

A southward range extension of a wreckfish, *Stereolepis doederleini* (Actinopterygii: Acropomatiformes: Polyprionidae), to tropical water off eastern Taiwan

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Abstract

A wreckfish, *Stereolepis doederleini* Lindberg et Krasnyukova, 1969, inhabits typical cold or temperate waters and was previously known from Great Bay (Sea of Japan), Korea, south to Kyuhu-Palau Ridge of Japan. In the present report, a specimen of this fish was collected from southeastern Taiwan representing the southernmost distribution of the cold-water genus *Stereolepis* in the Northern Hemisphere, with a southward extension into the tropical region. It is also the first record of a member of the family Polyprionidae from Taiwan. Here we document the species found in Taiwan, with a detailed description of the specimen.

Keywords

Actinopterygii, Acropomatiformes, biogeography, cold-water fish, distribution

Introduction

The wreckfish family Polyprionidae is a group of large marine fishes, growing up to 250 cm in length, and attaining high market values by some of its members (Froese and Pauly 2021). The family comprises 2 genera and 4 species, including *Polyprion americanus* (Bloch et Schneider, 1801) (nearly circumglobal; absent in Pacific coast of South America and northern Pacific), *Polyprion oxygeneios* (Schneider et Forster, 1801) (circumglobal in the Southern Ocean), *Stereolepis gigas* Ayres, 1859 (northern Pacific), and *Stereolepis doederleini* Lindberg et Krasnyukova, 1969 (northwestern Pacific).

Of these species, *S. doederleini* was previously recorded from around Great Bay, Korea to Kyuhu-Palau Ridge of Japan (Sokolovska et al. 1998; Choi et al.

2003; Nakabo 2013). However, not much morphological information regarding the species was available in the literature. Noichi et al. (1990) studied the ecology of juveniles of *S. doederleini* based on 106 individuals collected from Yanagihama beach of Nagasaki Prefecture, Japan. Kwun et al. (2018) reported juvenile *S. doederleini* collected from Jeju Island, southern Korea. Moon et al. (2011) studied the nutrition components of *S. doederleini* and suggested that it can potentially be a new aquaculture fish species.

Recently, a younger specimen of *S. doederleini* was collected from deep water by hook and line from off Fugang, Taitung, southeastern Taiwan. The finding reveals a southward extension of its distribution from cold or temperate into tropical water. A detailed description of this specimen is provided.

Materials and methods

Methods for counts and proportional measurements followed Hubbs and Lagler (1958). Standard length is expressed as SL. Standardization of morphometric data is expressed as a percentage of SL. All measurements were made with digital calipers to the nearest 0.1 mm. The cheek depth is the narrowest space between the lower margin of the eye and the lower margin of premaxilla. Osteological characters were determined by X-radiographs. The specimen is deposited at Pisces Collection of the National Museum of Marine Biology and Aquarium, Pingtung, Taiwan (NMMB-P).

Results

Family Polyprionidae

Stereolepis doederleini Lindberg et Krasuykova, 1969

Figs 1–3

Synonymy. *Stereolepis doederleini* Lindberg et Krasuykova, 1969; Lindberg and Krasuykova 1969: 69, fig. 130 (type locality: Sea of Japan). Mochizuki 1984: 124 (Hokkaido to Kochi and Ishikawa, Japan). Sokolovskaâ et al. 1998: 11 (Sea of Japan). Choi et al. 2003: 307, 589 (Korea). Nakabo 2013: 749 (Hokkaido to Kyushu-Palau Ridge, Korea, East China Sea, Peter the Great Gulf).

Specimen examined. NMMB-P32813, 385 mm SL, off Fugang (ca. 22°43'N 121°20'E), Taitung, southeastern Taiwan, March 2020, by deep-water longline, ca. 400 m, purchased at local auction.

Description of NMMB-P32813. Morphological measurements presented as a percentage of SL. Dorsal-fin elements XI, 10; anal-fin elements III, 7; pectoral-fin rays 19 (right side)/18 (left side), two dorsalmost rays unbranched, others branched; pelvic-fin rays I, 5; principal caudal-fin rays 9 (upper lobe) + 8 (lower lobe), procurent caudal-fin rays 9 (dorsal)/8 (ventral), total caudal-fin rays 24. Gill rakers on first gill arch 4 + 13 = 16, 3 rudimental plus 1 developed on upper limb and 7 developed plus 6 rudimental on lower limb. Pored lateral-line scales 73, including 3 on caudal-fin base. Rows of cheek scales 11. Circumpeduncular scale rows 39. Scales above lateral line 15, counted slitting posteriorly from dorsal-fin origin. Scales below lateral line 28 (counted from anal-fin origin slitting up anteriorly to lateral line) or 23 (counted from anal-fin origin slitting up posteriorly to lateral line). Vertebrae: 12 precaudal + 14 caudal = 26 in total. Vertebral formula 0/0/0+2/1+1/1/1/1/1/1/1 (predorsal and spinous dorsal fin only).

Head length 2.7 times in SL (36.9% SL); body depth at pectoral-fin base depth 2.9 (34.2); body width at pectoral-fin base 5.2 (19.2); predorsal length 2.7 (36.4); prepectoral length 2.8 (36.4); prepelvic length 2.7 (37.1); distance between origins of pelvic and anal fins 2.8 (36.4); dorsal-fin base length 2.1 (48.1); anal-fin base 7.0 (14.2); caudal-peduncle length 5.2 (19.2); caudal-peduncle depth



Figure 1. *Stereolepis doederleini*, NMMB-P32813, 385 mm SL, off southeastern Taiwan. (A) preserved condition. (B) fresh condition at auction.

8.5 (11.8); pectoral-fin length 5.1 (19.6); pelvic-fin length 4.7 (21.1); pelvic-fin spine length 9.6 (10.4); caudal-fin length 4.8 (21.0).

Snout length 2.9 times (34.1% HL) in head length; fleshy eye diameter 5.5 (18.1); fleshy interorbital width 3.2 (30.9); bony interorbital width 3.6 (28.1); upper-jaw length 2.1 (46.9); post-orbital length 1.9 (52.5); distance from margin of eye to angle of subopercle 2.6 (38.1); suborbital height 7.7 (13.0); maxillary height 6.6 (including supramaxilla, maxilla, and premaxilla) (15.1); first dorsal-fin spine 8.4 (11.8); second dorsal-fin spines 3.5 (28.8); third dorsal-fin spine 2.3 (43.1); fourth dorsal-fin spine 2.0 (50.2); 11th dorsal-fin spine 4.9 (20.3); longest dorsal-fin ray 2.6 (39.2); first anal-fin spine 13.2 (7.6); second anal-fin spine 6.2+ (broken distally) (~16.1); third anal-fin spine 5.8 (17.3); longest anal-fin ray 2.7 (37.6).

Body moderately slender, deepest region at about middle of abdomen; less compressed. Dorsal profile smooth, nape slightly raised, dorsal-fin base straight at spinous region, slightly raised at soft-rayed region (Fig. 1A). Head moderately large; dorsal profile slightly more pronounced than ventral; dorsal profile barely convex from tip of snout to dorsal-fin origin (Fig. 2A). Posterior end of head below base of fourth dorsal-fin spine. Snout moderately long, blunt anteriorly, 1.9 times eye diameter. Eye small. Dorsal surface of skull with some smooth vermicular-like ridges. Middle of anterior portion of nape with long smooth ridge, its anterior portion branched (Fig. 2B).

Mouth moderately large, terminal, its gape slightly oblique, forming ca. 10° angle with horizontal body axis; lower jaw slightly overhanging upper jaw; posterior end of maxilla extending to vertical through middle of eye.

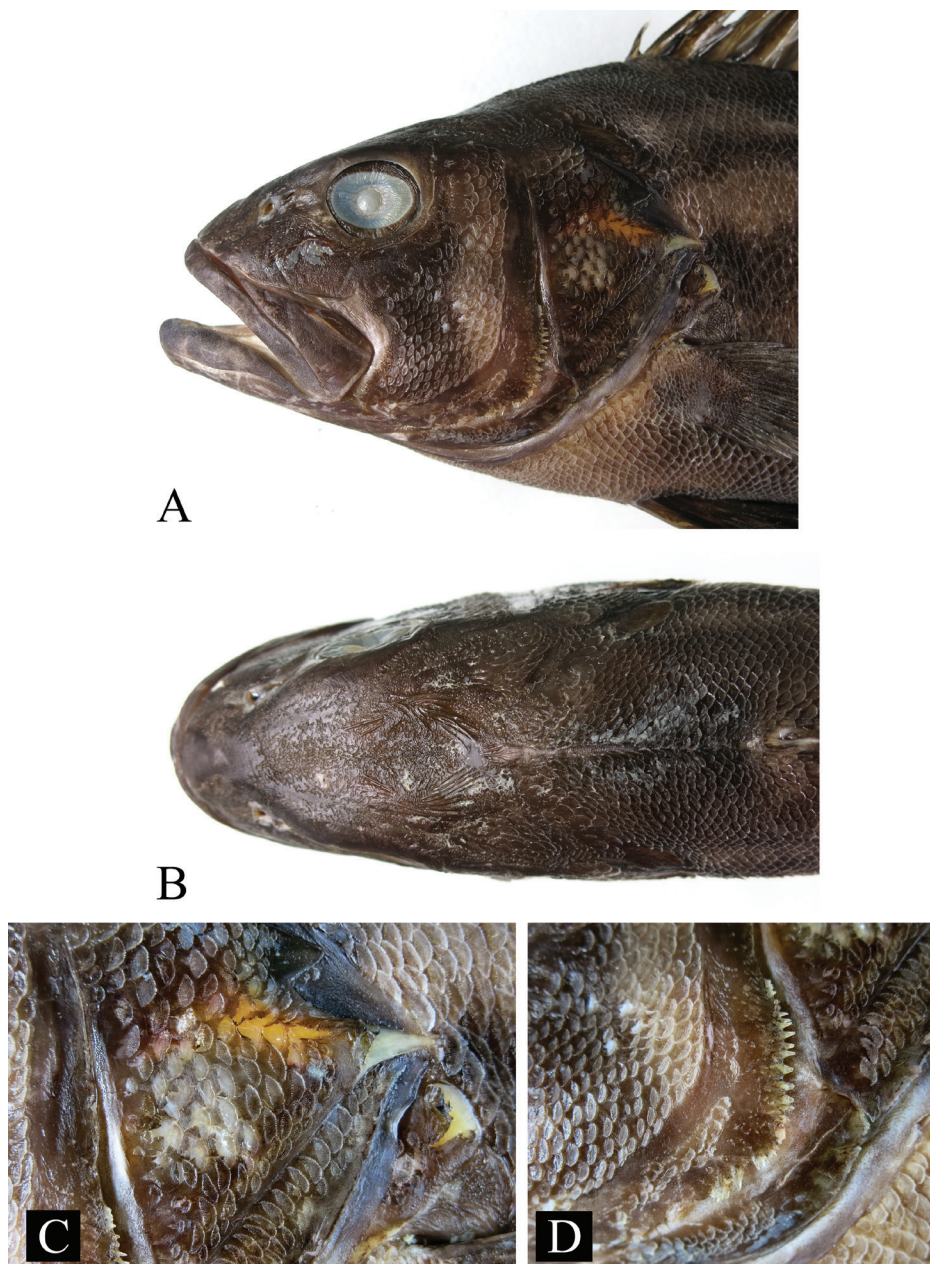


Figure 2. Close-up images of *Stereolepis doederleini*, NMMB-P32813. (A) Lateral view of head. (B) Dorsal view of head and nape. (C) Opercle. (D) Serration on preopercle. Anterior to left; not to scale.

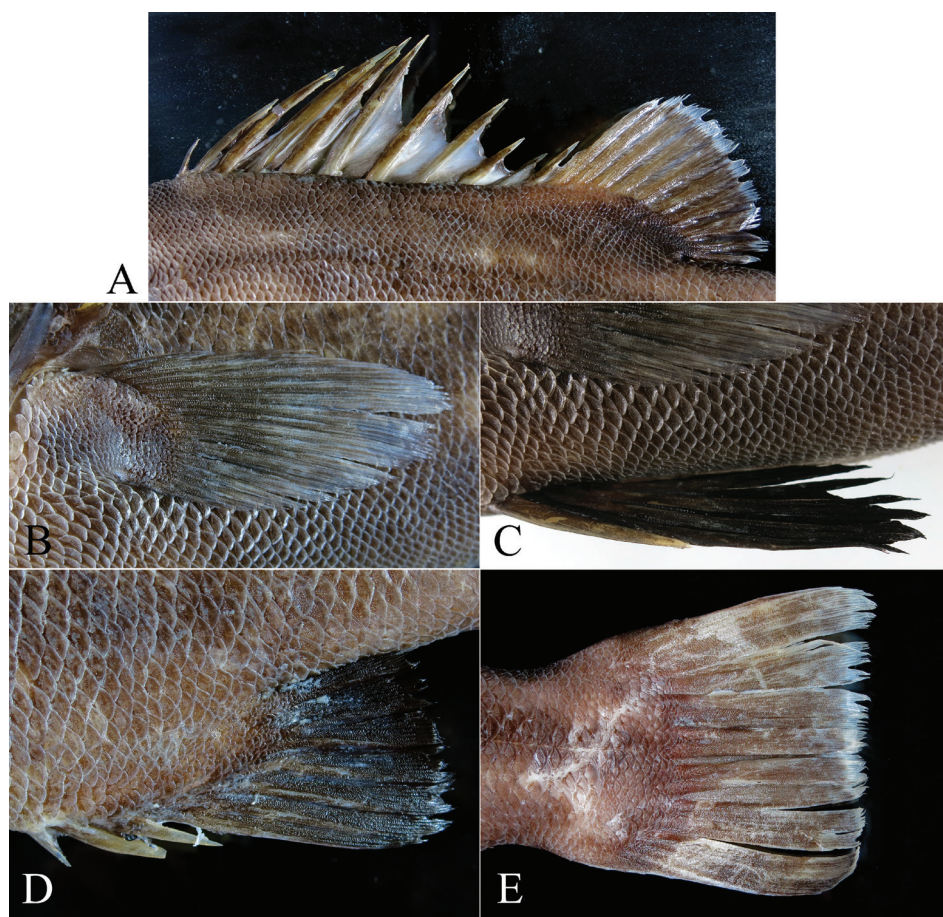


Figure 3. Close-ups of *Stereolepis doederleini*, NMMB-P32813. (A) Dorsal fin. (B) Pectoral fin. (C) Pelvic fin. (D) Anal fin. (E) Caudal fin. Anterior to left; not to scale.

First suborbital bone (lacrimal) well developed, slightly overlapped with anterior portion of maxilla, its lower margin smooth. Two nostrils well in front of eye. Anterior nostril rounded, bearing high rim with flap, its broader reaching anterior margin of posterior nostril when reflected. Posterior nostril elliptical, horizontal axis longer and slightly above the anterior nostril, with very low flashy rim along its lower margin (Fig. 2A).

Opercle with strong spine, pointed and rather distinct, mostly exposed from skin and extending to slightly overhanging posterior margin of opercle (Fig. 2C). Exposed margin of preopercle with strong stout spines, those along angle stronger and longer (Fig. 2D). Posterior margins of upper portion of subopercle smooth; lower margin of interopercle smooth. Posttemporal exposed, with weak serrations on posterior margin; upper portion cleithrum largely exposed; supracleithrum not exposed, covered by operculum totally.

Single dorsal fin with long base, deeply concaved at posterior third, spinous portion strongly arched with its base longer than that of soft-rayed portion, base of spinous portion 2.4 times base of soft-rayed portion (Fig. 3A). Dorsal-fin spines somewhat compressed; first spine short, the fourth spines longest, distinctly longer than third

spine, rest spines gradually shorter posteriorly, except for last spine (11th, also leading spine of posterior lobe), which is slightly longer than penultimate spine. Second dorsal-fin ray longest, gradually shorter posteriorly.

Pectoral fin moderately large, long oval (Fig. 3B), its origin slightly below body axis and lower opercular spine, its tip reaching base of 9th dorsal-fin spine when addressed. Origin of pelvic fin (Fig. 3C) below origin of pectoral fin, about vertical through base of third dorsal-fin spine; its tip slightly behind middle of interspace between origins of pelvic and anal fins, its tip well before anus when pressed. Anal fin small with short base, first spine very short, all three spines shorter than second ray (also longest) (Fig. 3D); outer margin of anal fin straight. Caudal fin truncate, very slightly emarginate as middle (Fig. 3E).

Teeth villiform on jaws, vomer, and palatines; no teeth at symphysis of upper jaw. Vomer with wide triangular patch of small villiform teeth; no backward prolongation of vomerine tooth patch. Palatine with a narrow band of numerous rows of small teeth. No teeth on pterygoids or tongue. Pseudobranch present.

Gill rakers on first gill arch 3 (rudimentary) + 1 (developed) on upper limb, 7 (developed) + 6 (rudimentary) on lower lobe.

Scales weakly ctenoid, including those on cheek, interorbital, operculum, chest, nape, chest, and base of pectoral fin. No scale on snout and chin. Predorsal scales beginning in plane about halfway between posterior margin of orbit and upper end of gill slit.

Lateral line complete, lateral line scales not enlarged, each with simple sensory tubule. Rows of scales above and below lateral line parallel to it. Bases of soft-rayed portions of dorsal and anal fins covered by small scales. Pectoral and caudal fins with scales basally.

Coloration. When fresh, body yellowish brown dorsally and grayish ventrally with all fin darker, except for membranes of spinous dorsal fin translucent; 5 broad, irregular white stripes on lateral side of body; white bar on head and cheek right behind eye; soft dorsal fin and caudal fin with bright white margin. Body dark brown in general, with 5 broad pale stripes, uppermost one along dorsal-fin base, and other 4 on lateral side of body; fins darker, except for membranes of spinous dorsal fin pale; posterior margins of soft dorsal fin and caudal fin pale.

Distribution. Known from Russia (Sea of Japan) (Sokolovskaâ et al. 1998), Korea (Choi et al. 2003), and Japan (Mochizuki 1984; Nakabo 2013), at depths around 400–600 m. Newly collected from southeastern Taiwan off Taitung at depth around 400 m.

Remarks. The Taiwanese specimen is identified as *Stereolepis doederleini* based on the distinct coloration with 5 broad pale stripes on lateral sides of body among the family. It differs from the only other congener, *S. gigas*, co-occurring in the northwestern Pacific, by having the spinous dorsal fin distinctly higher than the soft dorsal fin (vs. the former distinctly lower than the later in *S. gigas*); the caudal fin truncate (vs. slightly concave or emarginated); 5 pale stripes on lateral sides of body (vs. black patches on lateral sides of body); lateral-line scales less than 73 (vs. about 80), scale rows below lateral 28–31 (vs. 35–40), and posterior end of maxilla reaching a vertical through posterior margin of eye (vs. reaching a vertical through anterior margin to middle of eye) (Mochizuki 1984; this study).

It is notable that Mochizuki (1984) reported 57–68 pored lateral-line scales for *S. doederleini*, whereas we counted 73 (including 3 on caudal-fin base) for our specimens which may represent the individual variation.

Discussion

The presently reported material of *Stereolepis doederleini* was caught by hook-and-line from deep water off Fugang fishing port, Taitung, eastern Taiwan. A portion of the local fisheries there are targeting high economical value demersal species such as *Doederleinia berycoides* (Hilgendorf, 1879) and *Atrobucca nibe* (Jordan et Thompson, 1911) and it is likely that *S. doederleini* was a bycatch with these species by deep water line fishery, where the habitat is assumed to be deep sandy or muddy sea floor (CNT, personal observation).

The discovery of *Stereolepis doederleini* in eastern Taiwan may represent a rare dispersal case of a cold-water species to southern and warmer regions. Similar cases were documented by Koeda and Muto (2019) and Chou and Tang (2021), where cold water species *Pholis fangi* (Wang et Wang, 1935) and *Sebastes thompsoni* (Jordan et Hubbs, 1925) were found in local catches of southwestern and northern Taiwan, respectively. Still, given the lack of further specimens, it remains uncertain whether the presently described specimen represented a rare local population or a rare dispersal event from the high latitude region.

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