First Records of a Scorpionfish, Scorpaenodes albaiensis, from East Asia, with a Synopsis of S. minor (Actinopterygii: Scorpaeniformes: Scorpaenidae)

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The Indo-Pacific scorpionfish *Scorpaenodes albaiensis* (Evermann and Seale, 1907), for which the Philippines was previously the northernmost record, is recorded from East Asia (Taiwan and Japan) for the first time on the basis of 16 specimens. Specimens from Taiwan and Japan previously identified as *S. minor* (Smith, 1958) are shown to include the closely related species *S. albaiensis* as well. The East Asian specimens of *S. albaiensis* are described, and comparisons of the two species are made on the basis of Indo-Pacific specimens.
Key Words: Teleostei, Scorpaenidae, *Scorpaenodes albaiensis*, *Scorpaenodes minor*, Japan, Taiwan, new records.

Introduction

Scorpaenodes albaiensis (Evermann and Seale, 1907) was originally described as a new genus and species, *Hypomacrus albaiensis*, on the basis of two specimens from the Philippines. Subsequently, Smith (1958) described the closely related *Hypomacrus minor* Smith, 1958 based on 30 specimens from Mozambique. Both species share the following characters not otherwise seen in the genus *Scorpaenodes* Bleeker, 1857: middle rays of the pectoral fins abruptly longer than those immediately above, and nasal spines absent (Eschmeyer 1986; Poss 1999). Two other nominal species, *Hypomacrus africanus* Smith, 1958 and *H. brocki* Schultz, Woods and Lachner, 1966, were subsequently synonymized with *H. albaiensis* and *H. minor* respectively (Eschmeyer 1986). Eschmeyer (1969) regarded the genus *Hypomacrus* Evermann and Seale, 1907 (characterized by the two features mentioned above) as representing a species group within *Scorpaenodes*, whereas Mandrytsa (2001) believed *Hypomacrus* to be a valid sister genus of a clade comprising *Hoplosebastes* Schmidt, 1929 and *Scorpaenodes* on the basis of a morphological phylogenetic analysis. Much of the latter hypothesis, including the phylogenetic position of *Scorpaenodes*, was at odds with that subsequently proposed by Imamura (2004). The validity of *Hypomacrus* should be re-assessed on the basis of further

morphological and molecular phylogenetic analyses; for the moment, however, we follow the widely recognized generic concept of Eschmeyer (1969) and treat *Hypomacrus* as a junior synonym of *Scorpaenodes*.

Poss (1999) reviewed the distributions of *Scorpaenodes albaiensis* and *S. minor* in the western Pacific and regarded the Philippines and Ryukyu Islands, respectively, as their northernmost records. However, our examinations of East Asian specimens previously identified as *S. minor* by many authors (e.g., Shimizu 1984; Shao and Chen 1988; Poss 1999; Nakabo 2000, 2002), in addition to newly collected specimens, have revealed that those from Taiwan were *S. albaiensis* and those from the Ryukyu Islands included both *S. albaiensis* and *S. minor*. These specimens of *S. albaiensis* represent the first confirmed records of the species from East Asia and the Japanese specimens represent the northernmost western Pacific Ocean records for the species thus far. The East Asian specimens of *S. albaiensis* are briefly described below and comparisons of the two species, based on specimens from the Indo-West Pacific (including Taiwan and Japan), are also made. Synopses of the two species are provided.

Material and Methods

Measurements follow Motomura (2004a, b), with additional measurements (i.e., head width) following Motomura *et al.* (2005b, 2006a), and maxillary depth following Motomura *et al.* (2006b). Counts follow Motomura *et al.* (2005a–c) and Motomura and Johnson (2006), with predorsal scale counts following Motomura *et al.* (2006b). Last branched pectoral-fin ray length was measured from the base of the uppermost ray to the tip of the last branched ray. The last two soft rays of the dorsal and anal fins are counted as single rays, each pair being associated with a single pterygiophore. Standard and total lengths are expressed as SL and TL respectively. Terminology of head spines follow Randall and Eschmeyer (2002, fig. 1) and Motomura (2004b, fig. 1) with the following additions: the spine at the base of the uppermost preopercular spine is referred to as the supplemental preopercular spine (Eschmeyer 1965); the spine on the lateral surface of the lacrimal bone is referred to as the lateral lacrimal spine (Motomura and Senou 2008, fig. 2); and the coronal and pretympanic (as an extra spine) spines are as figured in Chen (1981, fig. 1) and Motomura *et al.* (2004, fig. 14b) respectively.

Specimens examined in this study have been deposited in the Australian Museum, Sydney (AMS); Biodiversity Research Center, Academia Sinica, Taipei (ASIZP); California Academy of Sciences, San Francisco (CAS); Kagoshima University Museum, Kagoshima (KAUM); Department of Marine Sciences, Faculty of Science, University of the Ryukyus, Okinawa (URM); Museum Support Center, Smithsonian Institution National Museum of Natural History, Suitland (USNM); and Yokosuka City Museum, Yokosuka (YCM).

The presence of a swimbladder was confirmed in specimens deposited at KAUM, following dissection of the right side of the abdomen. Osteological characters were observed by radiographs of three specimens of *Scorpaenodes albaiensis* (KAUM-I. 645–647). The formula for configuration of the anterior neural spines and anterior dorsal fin pterygiophores follows Ahlstrom *et al.* (1976). Diagnoses of the two species are based on specimens from the Indo-Pacific, and the description of *S.*

albaiensis is based on specimens from East Asia.

Taxonomy

Scorpaenodes albaiensis (Evermann and Seale, 1907)
[English name: Longfinger Scorpionfish]
[New standard Japanese name: Furisode-kasago]
(Figs 1A, 2A, Tables 1, 2)

Hypomacrus albaiensis Evermann and Seale, 1907: 102, fig. 20 (type locality: Bacon, Sorsogon Province, Philippines).
Hypomacrus africanus Smith, 1958: 178 (type locality: Zanzibar) [Subjectively invalid; secondarily preoccupied in *Scorpaenodes* by *Scorpaenodes africanus* Pfaff, 1933].
Scorpaenodes albaiensis: Eschmeyer 1986: 471.

East Asian specimens examined. Japan: KAUM-I. 645, 63.7 mm SL, 646, 65.1 mm SL, and 647, 46.8 mm SL, Toguchi Beach, Yomitan, Okinawa Island, Ryukyu Islands, 26°22′04″N, 127°44′06″E, Y. Sakurai, 17 Sept. 2006, washed up by Typhoon No. 13; KAUM-I. 6429, 78.5 mm SL, 6430, 65.4 mm SL, 6431, 66.3 mm SL, 6432, 58.8 mm SL, 6433, 62.8 mm SL, 6591, 53.1 mm SL, 6592, 49.7 mm SL, and 6593, 40.2 mm SL, Hama Fishing Port, Nakagusuku, Okinawa Island, Ryukyu Islands, 26°15′29″N, 127°47′38″E, Y. Sakurai, 13 July 2007, washed up by Typhoon No. 4; URM-P 41473, 74.0 mm SL and 41474, 68.6 mm SL, Chatan, Okinawa Island, Ryukyu Islands, H. Ishimori and M. Kume, 17 Oct. 2001, washed up by Typhoon No. 21. **Taiwan:** ASIZP 56237, 46.2 mm SL, Wan-li-tung, Ping-tung, K.-T. Shao, 27 Nov. 1987; ASIZP 56858, 2 specimens, 49.7 and 51.0 mm SL, Nanliao Bay, Lutao Island, 15 m, J.-P. Chen, 22 Oct. 1993.

Comparative material from the Indo-Pacific. Israel: USNM 355353, 48.1 mm SL, southern end of Sinai Peninsula, Strait of Jubal, Red Sea, 9.1 m, V. Springer *et al*., 29 Sept. 1969. **Philippines:** CAS 75357, 70.2 mm SL, Bolinao, Pangasinan Province, Luzon, C. Ferraris, 15 Apr. 1980; USNM 55902, holotype of *Hypomacrus albaiensis*, 48.9 mm SL, Bacon, Sorsogon, Luzon Island, C. Pierson; USNM 372602, 48.7 mm SL, Princesa Bay, Palawan, 09°47′N, 118°44′E, 12.2–18.3 m, R. Schroeder, 13 July 1979; USNM 372637, 53.8 mm SL, Bolinao Lagoon, Lingayan Gulf, Pangasinan, 16°26′N, 119°56′E, 2–15 m, C. Ferraris, 16 Apr. 1980; USNM 372638, 45.8 mm SL, Lingayan Gulf, Pangasinan, 16°26′N, 119°56′E, 2–15 m, E. Murdy, 16–17 Apr. 1980; USNM 372683, 52.0 mm SL, west side of Bararin Island, Palawan, 10°52′30″N, 120°56′00″E, 13.7 m, V. Springer *et al*., 23 May 1978; USNM 372684, 44.8 mm SL, southern tip of Negros Island, 09°02′27″N, 123°07′37″E, 6–10 m, V. Springer *et al*., 12 May 1978. **Solomon Islands:** USNM 380946, 42.6 mm SL, west coast of Tomotu Island, Santa Cruz Islands, 10°40′S, 165°47′30″E, 10–30 m, J. Williams *et al*., 29 Sept. 1998; USNM 382906, 31.0 mm SL, Ndendo Island, Santa Cruz Islands, 5–35 m, 10°49′30″S, 165°50′E, J. Williams *et al*., 28 Sept. 1998. **Indonesia:** USNM 210019, 32.3 mm SL, west of Tandjung Namatatuni, Moluccas, 13.7–15.2 m, V. Springer and M. Gomon, 19 Jan. 1973; USNM 308017, 49.6 mm SL, off northwest shore of Damalawa Islet, Tallabassi Bay, Kabaena Island, 05°17′20″S, 122°04′E, 4–8 m, V. Springer, 24 Feb. 1974.

Papua New Guinea: USNM 380381, 2 specimens, 26.1 and 53.8 mm SL, north side of West Entrance, Hermit Islands, 01°30′30″S, 144°59′15″E, 12 m, V. Springer *et al.*, 4 Nov. 1978. **Vanuatu:** USNM 353504, 42.3 mm SL, Lamen Bay, Epi Island, 16°44′00″S, 168°07′35″E, 22.9–27.4 m, J. Williams *et al.*, 13 June 1996; USNM 363767, 47.3 mm SL, Rowa Islands, Banks Islands, 13°38′32″S, 167°30′18″E, 23–29 m, J. Williams *et al.*, 20 May 1997. **Fiji:** CAS 214127, 44.3 mm SL, off Suva, Viti Levu Island, 18°09′52″S, 178°23′48″E, 12.2–19.8 m, D. Greenfield *et al.*, 26 May 1999. **Tonga:** USNM 336568, 2 specimens, 29.3 and 32.4 mm SL, north of Ohonua Harbor, Eua, 21°19′30″S, 174°56′50″W, 21.3–30.0 m, J. Williams *et al.*, 5 Nov. 1993. **French Polynesia:** USNM 379392, 14.5 mm SL, Rapa, 27°37′31″S, 144°18′00″W, 12–18 m, J. Williams *et al.*, 4 Nov. 2002.

Diagnosis. A species of *Scorpaenodes* with the following combination of characters: nasal spines absent; middle rays of pectoral fin abruptly longer than those immediately above, length of last branched ray of pectoral fin 58.0–72.5% (mean 63.5%) of that of longest pectoral-fin ray; 8 or 9 (mode 9) dorsal-fin soft rays; 15–17 (16) pectoral-fin rays; 7–9 (7) predorsal-fin scale rows; 37–42 (40) scale rows in longitudinal series; 4 or 5 (5) scales above lateral line, 10–12 (11) below; 4–6 (5) scale rows between last dorsal-fin spine base and lateral line; large dark blotch often present on subopercle; largest specimen examined 78.5 mm SL.

Description. Counts and proportional measurements as percentages of SL of the East Asian specimens of *S. albaiensis* are given in Table 1. Selected counts of the Indo-Pacific specimens of the species are given in Table 2. Characters given in the diagnosis and Tables are not repeated here.

Body moderately compressed anteriorly, progressively more compressed posteriorly (Fig. 1). Nape and anterior body not arched. Body depth shallow, less than head length. Slender tentacles on supraocular, posterior lacrimal, parietal, nuchal, and preopercular spines. Short, broad tentacle on posterior edge of low membranous tube associated with anterior nostril. Distinct tentacles absent from membranes of all fins. Pectoral-fin axil without skin flaps. Scales covering dorsal and lateral surfaces of head and upper margin of maxilla. Well-exposed ctenoid scales on lateral surface of trunk, scales becoming cycloid on abdomen. Exposed cycloid scales on anteroventral surface of body. Body scales extending onto basal fin rays or membranes except for bases of spinous portion of dorsal fin and pelvic fins. Lateral line not strongly sloping downward above dorsoposterior tip of opercle. Series of pored lateral-line scales sometimes not complete, lacking from middle or posterior parts of body. Underside of dentary with three well-developed sensory pores on each side, third pore sometimes covered with skin. Pair of small pores behind symphysial knob of lower jaw in ventral view.

Posterior margin of maxilla not reaching to level of posterior margin of orbit. No distinct longitudinal ridge on lateral surface of maxilla. Width of symphysial gap separating premaxillary teeth bands subequal to width of each band. Upper and lower jaws with villiform teeth, several canine teeth at front of jaws. Teeth absent at front of vomer, appearing in 2 or 3 rows posteriorly, forming V-shaped patch on vomer. Palatine teeth absent. Underside of lower jaw without ridges.

Dorsal profile of snout not steep, forming angle of about 20 degrees to horizontal axis of head and body. Ascending process of premaxilla not intruding into interorbital space, its posterior margin not reaching level of posterior margin of posterior nostril in dorsal view. Median interorbital ridge absent. Interorbital ridges

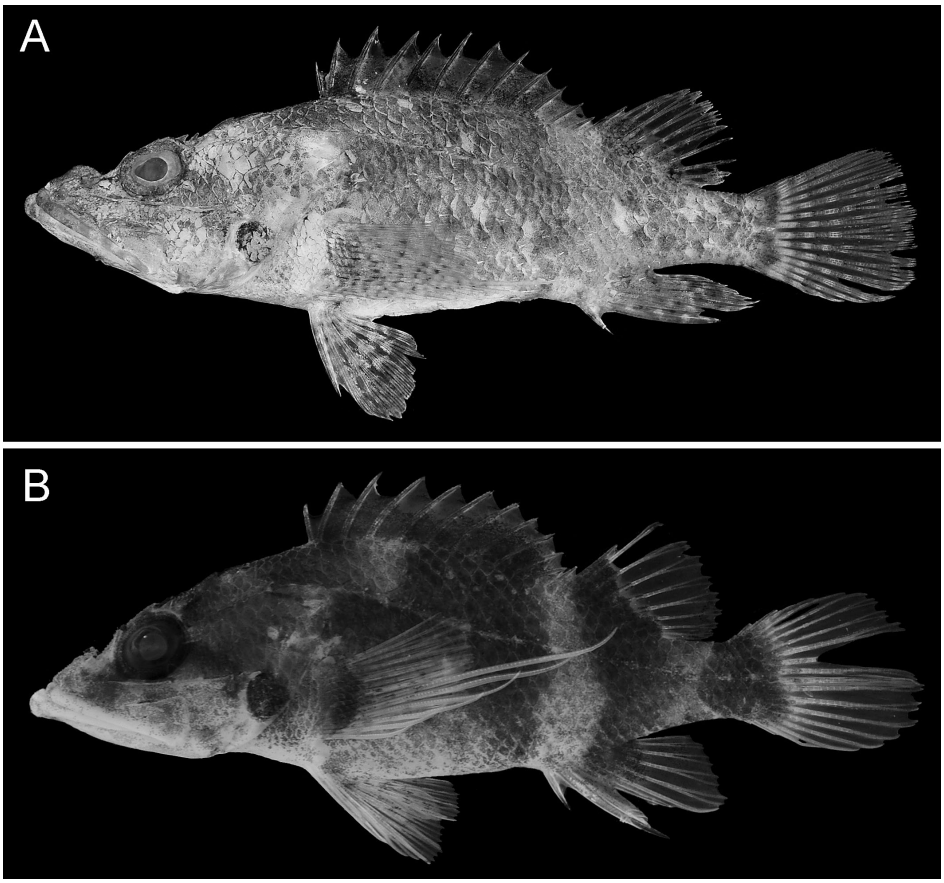

Fig. 1. *Scorpaenodes albaiensis*, fresh specimen, KAUM-I. 6429, 78.5 mm SL, Okinawa Island, Ryukyu Islands, Japan (A) and *S. minor*, preserved specimen, YCM-P 42256, 35.0 mm SL, Amami-oshima, Ryukyu Islands, Japan (B).

weakly developed, separated by relatively shallow channel. Interorbital space shallow, with about one-tenth of orbit extending above dorsal profile of head. Preocular spine simple, flattened anteriorly and posteriorly; anterior surface of spine without ridges. Supraocular, postocular, and tympanic spines simple. Interorbital, coronal, and pretympanic spines absent. Occipital region flat, with no distinct ridges in front or rear of occiput. Parietal and nuchal spines joined at base. Sphenotic with 1–3 small, indistinct spines. Postorbital without spines. Pterotic spine simple, often not forming spine (simply a ridge). Upper posttemporal spine absent. Lower posttemporal, supracleithral, and cleithral spines simple.

Lateral lacrimal spine absent; lateral surface of lacrimal with ridge. Anterior and posterior lacrimal spines simple, triangular, not strongly developed. Suborbital ridge with 2 spines, first spine on main suborbital ridge below space between posterior margins of pupil and orbit, second spine at end of suborbital ridge. Space between ventral margin of eye and suborbital ridge remarkably narrow. Subor-

Table 1. Counts and measurements of East Asian specimens of *Scorpaenodes albaiensis* and *S. minor*, expressed as percentages of standard length with means in parentheses.

	S. albaiensis *n*=16	*S. minor* *n*=3
Standard length (SL, mm)	40.2–78.5	29.8–35.6
Counts		
Dorsal-fin rays	XIII, 8–9[8]	XIII, 8
Pectoral-fin rays	i–ii+6–8+vi–viii=15–16	i–ii+7–8+vi=15
Anal-fin rays	III, 5	III, 5
Pelvic-fin rays	I, 5	I, 5
Caudal-fin rays	8+8	8+8
Scale rows in longitudinal series	37–42	29–31
Pored lateral-line scales	19–23	19–23
Scales above lateral line	4–5	4
Scales below lateral line	10–12	9–10
Scale rows[1]	5–6	4
Scale rows[2]	4–6	4
Predorsal-fin scale rows	7–9	6–7
Gill rakers (upper+lower=total)	4–6+10–15=15–20	4–5+8–9=13
Vertebrae	10+14	10+14
Measurements (% of SL)		
Body depth	28.7–33.9 (30.4)	30.9–32.6 (31.9)
Body width	16.3–20.7 (18.5)	17.7–19.1 (18.5)
Head length	43.0–46.6 (44.5)	42.3–46.0 (44.3)
Snout length	11.8–12.9 (12.4)	11.7–12.9 (12.2)
Orbit diameter	9.6–12.7 (10.7)	11.1–11.7 (11.4)
Interorbital width[3]	4.3–5.5 (5.0)	5.6–6.0 (5.8)
Interorbital width[4]	3.8–4.7 (4.3)	4.7–5.6 (5.2)
Head width	12.2–13.7 (13.0)	13.7–13.8 (13.7)
Upper-jaw length	20.8–22.2 (21.3)	21.3–23.2 (22.3)
Maxillary depth	6.6–8.2 (7.7)	8.2–8.9 (8.5)
Postorbital length	21.3–23.1 (22.1)	20.0–22.8 (21.5)
Between tips of opercular spines	3.9–5.1 (4.4)	4.3–5.0 (4.7)
Predorsal-fin length	41.1–44.2 (42.3)	41.9–43.5 (42.7)
Preanal-fin length	74.6–77.9 (76.6)	72.3–75.2 (74.2)
Prepelvic-fin length	40.1–44.9 (42.4)	38.9–41.6 (40.1)
1st dorsal-fin spine length	5.3–6.5 (5.9)	5.1–6.3 (5.6)
2nd dorsal-fin spine length	8.4–10.0 (9.4)	8.7–9.7 (9.2)
3rd dorsal-fin spine length	10.7–12.4 (11.5)	11.7–12.3 (12.0)
4th dorsal-fin spine length	11.6–12.4 (12.1)	12.4–12.9 (12.6)
5th dorsal-fin spine length	11.2–13.9 (12.2)	12.8–13.2 (13.0)
12th dorsal-fin spine length	4.9–5.8 (5.3)	3.4–4.6 (4.0)
13th dorsal-fin spine length	8.4–10.1 (9.3)	7.7–10.3 (9.0)
Longest dorsal-fin ray length (2nd or 3rd)	15.4–17.4 (16.6)	16.4–17.7 (17.1)
1st anal-fin spine length	6.8–8.6 (7.7)	7.1–7.4 (7.3)
2nd anal-fin spine length	19.2–23.1 (21.1)	20.3–20.5 (20.4)
3rd anal-fin spine length	15.5–18.4 (16.6)	15.8–16.3 (16.0)
Longest anal-fin ray length[5]	19.6–22.9 (21.2)	21.5–22.0 (21.7)
Pectoral-fin ray length[6]	29.9–42.3 (36.1)	40.6–44.9 (42.7)
Last branched pectoral-fin ray length	21.4–24.6 (22.6)	20.7–22.8 (21.7)

Table 1. Continued.

	S. albaiensis *n*=16	*S. minor* *n*=3
Pelvic-fin spine length	14.6–17.3 (15.6)	16.6–18.1 (17.4)
Longest pelvic-fin ray length[7]	22.2–25.9 (23.5)	23.7–25.2 (24.4)
Caudal-fin length	24.6–27.7 (26.0)	24.0–26.5 (25.3)
Caudal-peduncle length	14.3–17.2 (16.0)	17.1–18.6 (17.8)
Caudal-peduncle depth	9.1–10.5 (9.6)	10.3–10.7 (10.5)

[1] Between last dorsal-fin spine base and lateral line; [2] between 6th dorsal-fin spine base and lateral line; [3] at vertical midline of eye; [4] at posterior end of preocular spine base; [5] 1st ray longest in *S. albaiensis*, and 1st or 2nd ray in *S. minor*; [6] 10th ray longest in *S. albaiensis*, and 9th or 10th ray in *S. minor*; [7] 2nd ray longest in *S. albaiensis*, and 2nd or 3rd ray in *S. minor*; [8] one deformed specimen with XII, 10.

bital pit present. Preopercle with 5 spines; uppermost spine largest with supplemental preopercular spine on its base; first and second spines with narrow base; third to fifth spines with broad base; space between second and third spines broadest. Preopercle, between uppermost preopercular spine and upper end of preopercle, without serrae or spines. Upper opercular spine simple without median ridge. Lower opercular spine simple with low median ridge. Space between upper and lower opercular spines without ridges. Posterior tips of upper and lower opercular spines not reaching and often reaching opercular margin, respectively.

Origin of first dorsal-fin spine above supracleithral spine. Posterior margin of

Table 2. Frequency comparison of selected meristic characters in Indo-Pacific specimens of *Scorpaenodes albaiensis* and *S. minor*.

	Dorsal-fin soft rays[1]			Pectoral-fin rays				Predorsal-fin scale rows				
	7	8	9	15/15	15/16	16/16	16/17	5	6	7	8	9
S. albaiensis		5	30	6	6	21	1			18	12	1
S. minor	3	21		23	1			1	11	3		

	Scale rows in longitudinal series												
	27	28	29	30	31	32	—	37	38	39	40	41	42
S. albaiensis								1	3	2	9	8	8
S. minor	1	1	3	4	7	2							

	Scales above /below lateral line								Scales rows between last dorsal-fin spine base and lateral line		
	4	5	/	8	9	10	11	12	4	5	6
S. albaiensis	5	25				8	15	5	1	21	7
S. minor	13	3		2	7	5			9	7	

[1] One deformed specimen of *S. albaiensis* with XII, 10.

opercular membrane reaching level of base of third dorsal-fin spine. Posterior tip of pectoral fin extending beyond level of origin of anal fin. Origin of pelvic-fin spine just below origin of pectoral fin. Posterior tip of depressed pelvic fin not reaching origin of anal fin. Origin of first anal-fin spine slightly posterior to level of last dorsal-fin spine.

Gill rakers relatively short and spinous; slit present behind fourth gill arch. Formula for configuration of anterior neural spines and anterior dorsal pterygiophores //2+1/1/1/1/1/1/1/1/1+1/. Dorsal series of caudal-procurrent rays 4, ventral series 3. Swimbladder present.

Distribution. Known from tropical and subtropical waters in the Indo-Pacific, ranging through the east coast of Africa, Red Sea, Seychelles, Maldive Islands, Chagos Archipelago, northern Australia, Southeast Asia, southwestern Pacific (Randall 2005; this study), French Polynesia (this study), and Taiwan and Japan (this study). Specimens have been collected from depths of 2 to 35 m, and washed up on shore following typhoons.

Remarks. Yoshino and Nishijima (1981) reported two specimens of *Hypomarcus minor* (=*Scorpaenodes minor*) from Sesoko Island, off Okinawa Island, Ryukyu Islands. Subsequently, many Japanese authors, e.g., Shimizu (1984) and Nakabo (2000, 2002), have referred to this Japanese records of *S. minor* without re-examining the specimens. Although their two specimens (37.2 and 59.8 mm SL) lacked registration numbers, a photograph of the smaller example when fresh was provided as plate III, fig. 4 in their paper. The same photograph later appeared in Masuda *et al.* (1984, pl. 279L). We examined the smaller specimen (re-measured as 35.6 mm SL; registered as URM-P 4174) and confirmed it to have been correctly identified as *S. minor*, but the identification of the larger specimen could not be confirmed. It was unavailable for this study, not being found in the URM fish collection. Judging from its size, however, it is most likely to have been *S. albaiensis* (see Comparisons). Nakabo (2000, 2002) provided an illustration of a 6-cm SL fish identified as *S. minor*, but that specimen was in fact *S. albaiensis*, having a large body size.

Although Shao and Chen (1988) reported *S. minor* from Taiwan and included a photograph (as pl. 58, fig. 1), their specimen (ASIZP 56237, 46.2 mm SL) is here determined to be *S. albaiensis*. Two additional specimens (ASIZP 56858, 49.7 and 51.0 mm SL) from Taiwan, also examined by us, were similarly identified as *S. albaiensis*. Although specimens of *S. minor* have apparently not been collected from Taiwan (fish collections of ASIZP and NTUM surveyed during this study), *S. minor* is probably distributed in Taiwanese waters since it occurs in both the Philippines and the Ryukyu Islands (see Distributional implications).

Characters of the specimens from Taiwan and the 11 specimens newly collected off Okinawa Island agreed with those of the holotype of *Hypomacrus albaiensis* (USNM 55902, 48.9 mm SL, Philippines) and non-type material of *Scorpaenodes albaiensis* from the Indo-Pacific examined during this study. Accordingly, the 16 Taiwanese and Japanese specimens of *S. albaiensis* represent the first reliable records of the species from East Asia.

Comparisons. *Scorpaenodes albaiensis* and *S. minor* can be distinguished from all their congeners by lacking nasal spines and having the middle rays of the pectoral fin abruptly longer than those immediately above (Eschmeyer 1986; Poss 1999; Randall 2005). Although the two species are similar to each other in overall body appearance (e.g., having a long snout, long middle pectoral-fin rays, and slen-

der body) and color pattern (e.g., often having a large dark blotch on the subopercle), *S. albaiensis* tends to have smaller body scales than those of *S. minor*. Although the numbers of predorsal-fin scale rows, scales above and below the lateral line, and scale rows between the last dorsal-fin spine base and lateral line for *S. albaiensis* tend to be higher than those for *S. minor*, these meristic characters of both species overlap narrowly (Table 2). The numbers of scale rows in longitudinal series, however, provide a clear separation of the two species (37–42 in *S. albaiensis* vs 27–32 in *S. minor*; Table 2). In addition, *S. albaiensis* differs from *S. minor* in having higher counts of the dorsal-fin soft rays (mode 9, vs 8 in the latter) and pectoral-fin rays (mode 16, vs 15; Table 2). Finally, adults of *S. albaiensis* (78.5 mm maximum recorded SL (97.0 mm TL), KAUM-I. 6429, Japan) attain a larger size than those of *S. minor* (39.0 mm maximum recorded SL, USNM 99783, Philippines).

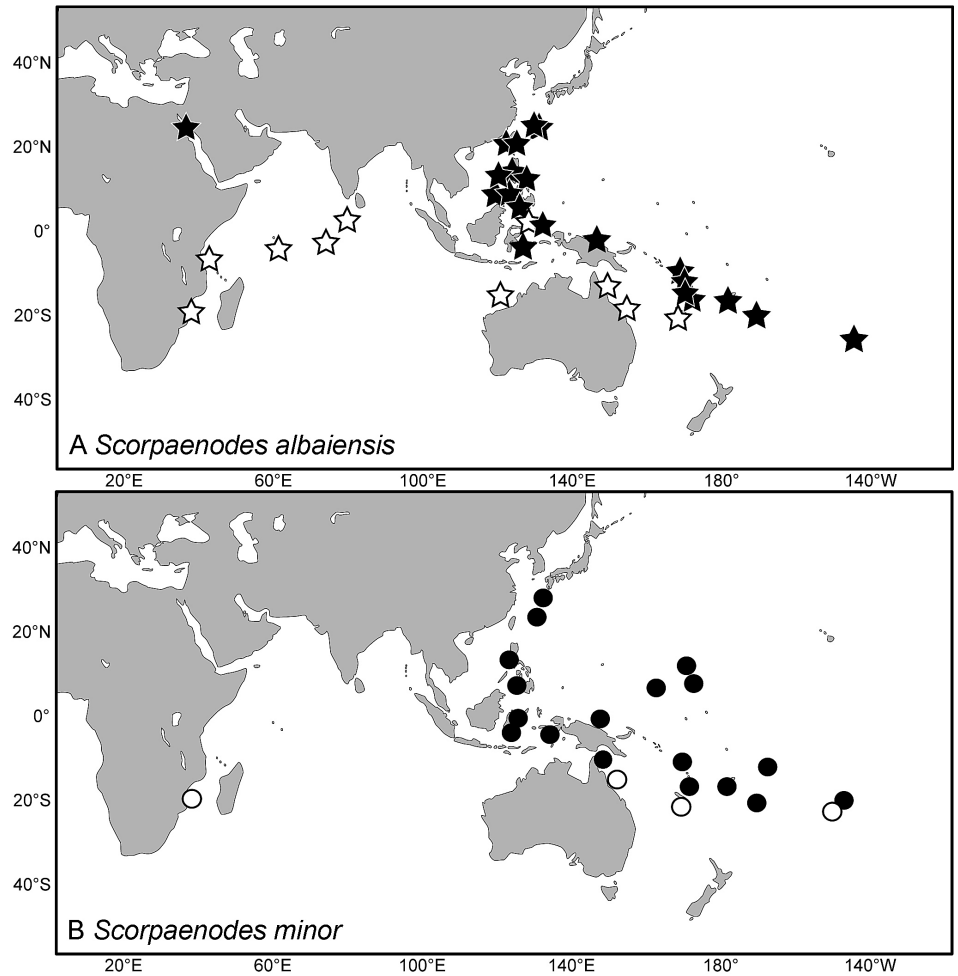

Fig. 2. Distributional records of *Scorpaenodes albaiensis* (A) and *S. minor* (B) on the basis of collected specimens. Closed and open symbols indicate specimens examined in this study and other specimens previously recorded in reliable reports, respectively.

Distributional implications. *Scorpaenodes albaiensis* and *S. minor* follow the distribution pattern typical of many tropical Indo-Pacific fishes (Fig. 2). In the western Pacific, the northernmost records of *S. albaiensis* and *S. minor* are off Okinawa Island and Amami-oshima Island, respectively, in the Ryukyu Islands. Although the ichthyofauna of the Japanese mainland has been well surveyed, neither species has been recorded off the mainland coast, suggesting that within Japanese waters both species are indeed restricted to the Ryukyu Islands.

The Kuroshio Current, a strong warm-water current, flows from off the Philippines to the Pacific coast of southern Japan, via Taiwan and far west of the Ryukyu Islands. Because the current flows from west to east across the Tokara Islands (located between Yaku-shima and Amami-oshima Islands), *S. albaiensis* and *S. minor* are unlikely to extend north of Amami-oshima Island, owing to the barrier formed by the current.

Dissection of the abdomen on the right side of the largest specimen of *S. albaiensis* (KAUM-I. 6429) from Okinawa Island showed it to have an expanded gonad, full of relatively large-sized ova (about 0.4 mm diameter). This suggests that the species reproduces in Japanese waters.

Scorpaenodes minor (Smith, 1958)
[English name: Minor Scorpionfish]
[Standard Japanese name: Yubinaga-kasago]
(Figs 1B, 2B, Tables 1, 2)

Hypomacrus minor Smith, 1958: 178 (type locality: Bazaruto Island, Mozambique).
Hypomacrus brocki Schultz *et al.*, 1966: 39, figs 138i, 143 (type locality: Talisse Island, Indonesia).
Scorpaenodes minor: Shimizu 1984: 314.

East Asian specimens examined. Japan: URM-P 4174, 35.6 mm SL, west of Sesoko Island, off Okinawa Island, Ryukyu Islands, 18 m, T. Yoshino *et al.*, 12 Sept. 1977; YCM-P 34460, 29.8 mm SL, Nishikomi, Setouchi, Amami-oshima Island, Ryukyu Islands, 31 Aug. 1994; YCM-P 42256, 35.0 mm SL, Saneku, Kakeroma Island off south of Amami-oshima Island, Ryukyu Islands, 18 Sept. 2003.

Comparative material from the Indo-Pacific. Philippines: USNM 99783, paratype of *Hypomacrus brocki*, 39.0 mm SL, Romblon Reef, Romblon, 26 Mar. 1909; USNM 133076, paratype of *Hypomacrus brocki*, 34.1 mm SL, Limbones Cove, Manila Bay, 8 Feb. 1909; USNM 372689, 30.0 mm SL, off Bonbonon Point, southern tip of Negros Oriental, 09°02′45″N, 123°07′37″E, 12.2 m, V. Springer *et al.*, 13 May 1978. **Caroline Islands:** USNM 224509, 24.6 mm SL, southwest of Ponape, 06°52′N, 158°06′E, 36.6 m, V. Springer *et al.*, 15 Sept. 1980. **Marshall Islands:** USNM 140090, paratype of *Hypomacrus brocki*, 26.6 mm SL, Latoback Island, Rongerik Atoll, L. Schultz and Herald, 28 June 1946; USNM 140091, paratype of *Hypomacrus brocki*, 20.8 mm SL, Arji Island, Bikini Atoll, 6–12 m, Herald and Brook, 7 Aug. 1946; USNM 140228, paratype of *Hypomacrus brocki*, 27.2 mm SL, Kieshiechi Island, Rongelap Atoll, 6 m, Brock and Herald, 24 July 1946; USNM 361009, 20.4 mm SL, Taka Island, 9.1 m, A. Amerson, 22 Oct. 1964. **Solomon Islands:** USNM 384521, 30.7 mm SL, Graciosa Bay, Ndendo Island, Santa Cruz Islands, 10°44′12″S, 166°49′30″E, 3–17 m, J. Williams *et al.*, 26 Sept. 1998. **Papua New Guinea:** USNM 380373, 24.2 mm SL, Amot Island,

Hermit Islands, 01°33′S, 144°59′E, V. Springer *et al*., 30 Oct. 1978. **Indonesia:** USNM 99782, holotype of *Hypomacrus brocki*, 34.4 mm SL, Talisse Island, 3–5 m, 9 Nov. 1909; USNM 133077, paratype of *Hypomacrus brocki*, 29.5 mm SL, Patiente Strait, 3–8 m, 1 Dec. 1909; USNM 136430, paratype of *Hypomacrus brocki*, 32.2 mm SL, Talisse Island, 3–5 m, 9 Nov. 1909; USNM 136438, paratype of *Hypomacrus brocki*, 26.7 mm SL, Gulf of Tonimi, Buka Island, 2–5 m, 20 Nov. 1909; USNM 266025, 19.9 mm SL, north shore of Banda Island, 04°32′50″S, 129°54′00″E, 3 m, V. Springer *et al*., 8 Mar. 1974. **Australia:** AMS I.20757-022, 28.6 mm SL, Raine Island, Queensland, 11°36′S, 144°01′E, 20 m, R. McKay, 13 Feb. 1979. **Loyalty Islands:** USNM 324422, 25.5 mm SL, Bagaat, Ouvea Atoll, 20°37′19″S, 166°16′12″E, 9–12 m, J.-L. Menou *et al*., 18 Nov. 1991. **Fiji:** CAS 214156, 35.4 mm SL, off Suva, Viti Levu Island, 18°05′42″S, 178°13′48″E, 10.7–16.8 m, D. Greenfield *et al*., 25 May 1999. **Wallis Islands:** USNM 373672, 20.0 mm SL, northwest of Pte. Vaha'a'Utu, Île Uvea, 13°16′50″S, 176°15′55″W, 2–20 m, J. Williams *et al*., 10 Nov. 2000. **Tonga:** USNM 334501, 22.7 mm SL, Eua, 21°18′15″S, 174°26′20″W, 18.3–30.8 m, J. Williams *et al*., 3 Nov. 1993. **French Polynesia:** USNM 392263, 19.6 mm SL, Vaiare Pass, Moorea, 17°31′14″S, 149°45′44″W, 25–35 m, D. Lecchini *et al*., 30 Mar. 2006.

Diagnosis. A species of *Scorpaenodes* with the following combination of characters: nasal spines absent; middle rays of pectoral fin abruptly longer than those immediately above, length of last branched ray of pectoral fin 58.1–62.8% (mean 60.4%) of that of longest pectoral-fin ray; 7 or 8 (mode 8) dorsal-fin soft rays; 15 or 16 (15) pectoral-fin rays; 5–7 (6) predorsal-fin scale rows; 27–32 (31) scale rows in longitudinal series; 4 or 5 (4) scales above lateral line, 8–10 (9) below; 4 or 5 (4) scale rows between last dorsal-fin spine base and lateral line; large dark blotch often present on subopercle; largest specimen examined 39.0 mm SL.

Distribution. Known from scattered localities in the Indo-Pacific, ranging from South Africa east to French Polynesia, and the Ryukyu Islands south to northeastern Australia (Poss 1999; this study) at depths of 2–36 m. No records from central Indian Ocean.

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