Bull. Natl. Mus. Nat. Sci., Ser. A, 49(4), pp. 179–189, November 22, 2023
DOI: 10.50826/bnmnszool.49.4_179

A Rare Flatfish, *Samaris spinea* (Teleostei: Pleuronectiformes: Samaridae) from the Ogasawara Islands, Japan, with Notes on Its Distribution, Taxonomy and Sexual Dimorphism

Kota Obata[1, *], Toshio Kawai[1] and Gento Shinohara[2, 3]

[1]Faculty/Graduate School of Fisheries Sciences, Hokkaido University,
3–1–1 Minato-cho, Hakodate, Hokkaido 041–8611, Japan
[2]Department of Zoology, National Museum of Nature and Science,
4–1–1 Amakubo, Tsukuba, Ibaraki 305–0005, Japan
[3]The Hokkaido University Museum,
Kita 10-jo Nishi 8-chome, Kita-ku, Sapporo, Hokkaido 060–0841, Japan
*E-mail: obata.kota.z1@elms.hokudai.ac.jp

(Received 7 July 2023; accepted 20 September 2023)

Abstract A single specimen of the samarid flatfish, *Samaris spinea* Mihara and Amaoka, 2004, was collected off the northwest coast of Ototo-jima Island, Ogasawara Islands, Japan. This specimen represents the third occurrence of this species and the second record from Japan and the Northern Hemisphere. We report morphological characters of the specimen in detail with discussion of small spines along the dorsal and ventral margins of the caudal peduncle and the intermuscular bones. We confirmed the small spines coming out from large, plate-like scale. It is also revealed that distributional patterns of intermuscular bones of *S. spinea* are different from those of the congeneric species, *S. cristatus*: epimerals are absent and hypomerals are present only on abdominal and anterior caudal vertebrae in *S. spinea*. Although the present specimen bears a testis, male character as prolonged anterior dorsal- and pelvic-fin rays on ocular side is not appeared. This may be related to the presence of a single isopod parasite in the gill. The taxonomic confusion on gender of the generic name is also fixed.
Key words: Bonin Islands, CT, ctenoid scales, intermuscular bones, parasitic infection.

Introduction

The Spined Cockatoo Righteye Flounder, *Samaris spinea* Mihara and Amaoka, 2004, belonging to the family Samaridae (Pleuronectiformes), is characterized by the presence of small spines along the dorsal and ventral margins of the caudal peduncle (Amaoka *et al.*, 2004; Mihara and Amaoka, 2004). The species has been recorded only from New Caledonia (type locality) and the East China Sea off the Kerama Islands, Okinawa, Japan (Amaoka *et al.*, 2004; Mihara and Amaoka, 2004).

In 2009, a single specimen of *S. spinea* was collected with an ORI biological dredge (Namikawa *et al.*, 2011: fig. 2A) off the northwest coast of Ototo-jima Island, Ogasawara Islands (Bonin Islands), Japan (Fig. 1). This specimen represents the third example of the species, and the second record from Japan. The specimen indicates a range extension of *S. spinea* eastward by 1,400 km in the northern hemisphere. Because no samarid species have been reported from the Ogasawara Islands (see Randall *et al.*, 1997; Nakabo and Doiuchi, 2013; Amaoka, 2016), it represents the first record of the family Samaridae from the Islands. We describe its morphology and discuss on the small spines along the dorsal and ventral margins of the caudal peduncle and its intermuscular bones with computed tomography (CT) scanning which enables to examine internal morphology of rare specimens without dissection. A biological note on the sexual dimorphism is also provided.

Material and Methods

The specimen reported is deposited in the Department of Zoology, National Museum of Nature and Science, Tsukuba (NSMT); comparative specimens are lodged in the Laboratory of Marine Biology, Faculty of Science, Kochi University, Kochi (BSKU), the Hokkaido University Museum, Hakodate (HUMZ) and the Muséum national d'Histoire naturelle, Paris (MNHN).

Counts and proportional measurements mainly follow Hubbs and Lagler (1958). All dorsal- and anal-fin rays are counted as individual rays. Snout length is measured from the anterior margin of lower orbit to the tip of upper jaw. Lengths of the longest anterior prolonged dorsal-fin ray and the middle caudal-fin ray are measured from the base to the distal tip of the respective rays. The standard length and head length are abbreviated as SL and HL, respectively. Vertebral counts were determined from radiographs and are expressed as abdominal + caudal vertebrae. All measurements were made to the nearest 0.1 mm with digital calipers and divider. The terminology of sensory pores on the head follows Voronina (2009). Although Patterson and Johnson (1995) has since redefined intermuscular bones of teleostean fishes, our terminology follows Sakamoto (1984) and Hensley and Ahlstrom (1984) for comparison with the many previous studies on the systematics of flatfishes that used their definition. Two intermuscular bones (epicentra and epimerals) and the hypomerals of *Samaris* correspond with neoneurals and ribs of Patterson and Johnson (1995), respectively.

A map of collection sites of *S. spinea* (Fig. 1) showing bathymetric imagery was made with GMT 5.4.5 using data from ETOPO1 (Amante and Eakins, 2009).

Spines and osteological characters of NSMT-P 109872 were investigated with CT scanning using inspeXio SMX-225CR FPD HR Plus (Shimadzu, Kyoto) (0.028 mm/voxel, 100 kv) and three-dimensional reconstruction images produced by the rendering software VGSTUDIO MAX ver. 3.3 (Volume Graphics, Nagoya).

Result

Order Pleuronectiformes
Family Samaridae
Genus *Samaris* Gray, 1831
Samaris spinea Mihara and Amaoka, 2004
[Standard Japanese name: Toge-hatatate-garei]
(Figs. 2–4; Table 1)

Samaris spinea Mihara and Amaoka, 2004: 624, figs. 8–13, 20; Amaoka *et al.*, 2004: 2, figs. 1–3; Fricke and Kulbicki, 2006: 355; Voronina and Suzumoto, 2017: 7, fig. 6; Voronina and Volkova, 2019: 274, fig. 24.
Samaris spineus: Nakabo and Doiuchi, 2013: 1685; Nakabo and Hirashima, 2015: 266; Amaoka, 2016: 203, fig. 6.

Specimen examined. NSMT-P 109872, 32.9 mm SL, male, off northwest coast of Ototo-jima Island, Ogasawara Islands, Tokyo Prefecture, Japan, 27°13′05″N 142°09′11″E to 27°13′11″N 142°09′13″E, 135.8–135.5 m depth, 15 July 2009, 50 cm ORI dredge, R/V *Koyo-maru*.

Diagnosis. *Samaris spinea* is separable from the other species of *Samaris* by the following combination of characters: dorsal-fin rays 60–72; prolonged dorsal-fin rays 3–7; anal-fin rays 46–54; lateral line scales 44–58; vertebrae 9–10 + 27–31; body depth 36.0–41.5% SL; caudal-fin rays bifurcated except uppermost and lowermost two simple rays; 2–6 spines along dorsal and ventral margins of caudal peduncle on ocular side (Amaoka *et al.*, 2004; Mihara and Amaoka, 2004; present study).

Description. Proportional measurements (% SL) and counts are provided in Table 1.

Head length 4.0 in SL on ocular side, 3.8 on blind side; body depth 2.6 in SL; snout length 4.0 in HL; upper eye diameter 3.2 in HL; lower eye diameter 3.0 in HL; interorbital width 23.6 in HL; upper jaw length 3.0 in HL on ocular side, 3.6 on blind side; lower jaw length 1.9 in HL on ocular side, 2.2 on blind side; caudal peduncle length 17.0 in SL; caudal peduncle depth 8.3 in

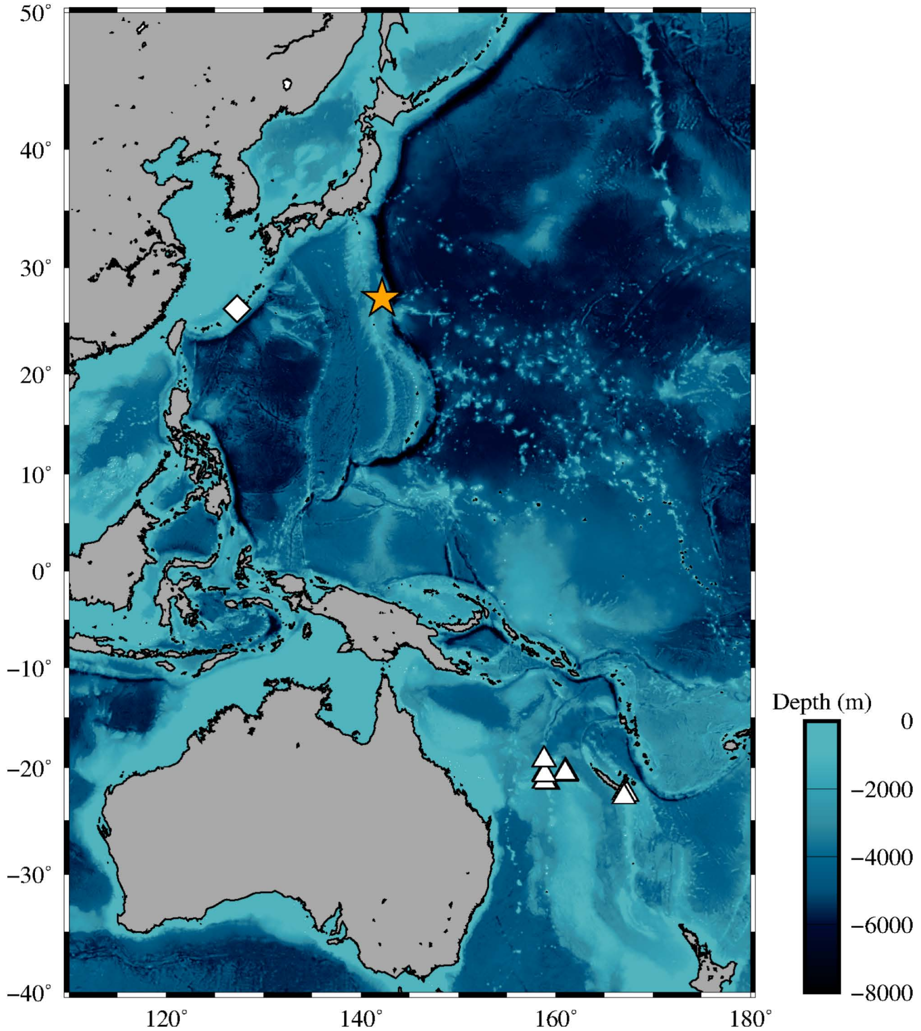

Fig. 1. Map showing collection localities for specimens of *Samaris spinea* reported. Star, diamond and triangles: records for the present specimen, and those in Amaoka *et al.* (2004) and Mihara and Amaoka (2004), respectively.

SL; pectoral-fin length 3.5 in SL on ocular side; pelvic-fin length 4.8 in SL on ocular side, 7.1 on blind side; pelvic-base length 13.2 in SL on ocular side, 20.2 on blind side; middle caudal-fin ray length 3.5 in SL; length of anterior prolonged dorsal-fin ray 4.0 in SL.

Body laterally compressed, elliptical, deepest at midpoint (Fig. 2). Head small, the dorsal profile slightly sloping anteriorly; head on ocular side slightly smaller than that on blind side. Eyes dextral, of moderate size, separated by scaleless narrow bony ridge; both eyes naked except for lower part of upper eye with one weak ctenoid scale; anterior margins of upper and lower eyes nearly on same vertical line. Nostrils on ocular side two, situated anterior to interorbital space; both nostrils on ocular side with long nasal tube, anterior tips reaching upper jaw when bent antero-ventrally; nostrils absent on blind side. Pores of supraorbital canal on ocular side two; pores of supraorbital canal on blind side absent. Mouth oblique; anterior tip of premaxilla just in front of upper margin of lower orbit; maxilla extending below anterior margin of lower eye, not reaching below middle of lower eye; lower

Table 1. Proportional measurements and counts of *Samaris spinea*.

	Present study	Amaoka *et al.* (2004)	Mihara and Amaoka (2004)	
	NSMT-P 109872 Male	BSKU 57843 Male	Holotype Male	Paratypes (n = 28) Males and females
SL (mm)	32.9	38.8	49.1	21.0–53.2
Measurements (% SL)				
HL on ocular side	25.1	25.3	23.4	21.3–28.4
HL on blind side	26.7	25.1*	—	22.1–28.7 (n = 6) *
Body depth	39.0	38.4	37.2	36.0–41.5
Snout length	6.3	6.4	5.9	5.0–6.8
Upper eye diameter	7.9	9.3	6.7	6.2–9.7
Lower eye diameter	8.4	8.5	7.1	6.4–9.7
Interorbital width	1.1	1.8	1.2	0.6–1.9
Upper jaw length on ocular side	8.3	9.0	7.5	6.9–9.9
Upper jaw length on blind side	7.4	7.2	6.7	6.0–8.6
Lower jaw length on ocular side	13.4	14.9	11.0	10.4–14.4
Lower jaw length on blind side	12.2	12.9	10.2	9.3–13.1
Caudal peduncle length	5.9	7.2*	—	6.3–8.5 (n = 6) *
Caudal peduncle depth	12.1	10.3	12.8	11.2–13.5
Pectoral-fin length	28.5	31.2	24.4	24.3–31.9
Pelvic-fin length on ocular side	20.8	42.8	47.5	14.9–60.0 (males) 11.4–20.5 (females)
Pelvic-fin length on blind side	14.1	10.3	11.7	9.0–12.6
Pelvic-base length on ocular side	5.9	6.4	5.1	4.2–5.7
Pelvic-base length on blind side	5.0	5.4	3.9	3.3–4.4
Length of the longest anterior prolonged dorsal-fin ray	24.8	63.1	54.0	10.4–68.2 (males) 8.6–31.2 (females)
Length of middle caudal-fin ray	28.6	38.7	33.4	26.6–41.9
Counts				
Dorsal-fin rays	68	68	62	60–72
Anal-fin rays	50	51	50	46–54
Caudal-fin rays	16	16	16	15–16
Pectoral-fin rays	4	4	4	4
Pelvic-fin rays on ocular side	5	5	5	5
Pelvic-fin rays on blind side	5	5	5	5
Lateral line scales	ca. 57	ca. 58*	53	44–58
Vertebrae	10 + 31	10 + 28	10 + 27	9–10 + 27–30
Spines on caudal peduncle				
along dorsal margin	5	4*	4*	2–5 (n = 26) *
along ventral margin	6	4*	4*	3–5 (n = 26) *

*Data obtained by present study

jaw slightly protruded; teeth small, in bands on both jaws. Vomer and palatine toothless. Gill rakers on first arch rudimentary on both limbs, but more developed on lower limb. Gill membranes united to each other. Scales ctenoid on head and body on ocular side, cycloid on head on blind side, cycloid and weakly ctenoid on anterior 1/3 part of body on blind side, weakly ctenoid on posterior 2/3 part of body on blind side; strongly ctenoid on dorsal-, anal-, caudal- and pelvic-fin bases of both sides; scales absent on snout, interorbital region, most parts of eyes, upper jaw, and dorsal, anal, pectoral and pelvic fins, and posterior 2/3 of caudal fin. Lateral line on ocular side nearly straight; lateral line absent on blind side.

Small spines present along dorsal and ventral margins of caudal peduncle; five on dorsal margin with fourth longest and fifth shortest, first, second and fourth simple, third and fifth bifurcated; six on ventral margin with fifth longest and first shortest, first, second, third and fifth simple, fourth and sixth bifurcated (Figs. 3, 4).

Dorsal-fin origin anterior to upper orbit; dorsal-fin membrane originating just behind anterior part of upper jaw on blind side; first three dorsal-fin rays prolonged, with first and second rays lon-

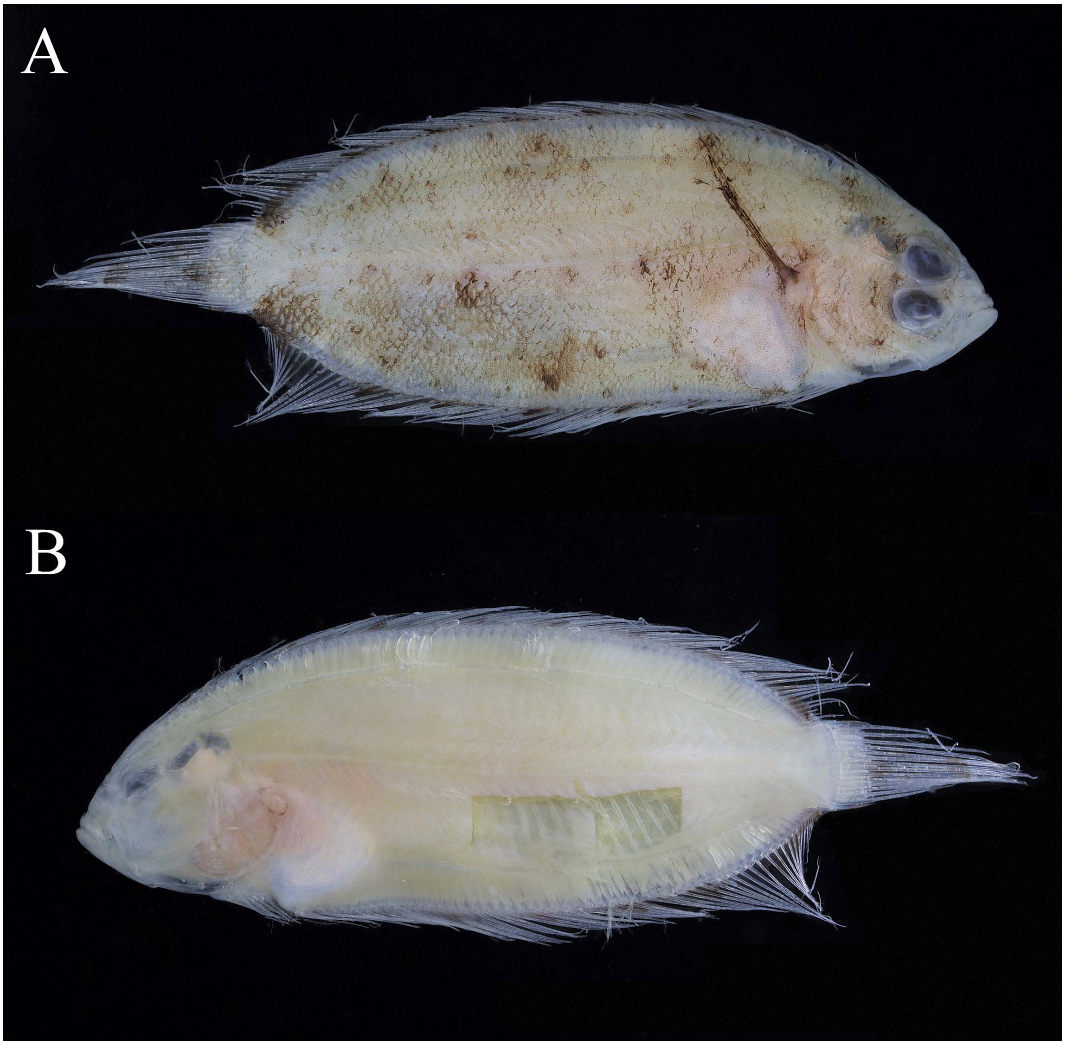

Fig. 2. Lateral view of ocular (A) and blind (B) sides of *Samaris spinea*, NSMT-P 109872, 32.9 mm SL, Ogasawara Islands, Japan.

ger than third. Anal-fin origin slightly posterior to anus. Pectoral-fin rays on ocular side short, not reaching middle of body; pectoral fin absent on blind side. Pelvic-fin rays on ocular side prolonged, third ray greatly prolonged, first and second rays broken; pelvic-fin rays on blind side short; pelvic-fin base on ocular side longer than base on blind side; pelvic-fin origin on ocular side slightly ahead of origin on blind side. All dorsal-, anal-, pectoral- and pelvic-fin rays simple. Caudal fin elongated and rounded; all caudal-fin rays bifurcated except uppermost and lowermost two simple rays; middle rays longest. Anus on midventral line between pelvic and anal fins. Urogenital papilla positioned on ocular side adjacent to anus.

Epicentra present on lateral sides of second to sixth abdominal vertebrae; absent on caudal vertebrae (Figs. 3, 5). Epimerals absent. Hypomerals present on ventral sides of fourth abdominal vertebrae to fourth (ocular side) or sixth (blind side) caudal vertebrae; absent on posterior caudal vertebrae.

Color in alcohol (Fig. 2). Ocular side of body whitish brown; two brown blotches just below lat-

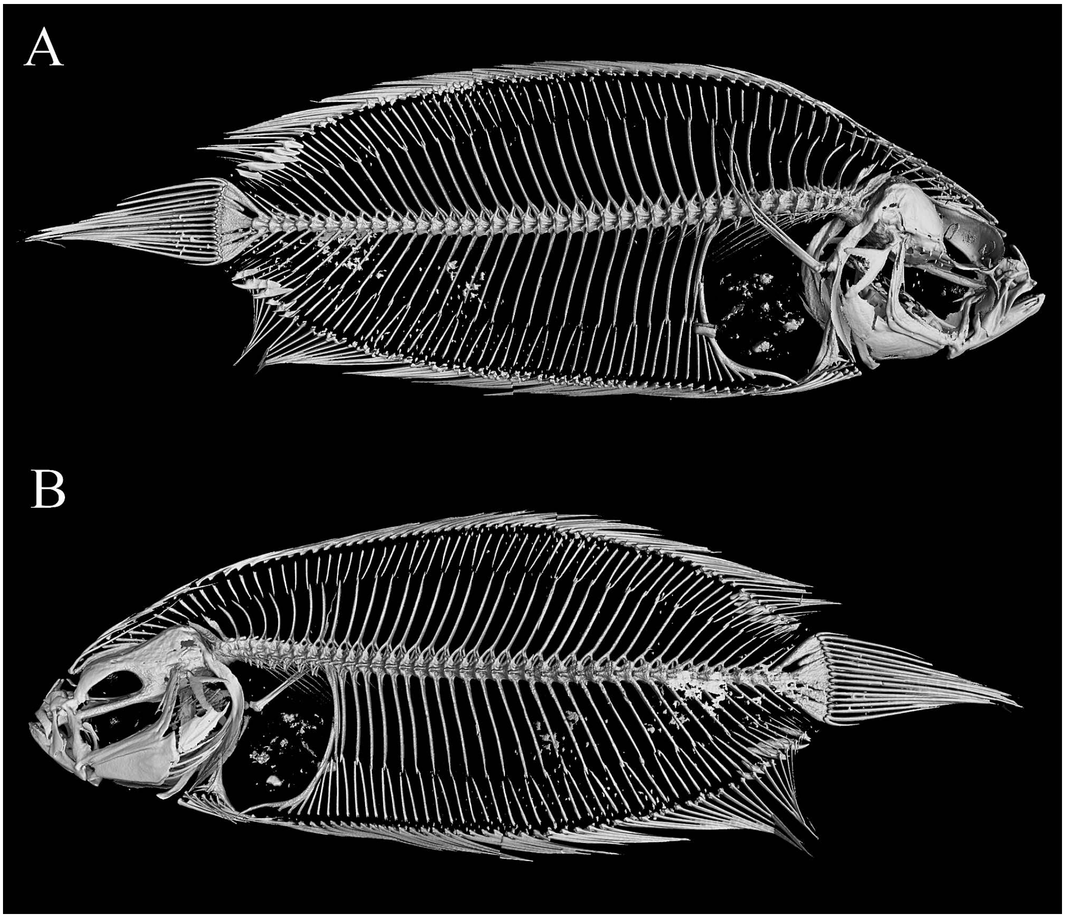

Fig. 3. CT images of osteology on ocular (A) and blind (B) sides of *Samaris spinea*, NSMT-P 109872, 32.9 mm SL.

eral line behind pectoral fin; three to four small brown blotches on dorsal and ventral margins of body; large brown blotch on posterior-most parts of dorsal- and anal-fin bases. Blind side of body whitish brown without spots or dots. Dorsal- and anal-fin membranes with five brown blotches and many small brown dots basally. Caudal fin with brown blotch basally, large brown blotch centrally, and small brown dots distally. Pectoral-fin membrane uniformly brown; pelvic-fin membrane uniformly whitish and transparent.

Distribution. Known from New Caledonia, and Ryukyu Islands (off Kerama Islands) and Ogasawara Islands, Japan at depths of 44–135.5 m (Amaoka *et al.*, 2004; Mihara and Amaoka, 2004; present study; Fig. 1).

Discussion

The genus *Samaris* Gray, 1831 comprises five valid species: *Samaris cristatus* Gray, 1831, *Samaris macrolepis* Norman, 1927, *Samaris costae* Quéro, Hensley and Maugé, 1989, *Samaris chesterfieldensis* Mihara and Amaoka, 2004 and *Samaris spinea* Mihara and Amaoka, 2004. The last two species are easily separable from the other three in having bifurcated middle caudal-fin rays and spines along dorsal and ventral margins of caudal peduncle (Amaoka *et al.*, 2004; Mihara and Amaoka, 2004). *Samaris spinea* and *S. chesterfieldensis* are separable from each other by body depth (36.0–41.5% SL *vs.* 31.2–35.5% SL, respectively: Amaoka *et al.*, 2004; Mihara and Amaoka, 2004). Characters of the present

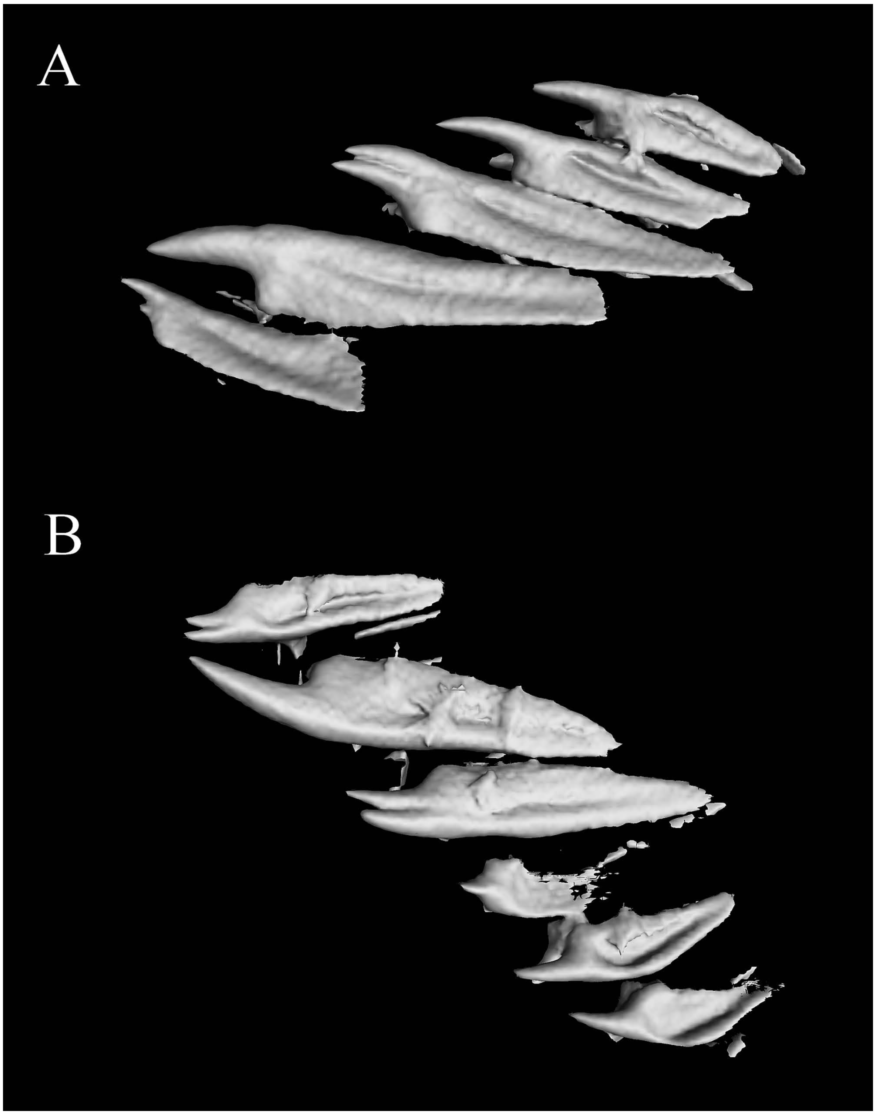

Fig. 4. CT images of transformed scales with small spines along dorsal (A) and ventral (B) margins of caudal peduncle on ocular side of *Samaris spinea*, NSMT-P 109872, 32.9 mm SL.

specimen are consistent with those in the original description of *S. spinea* provided by Mihara and Amaoka (2004) and the description provided by Amaoka *et al.* (2004) (Table 1). The number of caudal vertebrae (31) and spines on caudal peduncle (5–6) of the present specimen differ slightly from those of the previous studies (27–30 and 2–5 in Amaoka *et al.*, 2004; Mihara and Amaoka, 2004) (Table 1). These differences are considered to be intraspecific variation.

Small spines along dorsal and ventral margins of the caudal peduncle protrude from large, plate-like scales. The proximal half of the spine is embedded in the skin adjacent the proximal pterygiophores of the dorsal and anal fins (Figs. 3, 4; also see Amaoka *et al.*, 2004: fig. 3; Voronina and Volkova, 2019: fig. 24B). The distal half of the spine is continuous from the proximal half, acute, extends posteriorly, and is exposed external to the body surface. The distal half of the spines also varies in shape, *i.e.*, simple, bifurcate or trifurcate. Among the 29 specimens of *S. spinea* for this study, the Ogasawara Islands specimen and two other specimens (HUMZ 172359 and MNHN 2000-0729) have simple and bifurcated spines (Fig. 4), another five specimens (HUMZ 172357, MNHN 2000-0710, 2000-0711, 2000-0712 and 2000-0730) have simple and trifurcated spines, and the rest of the specimens have only simple spines. The variation found in the shape of spines does not appear to be related to the size, sex or collection locality of the specimens.

Among flatfishes, it is well known that scales are uniquely modified as bony plates or tubercles in two species of pleuronectid, *Clidoderma asperrimum* (Temminck and Schlegel, 1846) and *Platichthys bicoloratus* (Basilewsky, 1855), and a species of scophthalmid *Scophthalmus maximus* (Linnaeus, 1758) (Sakamoto, 1984; Zylberberg *et al.*, 2003; Abe *et al.*, 2013; Märss *et al.*, 2015). The morphology of the modified scales with small spines on the caudal peduncle of *S. spinea* resemble the modified ctenoid scales in the pleuronectid *Platichthys flesus* (Linnaeus, 1758) (Märss *et al.*, 2015: fig. 6D–H, J, K). The small spines on the caudal peduncle in *S. spinea* may also have originated from ctenoid body scales.

Intermuscular bones of *Samaris* have only been investigated in *S. cristatus*, which has three series of intermuscular bones, *i.e.*, epicentra, epimerals and hypomerals (Hensley and Ahlstrom, 1984; Sakamoto, 1984). We found the Ogasawara Islands specimen to have epicentra and hypomerals, but not epimerals. Additionally, although the epimerals and hypomerals of *S. cristatus* are distributed from abdominal vertebrae to posterior caudal vertebrae (Hensley and Ahlstrom, 1984; Sakamoto, 1984), the hypomerals of our specimen are present only on abdominal vertebrae and anterior caudal vertebrae (Fig. 5). Judging from X-ray images in previous studies (Amaoka *et al.*, 2004: fig. 3; Voronina and Volkova, 2019: fig. 24B), other specimens of *S. spinea* lack epimerals and have the same distribution of hypomerals. Therefore, the presence or absence of epimerals, and

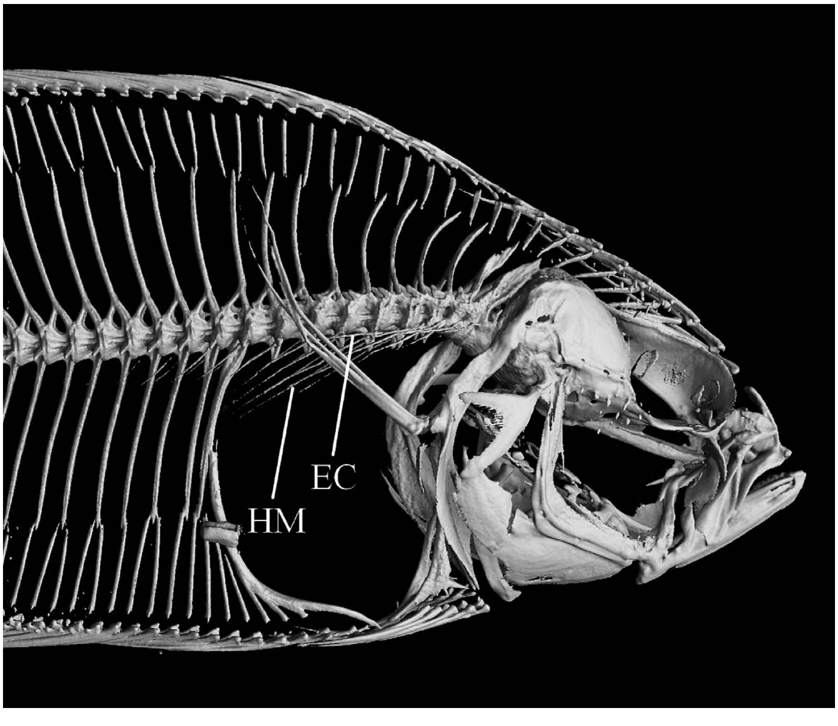

Fig. 5. CT images of osteology of head and anterior body on ocular side in *Samaris spinea*, NSMT-P 109872, 32.9 mm SL. EC: epicentrum; HM: hypomeral.

distribution of hypomerals vary among species of *Samaris*.

Samaris spinea is known to be sexually dimorphic, with extremely prolonged anterior dorsal-fin rays and pelvic-fin rays on the ocular side of males (Amaoka *et al.*, 2004: fig. 1; Mihara and Amaoka, 2004: figs. 12, 13). The Ogasawara Islands specimen is a male with a reduced testis on the ocular side only. Both its prolonged anterior dorsal-fin rays and pelvic-fin rays (ocular side) are shorter than those of other males (24.8% SL and 20.8% SL in the present specimen *vs.* more than 40% SL and 40% SL in males over 33.5 mm SL; Mihara and Amaoka, 2004: figs. 12, 13). A large parasitic isopod was found on the gills of the blind side of our specimen (Fig. 6). This isopod is a species of the family Cymothoidae, which are known to be parasitic widely on fishes, including the pleuronectiforms (*e.g.*, Kumar and Bruce, 1997; Trilles and Justine, 2006) (Ryota Kawanishi, personal communication). Some species of the Cymothoidae have been reported to cause parasitic castration in their hosts (*e.g.*, Lima *et al.*, 2007; Fogelman *et al.*, 2009; Lafferty and Kuris, 2009; Silva *et al.*, 2021). Parasitic castration may have occurred in the present specimen.

Gray (1831) originally described the genus *Samaris*, for *Samaris cristatus*. Because the specific name *cristatus* is masculine, Gray (1831) regarded *Samaris* as being masculine as well. Nakabo and Doiuchi (2013) disagreed and followed Gray, using *Samaris spineus* for Mihara and Amaoka's *Samaris spinea*. They missed the point that the ICZN (1999: Art. 30.1.1) ruling that "if it (= a generic name) is a compound word formed from two or more components, the gender is given by the final component." As *Samaris* is a combination of the two Latin words, Samara (noun; masculine) and -is (suffix; feminine) (Nakabo and Hirashima, 2015), we consider the gender of *Samaris* to be feminine as well and follow the ICZN ruling, using *Samaris spinea* as the species' scientific name.

Comparative specimens

Holotype: MNHN 2000-0724, 49.1 mm SL, male, New Caledonia, 20°27.35′S 161°4.70′E, 75–74 m depth, 22 July 1988.

Paratypes: HUMZ 172354, 34.5 mm SL, female, New Caledonia, 20°36.14′S 161°1.75′E, 86 m depth, 22 July 1988; HUMZ 172355, 40.5 mm SL, male, HUMZ 172356, 46.4 mm SL, male, MNHN 2000-0718, 42.1 mm SL, male, MNHN 2000-0719, 39.7 mm SL, male, MNHN 2000-0720, 33.5 mm SL, male, New Caledonia, 20°40.8′S 158°51.5′E, 77 m depth, 21 Aug. 1988; HUMZ 172357, 48.4 mm SL, male, HUMZ 172358, 22.5 mm SL, male, HUMZ 172359, 21.3 mm SL, female, MNHN 2000-0727, 21.9 mm SL, male, New Caledonia, 22°48.3′S 166°59.6′E, 53 m depth, 17 July 1985; MNHN 2000-0708, 29.0 mm SL, male, New Caledonia, 21°18.00′S 158°50.07′E, 66 m depth, 19 Oct. 1985; MNHN 2000-0709, 46.6 mm SL, male, New Caledonia, 20°31.50′S 161°6.45′E, 88 m depth, 15 July 1984; MNHN 2000-0710, 34.8 mm SL, male, MNHN 2000-0711, 32.1 mm SL, female, New Caledonia, 20°34.30′S 158°47.4′E, 67 m depth, 23 July 1984; MNHN 2000-0712, 42.9 mm SL, male, MNHN 2000-0713, 35.9 mm SL, male, New Caledonia, 21°24.90′S 159°9.30′E, 60 m depth, 25 July 1984; MNHN 2000-0714, 45.6 mm SL, male, New Caledonia, 20°30′S 160°57′E, 81 m depth, 31 Aug. 1988; MNHN 2000-0715, 51.9 mm SL, male, New Caledonia, 21°19′S 158°48′E, 66 m depth, 19 Oct. 1985; MNHN 2000-0721, 43.5 mm SL, male, MNHN 2000-0722, 34.3 mm SL, male, New Caledonia, 20°21.29′S 160°58.60′E, 75–74 m depth, 22 July 1988; MNHN 2000-0723, 47.5 mm SL, male, New Caledonia, 20°27.35′S 161°4.70′E, 75–74 m depth, 22 July 1988; MNHN 2000-0725, 31.1 mm SL, female, New Caledonia, 20°36.14′S 161°1.75′E, 86 m depth, 22 July 1988; MNHN 2000-0726, 52.4 mm SL, male, New Caledonia, 21°19.0′S 158°52.3′E, 64 m depth, 19 Oct. 1985; MNHN 2000-0728, 44.9 mm SL, male, New Caledonia, 22°25.00′S 166°59.60′E, 47 m depth, 23 Oct. 1984; MNHN 2000-0729, 27.9 mm SL, female, MNHN 2000-0730, 22.0 mm SL, male, New Caledonia, 22°48.30′S 166°59.60′E, 53 m

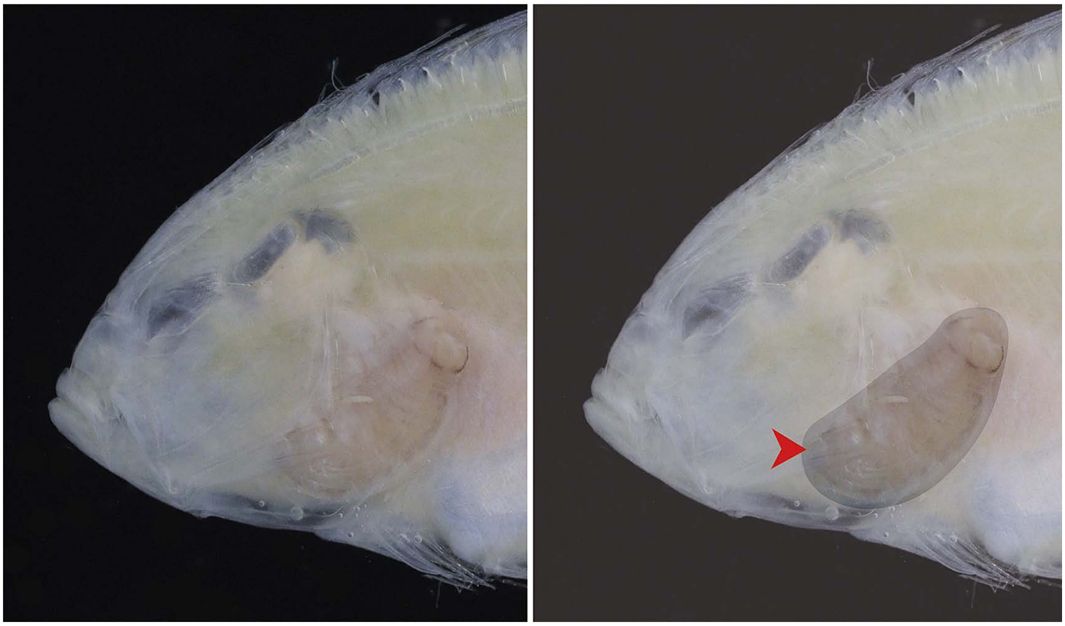

Fig. 6. Lateral view of head on blind side of *Samaris spinea*, NSMT-P 109872, 32.9 mm SL, showing a position of underlying parasitic isopod on the gill. Arrow head indicates cephalon.

depth, 17 July 1985.
Nontype: BSKU 57843, 38.5 mm SL, male, East China Sea off Kerama Islands, Okinawa, Japan, 26°15.4′N 127°15.9′E to 26°15.4′N 127°16.1′E, 95–101 m depth, 19 Apr. 2002.

Acknowledgements

We deeply thank Martin F. Gomon (Museums Victoria, Melbourne) for critically reading a draft manuscript. We are grateful to Hiroshi Namikawa and Hironori Komatsu (NSMT) and Captain Ichiro Gonoi and all crews of the R/V *Koyomaru* (Tokyo Metropolitan Ogasawara Fisheries Center) for providing the present specimen. Ryota Kawanishi (Hokkaido University of Education) kindly helped identification of the parasite isopod and provided valuable information. We express gratitude to Hiromitsu Endo (BSKU), Fumihito Tashiro (HUMZ), and Patrice Pruvost, Zora Gabsi and Jonathan Pfliger (MNHN) for helping examination of comparative specimens. Kunio Amaoka and Hisashi Imamura (HUMZ) advised on an early draft manuscript. Our thanks go to Shuhei Nomura, Takahiko Kutsuna and Yasunari Shigeta (NSMT) for their maintenance and valuable support on the micro-CT scanner and software in the Research Wing, Tsukuba District. This study was partially supported by JST SPRING Grant Number JPMJSP2119 and JSPS KAKENHI Grant Number JP23K05364.

References

Abe, T., T. Wada, M. Aritaki, N. Sato and T. Minami 2013. Morphological and habitat characteristics of settling and newly settled roughscale sole *Clidoderma asperrimum* collected in the coastal waters of northeastern Japan. Fisheries Science 79: 767–777.

Amante, C. and B. W. Eakins 2009. ETOPO1 1 arc-minute global relief model: procedures, date sources and analysis. NOAA Technical Memorandum NESDIS NGDC-24. National Geophysical Data Center, NOAA. https://doi.org/10.7289/V5C8276M [Accessed 7 January 2023].

Amaoka, K. 2016. Flatfishes of Japan (Citharidae, Paralichthyidae, Bothidae, Pleuronectidae, Poecilopsettidae, Samaridae). x + 229 pp. Tokai University Press, Hiratsuka (in Japanese).

Amaoka, K., H. Endo and N. Ishiguro 2004. New record of a samarid flatfish, *Samaris spinea* (Pleuronectiformes), from the Kerama Islands, Okinawa, Japan. I. O. P. Diving News 15: 2–5 (in Japanese with English abstract).

Fogelman, R. M., A. M. Kuris and A. S. Grutter 2009. Parasitic castration of a vertebrate: effect of the cymothoid isopod, *Anilocra apogonae*, on the five-lined cardinalfish, *Cheilodipterus quinquelineatus*. International Journal for Parasitology 39: 577–583.

Fricke, R. and M. Kulbicki 2006. Checklist of the shore fishes of New Caledonia. In Payri C. E. and B. Richer de Forges (eds.): Compendium of Marine Species from New Caledonia, Documents Scientifiques et Techniques II 7, pp. 313–357, pl. 15. Institut de recherche pour le développement, Nouméa.

Gray, J. E. 1831. Description of three new species of fish, including two undescribed genera, discovered by John Reeves, Esq., in China. Zoological Miscellany (1): 4–5.

Hensley, D. A. and E. H. Ahlstrom 1984. Pleuronectiformes: relationships. In Moser H. G., W. J. Richards, D. M. Cohen, M. P. Fahay, A. W. Kendall, Jr. and S. L. Richardson (eds.): Ontogeny and Systematics of Fishes, pp. 670–687. Ammerican Society of Ichthyologists and Herpetologists, Lawrence.

Hubbs, C. L. and K. F. Lagler 1958. Fishes of the Great Lakes region. Bulletin of the Cranbrook Institute of Science (26): 1–213, pls. 1–44.

ICZN (International Commission on Zoological Nomenclature). 1999. International code of zoological nomenclature, fourth edition, online version. https://www.iczn.org/the-code/the-code-online/ [Accessed 17 May 2023].

Kumar, A. B. and N. L. Bruce 1997. *Elthusa samariscii* (Shiino, 1951) (Isopoda, Cymothoidae) parasitizing *Samaris cristatus* Gray, 1831, off the Kerala Coast, India. Crustaceana 70: 780–787.

Lafferty, K. D. and A. M. Kuris 2009. Parasitic castration; the evolution and ecology of body snatchers. Trends in Parasitology 25: 564–572.

Lima, N. R. W., J. S. Azevedo, L. G. Silva and M. Dansa-Petretski 2007. Parasitic castration, growth, and sex steroids in the freshwater bonefish *Cyphocharax gilbert* (Curimatidae) infested by *Riggia paranensis* (Cymothoidae). Neotropical Ichthyology 5: 471–478.

Märss, T., M. Wilson, J. Lees, T. Saat and H. Špilev 2015. A comparative SEM study of ossicles in the Pleuronectiformes (Teleostei) of the Baltic Sea. Proceedings of the Estonian Academy of Sciences 64: 495–517.

Mihara, E. and K. Amaoka 2004. Pleuronectiform fishes from New Caledonia waters. Five species of the samarid genera *Plagiopsetta* and *Samaris* (Samaridae). In Marshall B. and B. Richer de Forges (eds.): Tropical Deep-Sea Benthos 23. Mémoires du Muséum National d'Histoire Naturelle, Paris 191: 611–635.

Nakabo, T. and R. Doiuchi 2013. Samaridae. In Nakabo T. (ed.): Fishes of Japan with Pictorial Keys to the Species, pp. 1685, 2231. Tokai University Press, Hadano (in Japanese).

Nakabo, T. and Y. Hirashima 2015. Scientific Names of Japanese Fishes: Etymology. xv + 372 pp. Tokai University Press, Hadano (in Japanese).

Namikawa, H., K. Yamaguchi, Y. Horii and Y. Tanaka 2011. Outline of dredge surveys conducted from 2007 to 2010 by R/V *Takunan* and *Koyo* to elucidate the benthic marine invertebrate fauna of the area encompassing the Izu and Ogasawara Islands. Memoirs of the National Science Museum 47: 1–9.

Patterson, C. and G. D. Johnson 1995. The intermuscular bones and ligaments of teleostean fishes. Smithsonian contributions to zoology (559). iv + 83 pp., 3 tables. Smithsonian Institution Press, Washington D.C.

Randall, J. E., H. Ida, K. Kato, R. L. Pyle and J. L. Earle 1997. Annotated checklist of the inshore fishes of the Ogasawara Islands. National Science Museum Monographs (11): 1–74.

Sakamoto, K. 1984. Interrelationships of the family Pleuronectidae (Pisces: Pleuronectiformes). Memoirs of the Faculty of Fisheries Sciences, Hokkaido University 31: 95–215.

Silva, J. O. S., T. R. Colaço-Fernandes, A. C. Costa, L. N. Carvalho and R. M. Takemoto 2021. Effect of burrowing cymothoid parasitism on loricariids. International Journal for Parasitology: Parasites and Wildlife 16: 30–36.

Trilles, J.-P. and J.-L. Justine 2006. *Elthusa arnoglossi* sp. nov. (Crustacea: Isopoda: Cymothoidae), a branchial parasite of flatfishes (Bothidae) from the Chesterfield Islands, New Caledonia. Zootaxa 1338: 57–68.

Voronina, E. P. 2009. Specific features of the seismosensory system and their use in the systematics of five families of the order Pleuronectiformes. Journal of Ichthyology 49: 349–361.

Voronina, E. P. and A. Y. Suzumoto 2017. *Samaretta perexilis*, a new genus and new species of samarid flatfish (Pleuronectiformes: Samaridae) from the South Pacific. Journal of Ichthyology 57: 1–9.

Voronina, E. P. and G. A. Volkova 2019. Annotated catalogue of type specimens of flatfishes (Osteichthyes: Pleuronectiformes) in the Zoological Institute, St. Petersburg, Russia. Zootaxa 4695: 253–282.

Zylberberg, L., B. Chanet, F. Wagemans and F. J. Meunier 2003. Structural peculiarities of the tubercles in the skin of the turbot, *Scophthalmus maximus* (L., 1758) (Osteichthyes, Pleuronectiformes, Scophthalmidae). Journal of Morphology 258: 84–96.