

***Scorpaena onaria* (Scorpaenidae), Previously Considered to Have an Antitropical Distribution, Found in Northern Sulawesi, Indonesia, Western Central Pacific Ocean**

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Abstract. A single specimen (150.0 mm standard length) of the scorpionfish (Scorpaenidae), *Scorpaena onaria*, was collected off Bitung, northern Sulawesi, Indonesia. The species has previously been known only from East Asia and Australasia and been considered to represent an antitropical distribution; thus the Indonesian specimen is described herein as the first record of *S. onaria* from the western central Pacific Ocean. The Indonesian specimen indicates that *S. onaria* is widely and continuously distributed in the western Pacific where it ranges from Korea and Japan to Australia and New Zealand.

Keywords: Scorpaenidae, scorpionfish, *Scorpaena onaria*, Indonesia, northern population.

Introduction

The scorpionfish, *Scorpaena onaria*, originally described by Jordan and Snyder (1900) from Misaki on the Pacific coast of Japan, was redescribed by Motomura *et al.* (2005), with discussions of its distribution, morphological changes with growth, sexual dichromatism, and biology. Motomura *et al.* (2005, 2007) recognized that the species represents an antitropical distribution (East Asia and Australasia).

During ichthyofaunal surveys of Bitung, northern Sulawesi, Indonesia, a single specimen of *S. onaria* was collected from a depth of 20–30 m off Lembeh Island at Bitung. The specimen are described herein as the first reliable record of *S. onaria* from the tropical region in the western Pacific Ocean.

Counts and measurements followed Motomura *et al.* (2005, 2007). 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. Terminology of head spines followed Randall and Eschmeyer (2002: fig. 1) and Motomura (2004: fig. 1) with the following addition: the spine on the lateral surface of the lacrimal bone is referred to as the lateral lacrimal spine (Motomura and Senou 2008: fig. 2). The specimen of *S. onaria* from Indonesia is deposited at the Reference Collection of LIPI Bitung (LBRC-F), Technical Implementation Unit for Marine Biota Conservation, Indonesian Institute of Science, Bitung, Indonesia.

***Scorpaena onaria* Jordan and Snyder**

(Fig. 1)

Scorpaena onaria Jordan and Snyder, 1900: 365, pl. 16 (type locality: Misaki, Japan); Motomura *et al.*, 2005: 865, figs. 1–7 (southwestern Pacific; comparisons of southern population with northern population; redescription); Motomura *et al.*, 2007: 42, figs. 2B, 3 (southwestern and northwestern Pacific; review).

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Fig. 1. Fresh specimen of *Scorpaena onaria* from Bitung, Indonesia (LBRC-L 2052, 150.0 mm SL).

Material examined. LBRC-F 2052, 150.0 mm SL, off Lembah Island, Bitung, Sulawesi, Indonesia, 20–30 m, line-fishing, 5 Oct. 2009, purchased by Teguh Peristiwa at Girian Fish Market.

Description. Dorsal-fin rays XII, 9. Anal-fin rays III, 5. Pelvic-fin rays I, 5. Pectoral-fin rays 16 on both sides; uppermost ray and lower 9 rays unbranched, remaining rays branched. Longitudinal scale rows 48. Pored lateral-line scales 23. Scale rows between origin of sixth dorsal spine and lateral line 10. Scale rows between origin of last dorsal spine and lateral line 10. Scales above lateral line 7, below lateral line 17. Gill rakers on upper limb 5, lower limb (including a raker at angle) 11, including 2 rakers on hypobranchial; total rakers 16. Branchiostegal rays 7. The following morphometrics are expressed as percentage of SL: Body depth 33.8; body width 24.9; head length 49.1; snout length 12.5; orbit diameter 12.3; interorbital width at middle of eye 6.3; interorbital width between preocular spine bases 5.5; head width 15.5; upper-jaw length 23.1; maxillary depth 7.2; suborbital space 2.7; postorbital length 25.9; distance between tips of opercular spines 6.5; occipital pit length 6.3; occipital pit width 6.3; post-occipital pit length 9.6; supraocular tentacle length 10.3 on both sides of head; predorsal

length 39.9; preanal length 76.7; prepelvic length 43.7; first dorsal-fin spine length 9.3; second dorsal-fin spine length 16.0; third dorsal-fin spine length 20.2; fourth dorsal-fin spine length 19.7; fifth dorsal-fin spine length 18.3; eleventh dorsal-fin spine length 9.7; twelfth dorsal-fin spine length 16.5; longest dorsal-fin soft ray (second ray) length 20.2; first anal-fin spine length 9.9; second anal-fin spine length 20.5; third anal-fin spine length 17.4; longest anal-fin soft ray (first ray) length 22.5; longest pectoral-fin ray (eighth ray) length 29.5; pelvic-fin spine length 17.0; longest pelvic-fin soft ray (second ray) length 25.6; caudal-fin length 28.1; caudal-peduncle length 15.5; caudal-peduncle depth 10.0.

Body moderately compressed anteriorly, progressively more compressed posteriorly. Nape and anterior body moderately arched. Body moderately deep, but less than head length. Numerous small papillae on head, especially dorsal surface of head, snout and lateral surface above suborbital ridge; numerous tiny tentacles and cirri on head. A long tentacle on posterior end of supraocular spine base, its length greater than pupil diameter. Several small tentacles on upper part of outer margin of eye. Posterior lacrimal spine associated with a large fimbriate flap, its length less than supraocular tentacle, linked posteriorly to head

by fringed skin. A few small tentacles associated with pored lateral-line scales. Pectoral-fin axil without a skin flap. No distinct tentacles on lateral surface of body, except pored lateral line.

Cycloid scales covering an area bound by posterior tips of upper and lower opercular spines and opercular margin (but not on opercular margin); embedded cycloid scales (some scales exposed) covering an area surrounded by upper preopercle, lower posttemporal and upper opercular spines; embedded cycloid scales covering an area surrounded by postorbital, sphenotic, pterotic and upper preopercle; other parts of head not covered with scales. Well-exposed ctenoid scales covering entire lateral surface of body, but not extending onto rays or membranes of fins, except basal caudal fin. Exposed cycloid scales covering ventral surface of body between first anal-fin spine base and front of anus. Embedded cycloid scales covering ventral surface of body anterior to front of anus, including breast and between pelvic fins, and pectoral-fin base; scales on pectoral-fin base covered by thin skin. Lateral line sloping steeply downward above anterior half of pectoral fin.

Mouth large, slightly oblique, forming an angle of about 25 degrees to horizontal axis of head and body. Posterior margin of maxilla extending beyond a vertical through posterior margin of pupil, but not reaching posterior margin of orbit. Lateral surface of maxilla smooth, without ridges, tentacles, or scales. Lower jaw with a symphyseal knob. Width of symphyseal gap separating premaxillary teeth bands slightly greater than width of each band. Upper jaw with a band of short, incurved, conical teeth. Tooth band of upper jaw slightly wider than that of lower jaw. Lower jaw with a band of villiform teeth, lengths of most teeth shorter than those of upper jaw. Vomer and palatines with villiform teeth; width of vomer plate subequal to length of palatine plate. Underside of dentary with 3 sensory pores on each side, first pore below tip of anterior lacrimal spine, second pore (covered by thin skin) below posterior lacrimal spine, third pore located on posterior margin of dentary. A pore behind symphyseal knob of lower jaw on each side. Underside of lower jaw smooth, without ridges or tentacles.

Dorsal profile of snout steep, forming an angle of about 50 degrees to horizontal axis of head and body. Nasal spine simple, conical, directed upward. Anterior nostril with a distinct tentacle, its length greater than nasal spine. Ascending process of premaxilla not intruding into interorbital space, its posterior margin not extending beyond level with posterior margin of posterior nostril. Median interorbital ridge present, beginning just behind posterior margin of ascending process of premaxilla and ending midline slightly posterior to posterior end of preocular spine base. Interorbital ridges well developed, separated by a deep channel, beginning posterior to nasal spines and then conjoined level with, and between origins of, tympanic spines, forming a distinct ridge to anterior angular edge of occipital pit. Interorbital ridges diverging anteriorly and posteriorly in dorsal view, distance between interorbital ridges narrowest at a vertical midline through eye. Interorbital space moderately deep, about one-third of orbit extending above dorsal profile of head. Preocular spine simple, directed nearly upward. Supraocular spine simple, its tip located at vertical midline of eye. Postocular spine simple, its length slightly less than tympanic spine. Tympanic spine simple, strongly pointed. Bases of tympanic spines joined with interorbital ridges and a transverse ridge in front of occipital pit. Coronal, interorbital and pretympanic spines absent. A distinct transverse ridge (formed from posterior part of interorbital ridges) anterior to occipital pit slightly curved posteromedially in dorsal view. Occipital pit 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, parietal spines, and low ridges between tympanic and parietal spines. Parietal spine simple, its base curving into occipital pit. Nuchal spine simple; nuchal and parietal spines joined at base. Sphenotic with 2 small spines. Postorbital smooth. Pterotic spine simple. Upper posttemporal spine simple, pointed, small, directed dorsoposteriorly, its length much shorter than lower posttemporal spine. Lower posttemporal spine simple, its base length greater than that of pterotic spine. Supracleithral spines simple, flattened. Cleithral

spine flattened, pointed.

Lateral lacrimal spine present. Anterior lacrimal spine pointed, directed forward, its tip reaching dorsal margin of upper-jaw lip; a second short spine present at anterior lacrimal spine base. Posterior lacrimal spine simple, directed ventroposteriorly, its tip reaching upper-jaw lip. Posterior lacrimal spine larger than anterior spine. Suborbital ridge with 3 spines, first spine slightly posterior to midline of eye, second and third spines behind orbit. Broad space between ventral margin of eye and suborbital ridge. Suborbital pit absent. Preopercle with 5 spines, uppermost spine largest with a supplemental preopercular spine on its base, third to fifth spines without a median ridge, directed posteriorly. Preopercle, between uppermost preopercular spine and upper end of preopercle, without serrae or spines. Upper opercular spine simple with a low median ridge. Lower opercular spine simple with a distinct median ridge. Space between upper and lower opercular spines (with a low ridge on right side of head) not covered with fleshy skin. Posterior tips of upper and lower opercular spines not reaching opercular margin.

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

Remarks. The above characters of the present specimen from Indonesia agreed with characters of *Scorpaena onaria* given by Motomura *et al.* (2005, 2007), with the exception of 16 pectoral-fin rays on each side of the body in the Indonesian specimen [vs. usually 17 rays on each side of body (ca. 82% of 54 specimens examined), rarely asymmetrically 16 and 17 rays (ca. 6%) or 17 and 18 rays (ca. 10%), and rarely 18 rays (ca. 2%) on each side in *S. onaria*; Motomura *et al.*, 2007]. Although the 16 pectoral-fin

rays is one of diagnostic characters for a closely related East Asian species, *Scorpaena pepo* Motomura, Poss and Shao, 2007, we regard that of the Indonesian specimen as within variation of *S. onaria*. Detailed comparisons of *S. onaria* with *S. pepo* were given in Motomura *et al.* (2007, 2009).

Motomura *et al.* (2005) recognized two geographically distinct populations for *S. onaria*: a northern population from the northwestern Pacific (southern Korea, Japan, and Taiwan) and a southern population from the southwestern Pacific (northwestern and eastern Australia, New Caledonia, and northern New Zealand). In addition, although this species was reported from the Andaman Sea (Kyushin *et al.*, 1977; as *Scorpaena neglecta*), the status of *S. onaria* from the Andaman Sea remains unknown because specimens from the Andaman Sea are no longer available (Motomura *et al.*, 2007).

Scorpaena onaria has previously been considered to represent an antitropical distribution in the western Pacific. Thus the present specimen from Bitung, northern Sulawesi, Indonesia, represents the first record of *S. onaria* from the tropical region in the western Pacific, suggesting that the species is widely and continuously distributed in the western Pacific from Korea and Japan to Australia and New Zealand.

The southern population of *S. onaria* have a short supraocular tentacle, which is usually shorter than the pupil diameter and the length of a tentacle on the posterior lacrimal spine. In contrast, the supraocular tentacle of the northern population of *S. onaria* is well developed and greater than the pupil diameter and the posterior lacrimal tentacle (Motomura *et al.*, 2005). The present Indonesian specimen has a well developed, long supraocular tentacle, which is greater than the pupil diameter and the tentacle on the posterior lacrimal spine. The length of the supraocular tentacle of the Indonesian specimen is 10.3% of SL, which is also within that of the northern population [4.9–11.3% (mean 7.6%) of SL; Motomura *et al.*, 2007]. In addition, the ventral margin of the dentary of individuals of the southern population of *S. onaria* is more convex than for individuals of the northern population (Motomura *et al.*, 2005, 2007). The condition of the dentary

in the Indonesian specimen is also similar to that of the northern population of *S. onaria*, rather than the southern population.

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Literature Cited

- Jordan, D. S. & Snyder, J. O., 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.
- Kyushin, K., Amaoka, K., Nakaya, K. & Ida, H., 1977. *Fishes of Indian Ocean*. 392 pp. Japan Marine Fishery Resource Centre, Tokyo.
- Motomura, H., 2004. Revision of the scorpionfish genus *Neosebastes* (Scorpaeniformes: Neosebastesidae), with descriptions of five new species. *Indo-Pacific Fishes*, **37**: 1–76.
- 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., Paulin, C. D. & Stewart, A. L., 2005. 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., Poss, S. G. & 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.
- Randall, J. E. & Eschmeyer, W. N., 2002 (dated 2001). Revision of the Indo-Pacific scorpionfish genus *Scorpaenopsis*, with descriptions of eight new species. *Indo-Pac. Fish.*, (34): 1–79.

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