

First Japanese Specimen-based Record of *Liopropoma tonstrinum* (Teleostei: Serranidae), from Minami-daito Island, Daito Islands, southern Japan

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A single specimen (25.8 mm standard length) of a serranid fish, *Liopropoma tonstrinum* Randall and Taylor, 1988, was collected from Minami-daito Island in the Daito Islands, southern Japan. This species was previously known based on specimens from Christmas Island in the eastern Indian Ocean, and various islands in the Pacific Ocean, including the Society Islands, American Samoa, Fiji, New Caledonia, Indonesia, Palau, Micronesia, the Marshall Islands, and Wake Island, as well as from underwater photographs taken in the Mariana Islands and southern Japan. Thus, the present specimen represents the first record from Japan based on a voucher specimen, as well as the northernmost specimen-based record of this species up to now.

Key Words: *Liopropoma tonstrinum*, *Liopropoma multilineatum*, Perciformes, new record, voucher specimen, distribution, taxonomy, Daito Islands, Japan.

Introduction

The serranid genus *Liopropoma*, inhabiting deep to shallow waters, comprises 23 species from the Indo-Pacific Ocean (Eschmeyer 2014). Of these, 11 species have been recorded from Japanese waters, most of them occurring from the Izu Islands to the Ryukyu Archipelago (Senou 2013).

During an ichthyofaunal survey at Minami-daito Island, Daito Islands (ca. 300 km east of Okinawa Island), southern Japan, a single specimen of *L. tonstrinum* Randall and Taylor, 1988 was collected off the island at a depth of 25 m. This species, one of seven new species of this genus described by Randall and Taylor (1988), has been recorded from the eastern Indian and Pacific oceans, and the northernmost record on the basis of voucher specimens has been from Palau. The Minami-daito specimen is herein described as the first specimen-based record of *L. tonstrinum* from Japan and the northernmost record of this species.

Materials and Methods

Counts and measurements follow Randall and Taylor (1988). Predorsal, preanal, and prepelvic lengths given in Randall and Taylor (1988) are described as pre-dorsal-fin, pre-anal-fin, and pre-pelvic-fin lengths, respectively, in the present paper. Measurements were made to the nearest 0.1 mm with needle-point calipers under a dissecting microscope. Standard and head lengths are abbreviated as SL and

HL, respectively. The morphological description is based on the specimen collected from Minami-daito Island. Curatorial procedures for the collected specimen followed Motomura and Ishikawa (2013). The specimen of *L. tonstrinum* examined in this study is deposited at the National Museum of Nature and Science, Tsukuba, Japan (NSMT). The underwater photographs of *L. tonstrinum* referred to in this paper are registered at the Image Database of Fishes in the Kanagawa Prefectural Museum of Natural History, Odawara, Japan (KPM-NR). The mitochondrial gene COI (653 bp) was sequenced following Ivanova *et al.* (2007), and the sequence is available at DDBJ/EMBL/GenBank under accession number AB983160.

Liopropoma tonstrinum Randall and Taylor, 1988
[New standard Japanese name: Borojino-hanasuzuki]
(Fig. 1)

Liopropoma sp. 1: Allen and Steene 1979: 24 (Christmas Island, Australia).

Liopropoma tonstrinum Randall and Taylor, 1988: 38, pl. 2, fig. B (holotype locality: Augulpelu Reef, Palau; paratypes localities: Christmas Island, Australia; Tutuila, American Samoa; Ono-Ilau Island, Fiji; Pohnpei and Ant Atoll, Micronesia; Kwajalein Atoll and Enewetak Atoll, Marshall Islands); Kulbicki and Williams 1997: 14 (Ouvea Atoll, New Caledonia); Heemstra and Randall 1999: 2460 (western Pacific); Randall *et al.* 2002: 159, fig. 4 (Tahiti, Society Islands); Allen and Adrim 2003: 32 (Sulawesi, Indonesia); Myers and Donaldson 2003: 618 (Mariana Islands); Lobel



Fig. 1. Fresh (A) and alcohol-preserved (B) specimen of *Liopropoma tonstrinum*. NSMT-P 120483, 25.8 mm SL, off Minami-daito Fishing Port, Minami-daito Island, Daito Islands, Okinawa Prefecture, Japan.

and Lobel 2004: 70 (Wake Island); Randall 2005: 172, lower fig. (Palau); Fricke *et al.* 2011: 385 (New Caledonia); Allen and Erdmann 2012: 309, upper fig. (Christmas Island, Australia).

Liopropoma sp.: Myers 1989: 111, pl. 36, fig. D (Guam, Mariana Islands).

Material examined. NSMT-P 120483, 25.8 mm SL, off Minami-daito Fishing Port (25°52'14"N, 131°13'25"E), Minami-daito Island, Daito Islands, Okinawa Prefecture, Japan, 25 m depth, 7 July 2014.

Description. Dorsal fin rays VI-I-I, 12 (first ray unbranched, last branched at base); anal fin rays III, 8 (last ray branched at base); pectoral fin rays 14 (upper 2 and lower 2 unbranched); pored lateral line scales 46; scale rows above lateral line to origin of dorsal fin 5; scale rows below lateral line to origin of anal fin 14; circumpeduncular scales 32; gill rakers 5+15.

Following morphometrics expressed as percentages of SL: body depth 30.0%; body width 12.3%; head length 38.6%; snout length 9.6%; orbit diameter 10.2%; bony interorbital

width 6.6%; upper jaw length 17.2%; caudal peduncle depth 14.0%; caudal peduncle length 20.3%; pre-dorsal-fin length 47.3%; pre-anal-fin length 66.5%; pre-pelvic-fin length 35.3%; length of dorsal fin base 37.9%; length of first dorsal fin spine 3.0%; length of second dorsal fin spine 9.3%; length of third dorsal fin spine 9.8%; length of longest dorsal fin ray 20.3%; length of anal fin base 15.0%; length of first anal fin spine 2.3%; length of second anal fin spine 8.1%; length of third anal fin spine 9.0%; length of longest anal fin ray 20.7%; caudal fin length 20.3%; pectoral fin length 25.5%; length of pelvic fin spine 10.6%; length of longest pelvic fin ray 23.4%.

Body moderately elongate and compressed; depth of caudal peduncle slightly less than half of body depth. Head pointed, dorsal profile nearly straight; snout length 4.0 in HL; orbit diameter 3.8 in HL; interorbital space flat, least bony width 5.3 in HL. Posterior margin of preopercle slightly irregularly curved, not obviously serrate; 6 small pores along preopercular margin. Anterior nostril a thin, membranous tube located in front of center of eye and just above upper lip; posterior nostril an elliptical opening slightly an-

terior to orbit at level of upper edge of pupil; distance between anterior and posterior nostrils 3.1 times in orbit diameter. Three pores in area between snout and interorbital space on each side of head.

Mouth large, slightly oblique; lower jaw projecting; posterior margin of maxilla short of vertical drawn through posterior edge of orbit; upper jaw length 2.2 in HL. Villiform teeth bands on jaws, teeth bands broader anteriorly, particularly in upper jaw with 8 irregular rows of teeth anteriorly and 4 rows posteriorly; in lower jaw, 7 irregular rows of teeth anteriorly and 3 rows posteriorly; inner teeth except for those on posterior part of upper jaw notably longer and slender than others; lips smooth.

Lateral line highly arched over middle to tip of pectoral fin, highest point below base of fifth dorsal fin spine. Head nearly fully scaled, only region around nostrils and large pores on snout naked; 8 diagonal rows of scales on cheek between orbit and corner of preopercle; small scales on basal one-third of second dorsal, anal, and caudal fins.

Origin of dorsal fin above seventh pored lateral-line scale; first dorsal fin spine slender, its base close to base of second spine; third spine of dorsal fin longest, its length 3.9 in HL; distinct scaly ridge between dorsal fins; seventh spine clearly visible above middle of ridge, its exposed part about half as long as eighth spine; fifth soft ray of dorsal fin longest, its length 1.9 in HL. Origin of anal fin below base of third soft ray of dorsal fin; first spine of anal fin shorter than second and third spines, its length 4.3 in HL; second soft ray of anal fin longest, its length 1.9 in HL. Pectoral fins pointed, fifth ray longest, reaching vertical drawn through base of first soft ray in dorsal fin; pectoral fin length 1.5 in HL. Origin of pelvic fin slightly anterior to upper base of pectoral fin; pelvic fin length 1.7 in HL. Caudal fin slightly emarginate with rounded lobes.

Color when fresh—Body dominated by 2 broad longitudinal ocher stripes, these being separated by mid-lateral white stripe edged with reddish orange; broadest portion of white stripe almost half as wide as each ocher stripe. Head reddish orange anteriorly, shading to yellow posteriorly, yellowish region extending onto thorax and lower abdomen and narrowly along base of first dorsal fin to origin of second dorsal fin. Lips and chin reddish orange, maxilla yellow. First dorsal fin, and anterior half of second dorsal fin, pectoral fin, pelvic fin, anterior half of anal fin yellowish; caudal fin with broad extensions of ocher body stripes, remaining part of fin whitish.

Color in alcohol—Pale tan with 2 faint dark longitudinal stripes on each side of body; dark stripes separated by ground-color stripe, its width subequal to that of dark stripes. Head white anteriorly, pale yellow posteriorly. Caudal fin with two pale gray stripes; other fins semi-transparent.

Distribution. Currently known from the eastern Indian Ocean and Pacific Ocean. Specimens have been collected from Christmas Island in the eastern Indian Ocean, and the following islands in the Pacific Ocean: Tahiti (Society Islands), Tutuila Island (American Samoa), Ono-Ilau Island (Fiji), Ouvea Atoll (New Caledonia), Sulawesi (Indonesia),

Angulpelu Reef (Palau), Pohnpei and Ant Atoll (Micronesia), Enewetak Atoll (Marshall Islands), Wake Island, and Minami-daito Island (Daito Islands) (Randall and Taylor 1988; Kulbicki and Williams 1997; Allen and Adrim 2003; this study). Underwater photographs of *L. tonstrinum* have been taken at Palau (KPM-NR 99042), Guam and Rota (Mariana Islands; Myers 1989, KPM-NR 93876), Chichi Island (Ogasawara Islands; KPM-NR 70243, 98690, 156910–156912), Hachijo Island (Izu Islands; KPM-NR 156628), and Kume Island (Ryukyu Archipelago; KPM-NR 16408, 22548). Collection data for the species indicate capture depths from 11 to 50 m, and the photographic record from Kume Island was taken at a depth of 65 m.

Remarks. Many characteristic of the present specimen collected from Minami-daito Island are consistent with those of the holotype and paratypes of *L. tonstrinum* given by Randall and Taylor (1988): e.g., VI-I-I, 12 dorsal fin rays; the seventh dorsal fin spine clearly visible above the interdorsal ridge and about half as long as the eighth spine; 14 pectoral fin rays; 46 lateral-line scales; 5+15 gill rakers; a non-serrate posterior margin of the preopercle; three pores on area between the snout and the interorbital space on each side of the head; the posterior part of the head, upper back, and lower abdomen yellowish, without stripes; the anterior part of the head reddish orange. In the following respects, however, the specimen from Minami-daito Island differs from the type series: circumpeduncular scales (32 vs 33–34 in the latter), body width (2.4 in SL vs 1.55–1.8), snout length (4.5 vs 4.15–4.4), bony interorbital width (5.3 vs 6.3–7.4), length of third dorsal fin spine (3.9 vs 2.45–2.85), and length of third anal fin spine (1.9 vs 2.55–3.15). These generally small differences in counts and measurements may simply reflect the limited number of specimens available for study. In addition, a color difference when both fresh or alive is evident. There are two ocher stripes on the side of the body and the head is reddish-orange in specimen from Minami-daito Island, whereas the individuals reported by Randall and Taylor (1988), Myers (1989), Randall *et al.* (2002), Randall (2005), and Allen and Erdmann (2012) had bright red stripes on the body and either a red or white head.

Among its congeners, *L. tonstrinum* is morphologically most similar to *L. multilineatum* Randall and Taylor, 1988, sharing the presence of a scaly ridge between the dorsal fins, the obvious emergence of the seventh dorsal fin spine, three pores in the area between the snout and interorbital space on each side of the head, 14 pectoral fin rays, and similar color patterns, with reddish-orange and white stripes on the tail, a yellowish body, and a reddish-orange head (Randall and Taylor 1988). The former can be clearly distinguished from the latter by the non-serrate posterior margin of the preopercle (vs serrate in *L. multilineatum*), a more slender body outline (body depth 27.0–29.1% of SL vs 28.7–33.9%), the slightly emarginate caudal fin (vs more deeply emarginate), shorter paired fins (pectoral fin length 25.4–28.3% of SL, pelvic fin length 22.6–28.0% of SL vs 27.0–30.0% and 25.2–28.2% respectively), the lack of a linear color pattern (vs having dark red longitudinal lines following scale rows

on the sides of the body), and the presence of two longitudinal broad, ocher or red stripes on the side of the body posterior to the head (*vs* two broad, red stripes only on the region posterior to the insertion of the second dorsal fin).

Although *L. tonstrinum* has been recorded from the Mariana Islands, the Ogasawara Islands, the Izu Islands, and the Ryukyu Archipelago on the basis of underwater photographs (see above), the northernmost record of the species based on a collected specimen was hitherto from Augulepelu Reef, Palau (07°16'N, 134°32'E, BPBM 9531, holotype). The specimen collected from Minami-daito Island represents the first record of *L. tonstrinum* from Japan based on a collected voucher specimen and, as well, the northernmost specimen-based record of the species (an approximately 2,000 km northward range extension).

Minami-daito Island, located 300 km east of Okinawa Island, is one of a handful of isolated oceanic islands in Japan. Koeda *et al.* (2013) recently described a new pempherid fish, *Pempheris ufuagari* Koeda, Yoshino, and Tachihara, 2013, from this island, and in the present study *L. tonstrinum* was collected during a survey lasting just a few days. These new finds are indications that the marine biodiversity around Minami-daito Island is still not well understood, and further taxonomic studies combined with extensive field surveys around this island are urgently required.

The proposed Japanese name is a combination of “borojino”, originating from the Russian warship “Borodino” which first discovered the Daito Islands, and “hanasuzuki”, meaning a fish of the genus *Liopropoma*. Minami-daito Island was commonly known as South Borodino Islands in Western countries after the Russians discovered it in 1820.

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