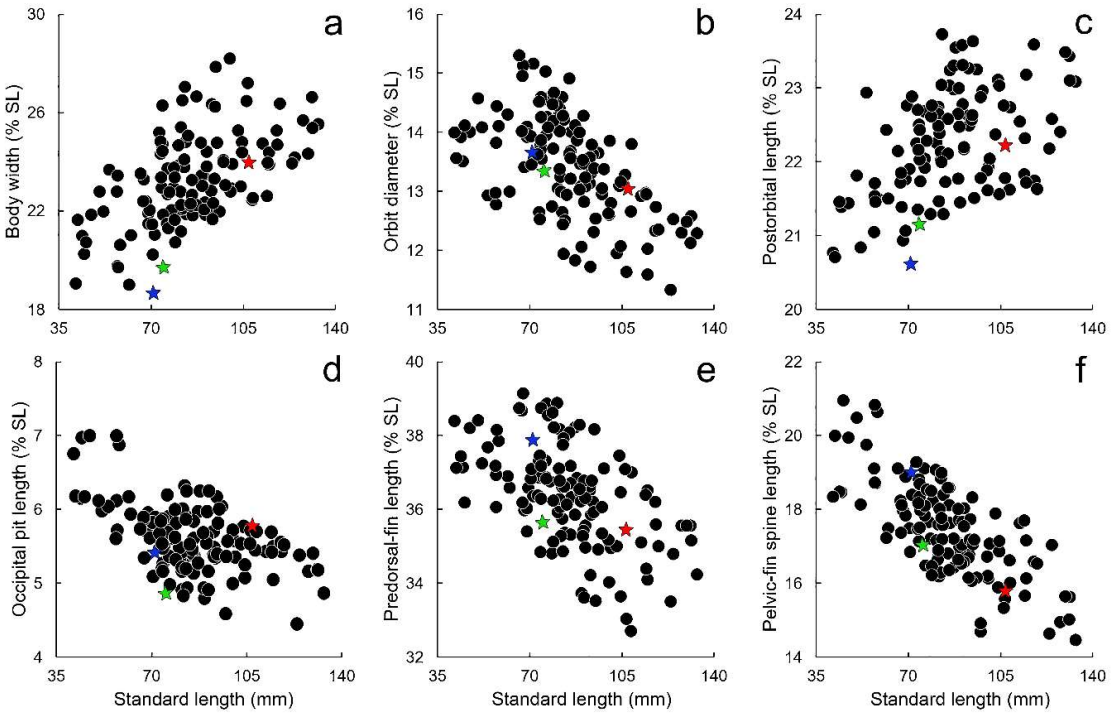

Fig. 36 Relationships of (a) body width; (b) orbit diameter; (c) postorbital length; (d) occipital pit length; (e) predorsal-fin length; (f) pelvic-fin spine length (all as % SL to SL) in *Scorpaena miostoma*. Closed red, green and blue stars indicate holotype of *S. miostoma*, and lectotype and paralectotype of *S. dabryi*, respectively

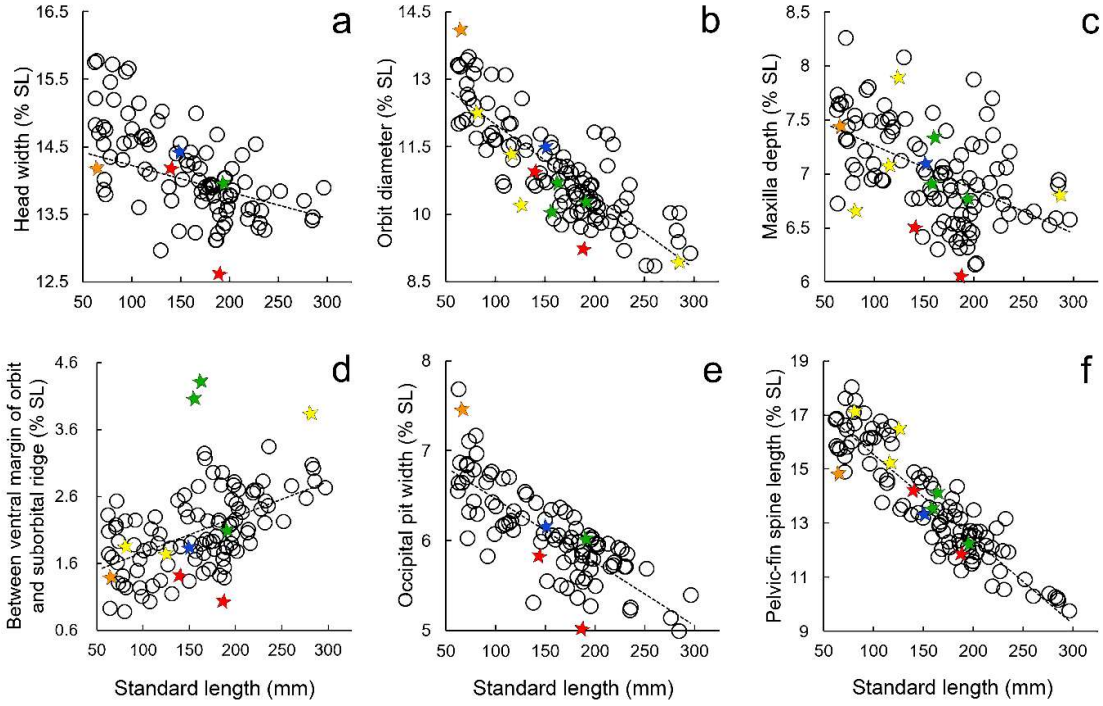

Fig. 37 Relationships of (**a**) head width; (**b**) orbit diameter; (**c**) maxilla depth; (**d**) between ventral margin of orbit and suborbital ridge; (**e**) occipital pit width; (**f**) pelvic-fin spine length (all as % SL to SL) in *Scorpaena neglecta*. Closed red, yellow, green, blue, and orange stars indicate type specimens of *S. neglecta*, *S. fimbriata*, *S. izensis*, *S. hemilepidota*, and *Scorpaenopsella armata*, respectively

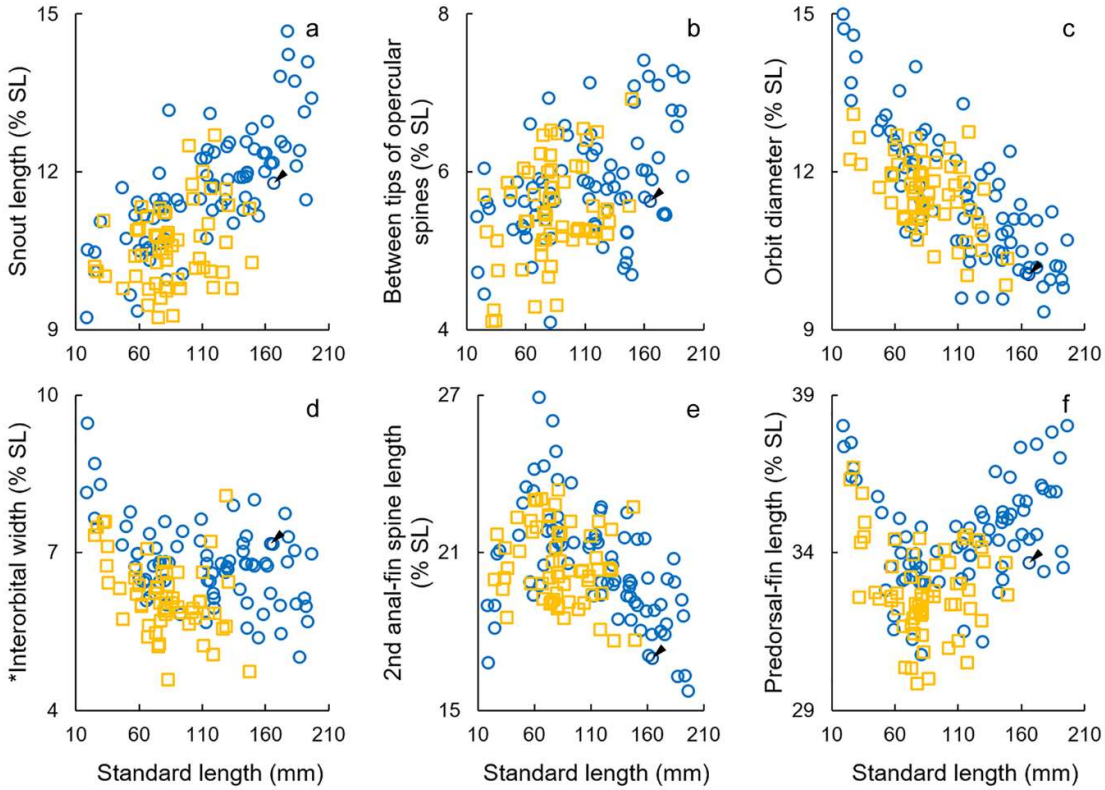

Fig. 38 Relationships of (**a**) snout length, (**b**) distance between tips of opercular spines, (**c**) orbit diameter, (**d**) *interorbital width at vertical midline of eye, (**e**) 2nd anal-fin spine length, and (**f**) predorsal-fin length (all as % SL to SL) in *Scorpaena papillosa papillosa* (blue circles), and *S. p. ergastulorum* (yellow squares). Arrowheads indicate neotype of *S. p. papillosa*

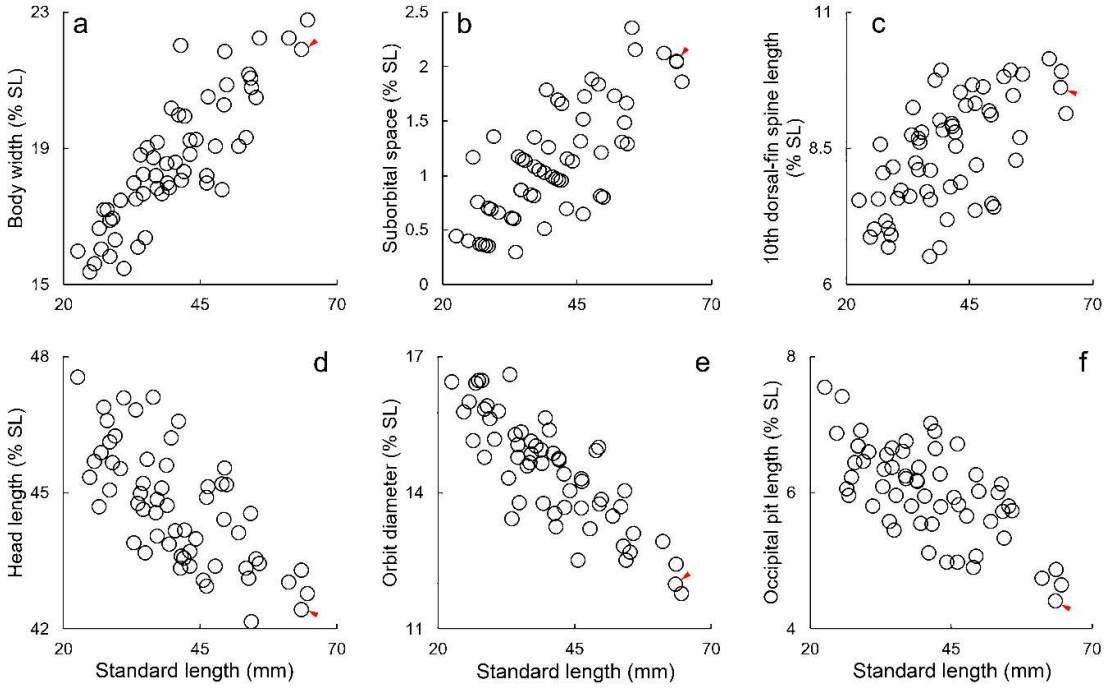

Fig. 39 Relationships of (**a**) body width; (**b**) suborbital space; (**c**) 10th dorsal-fin spine length; (**d**) head length; (**e**) orbit diameter; (**f**) occipital pit length (all as % SL to SL) in *Scorpaena regina*. Red arrowheads indicate holotype

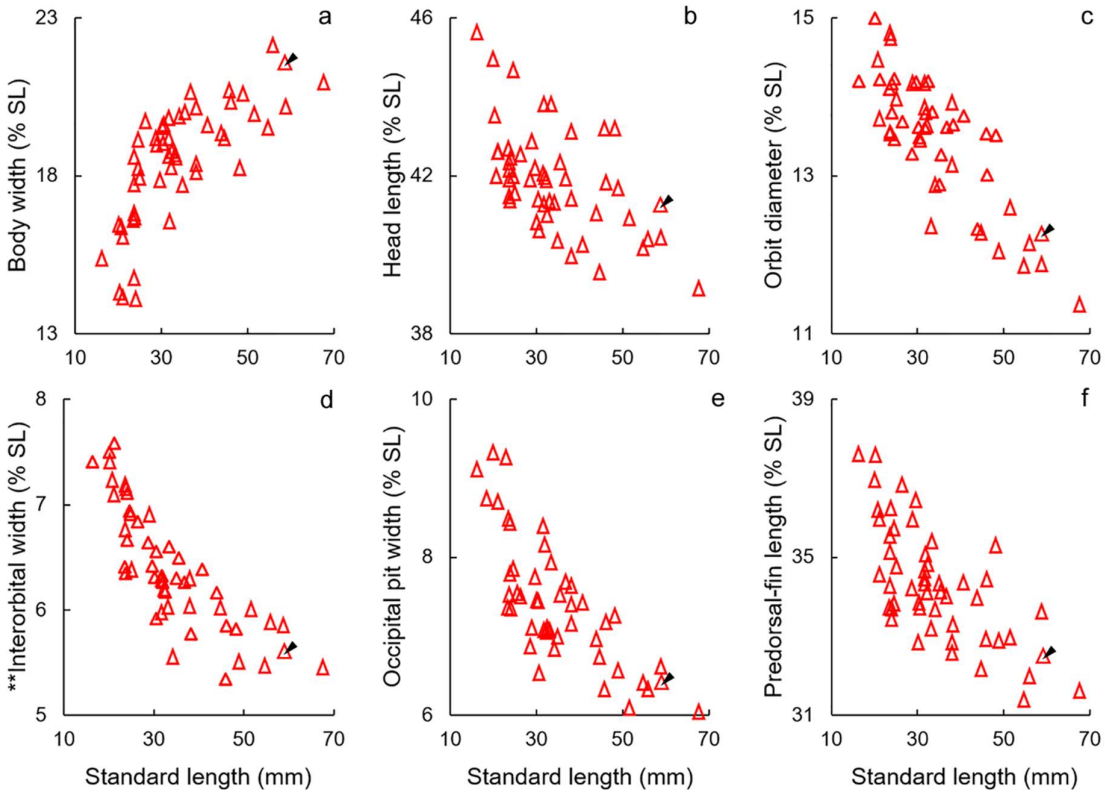

Fig. 40 Relationships of (**a**) body width, (**b**) head length, (**c**) orbit diameter, (**d**) **interorbital width at posterior end of preocular spine base, (**e**) occipital pit width, and (**f**) predorsal-fin length (all as % SL to SL) in *Scorpaena vesperalis*. Arrowheads indicate holotype of *S. vesperalis*

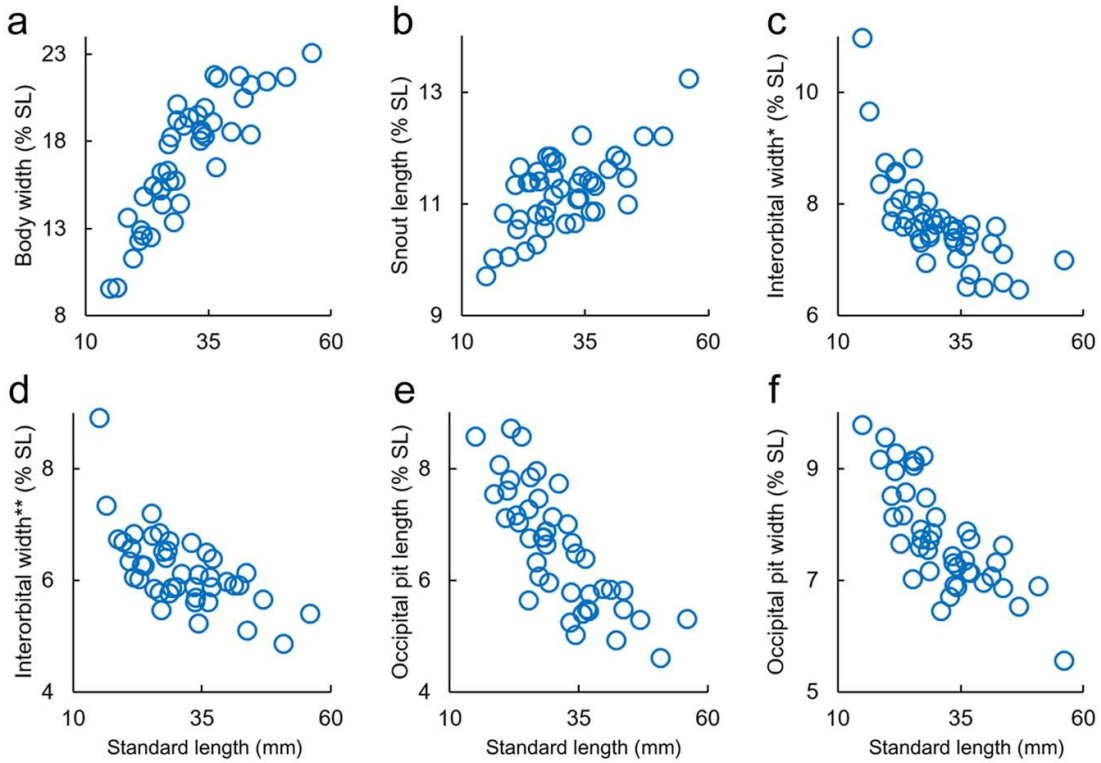

Fig. 41 Morphometric relationships (all as % SL to SL) in *Scorpaena longaecrista*; (**a**) body width, (**b**) snout length, (**c**) *interorbital width (at vertical midline of eye), (**d**) **interorbital width (at posterior end of preocular spine base), (**e**) occipital pit length, and (**f**) occipital pit width

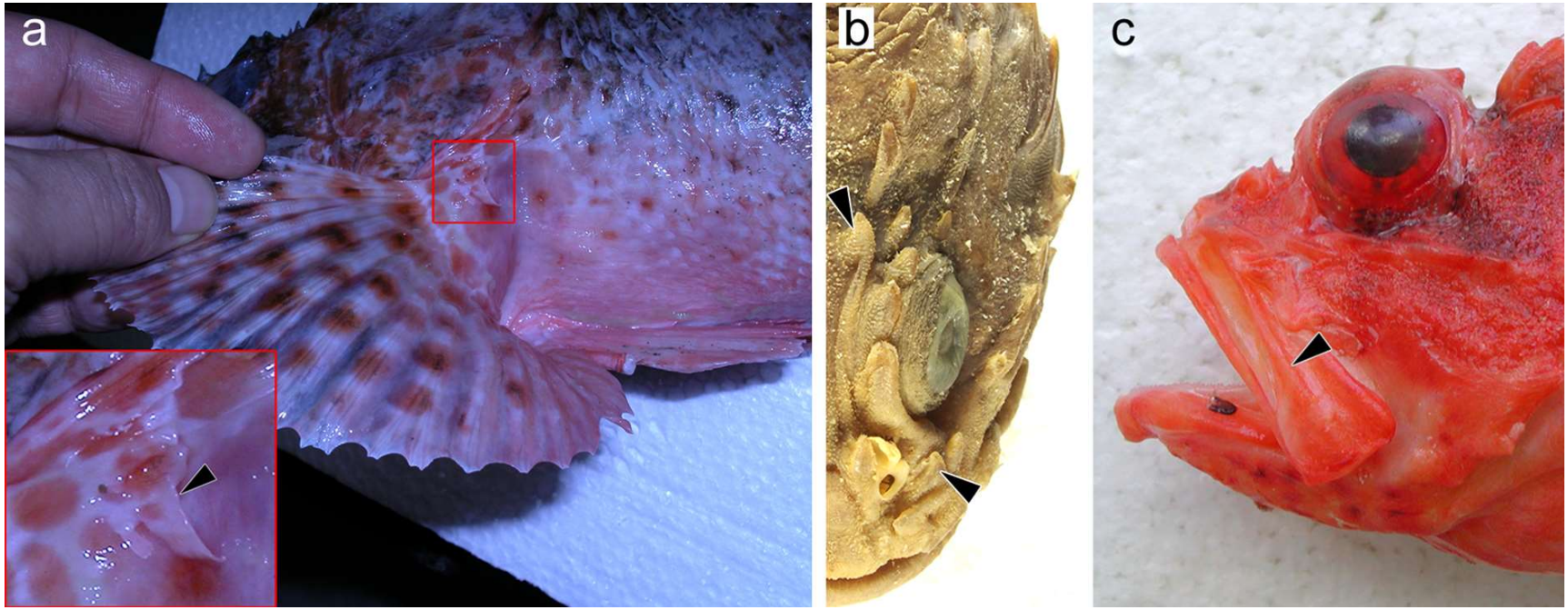

Fig. 42 Distinct features found in some species of *Scorpaena*. (**a**) dermal flap (indicated by arrow) on pectoral-fin axil of *S. neglecta*; (**b**) anterodorsal lacrimal and coronal spines (indicated by arrows) of *S. papillosa*; (**c**) longitudinal ridge (indicated by arrow) on lateral surface of maxilla of *S. sumptuosa*

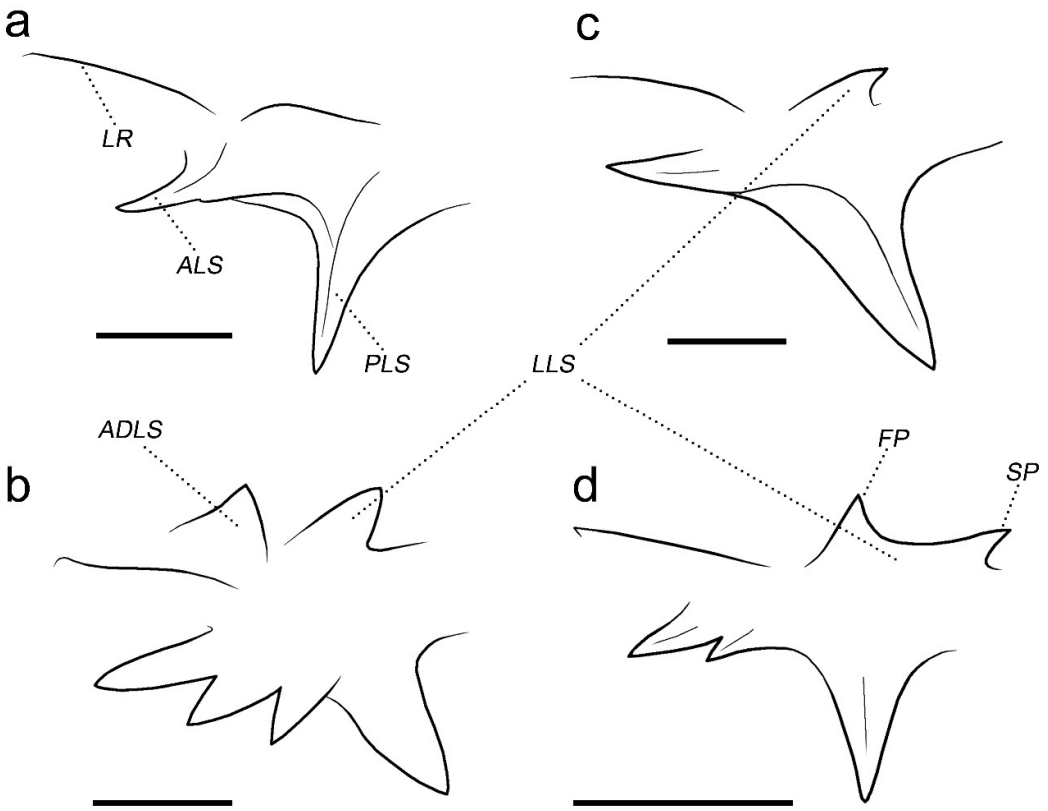

Fig. 43 Structure of lacrimal bones of (**a**) *Scorpaena neglecta*, KAUM–I. 1324, 145.1 mm SL; (**b**) *S. papillosa papillosa*, NMNZ P.026325, 1 of 9, 134.1 mm SL); (**c**) *S. onaria*, KAUM–I. 20695, 160.0 mm SL; and (**d**) *S. jacksoniensis*, KAUM–I. 35883, 111.7 mm SL. *LR* lacrimal ridge; *ADLS* anterodorsal lacrimal spine; *ALS* anterior lacrimal spine; *PLS* posterior lacrimal spine; *LLS* lateral lacrimal spine; *FP* first spinous point; *SP* second spinous point. Scale bar indicates 5 mm