

First voucher specimen of *Bembrops curvatura* (Teleostei: Perciformes) collected from Suruga Bay, Japan

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Abstract A single specimen of the duckbill fish *Bembrops curvatura* Okada & Suzuki, 1952, distributed from Japan to the northern coast of Australia and southern India, was recently collected off Numazu, Suruga Bay (Shizuoka Prefecture), Japan. Although the species has been reported from the Pacific coast of mainland Japan, from Sagami Bay to the southern coast of Kyushu, no specimen-based record has been reported to date from Suruga Bay. Here we report the first voucher specimen of *Bembrops curvatura* in details.

Key words: fish fauna, distribution, Actinopterygii, Nami-aitoragisu, Shizuoka

Introduction

The genus *Bembrops* Steindachner, 1876, including 18 valid species (Das and Nelson 1996; Thompson and Suttkus 1998, 2002), has usually been included in the family Percophidae, although recently treated as Bembropidae in some recent studies (Lautredou et al. 2013; Betancur-R et al. 2017; Smith et al. 2018). The genus is currently represented in Japanese waters by five species: *Bembrops caudimacula* Steindachner, 1876 (Aitoragisu), *Bembrops curvatura* Okada & Suzuki, 1952 (Nami-aitoragisu), *Bembrops filiferus* Gilbert, 1905 (Itohiki-aitoragisu), *Bembrops* sp. 1 (Somewake-aitoragisu) and *Bembrops* sp. 2 (Kishu-aitoragisu) (Nakabo and Doiuchi 2013; Ikeda and Nakabo 2015; Motomura 2020). Of them, only *B. caudimacula* has been recorded from Suruga Bay (Shizuoka Prefecture) on the basis of a confirmed voucher specimen (Kuroda 1950; Nakabo and Doiuchi 2013). Recently, however, a specimen of *B. curvatura* was collected off Numazu City, Suruga Bay. Because it represents the first specimen-based record of the species from Suruga Bay, we describe this specimen in detail herein.

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Material and methods

Methods for counts and proportional measurements followed Das and Nelson (1996) and Thompson and Suttkus (2002). All measurements were made with calipers to the nearest 0.1 mm. Curatorial procedure for the voucher specimen followed Motomura and Ishikawa (2013). Abbreviations: SL (standard length) and NSMT (National Museum of Nature and Science, Tsukuba).

Results

Bembrops curvatura Okada & Suzuki, 1952

(Standard Japanese name: Nami-aitoragisu)

(Fig. 1)

Bembrops curvatura Okada and Suzuki 1952: 68, fig. 1. [type locality: Owashi (currently Owase), Mie Prefecture, Japan]; Matsubara 1955: 694 (Owase, Mie Prefecture, Japan); Kamohara 1958a: 68 [Tosa (Kochi) and Kumanonada Sea, Japan]; Kamohara 1958b: 54 [Tosa (Kochi) and Kumanonada Sea, Japan]; Kamohara 1964: 88 [Province Tosa (Kochi Prefecture), southern Japan]; Ozawa 1983: 12 (south of Makurazaki, Kagoshima Prefecture, southern Japan); Okamura 1984: 277, pl. 259-E, F (southern Japan, Taiwan, and South China Sea); Das and Nelson 1996: 24 [Mie Prefecture (Owase), Tosa Bay and Kagoshima Prefecture, Japan and Saleh Bay, Sumbawa and Lombok, Indonesia]; Okamura 1997: 555, fig. 3 (Tosa Bay, Kochi Prefecture, southern Japan); Okiyama 1997: 153, fig. 1 (Sagami Bay, Japan); Kobayashi et al. 1999: 115, table 2 (Seno Umi, western part of Suruga Bay, Shizuoka Prefecture, Japan); Lee and Kim 1999: 31, fig. 3 [off Koje-do (Geoje) Island, Koje-myon, Kore-gun, Kyongsangnam-do, southern Korea]; Nelson 2000: 631 (South China Sea); Nelson 2001: 3516 (western central Pacific); Shinohara et al. 2001: 329 (Tosa Bay, Kochi Prefecture, southern Japan); Hutchins 2001: 40 (Western Australia, Australia); Thompson and Suttkus 2002: 288, fig. 5 (off southern Japan, Philippines, central and southern Indonesia and northern coast of Australia); Ide et al. 2003: 27, table 1 (off Irino and Saga, Tosa Bay, Kochi Prefecture, southern Japan); Matsumoto 2005: 82, table 1 (off Uragawa Town, Shimane Prefecture, Japan); Moriwaki et al. 2007: 8 (off Uragawa Town, Shimane Prefecture, Japan); Shao et al. 2008: 259 [Pingtung (Pingtung) County, southern Taiwan]; Kim 2009: 54, table 1 (Geoje Island, southern Korea); Ohtomi et al. 2009: 22



Figure 1. Fresh specimen of *Bembrops curvatura* collected off Numazu, Suruga Bay (Shizuoka Prefecture), Japan (NSMT-P 140055, 133.1 mm standard length).

(Kagoshima Bay, Kagoshima Prefecture, southern Japan); Yamamoto et al. 2010: 198 (East China Sea); Kawano et al. 2011: 50 (coast of Japan Sea off Yamaguchi Prefecture, Japan); Arai and Tamai 2011: 22 (south off Atsumi Peninsula, Aichi Prefecture, Japan); Kubo et al. 2012: 217 (Owase City and Kii-nagashima Town, Mie Prefecture, Japan); Motomura 2012: 32, fig. 2.5e (Kagoshima, Kagoshima Prefecture, southern Japan); Larson et al. 2013: 175 (Timor, Arafura Sea, and northern coast of Australia); Nakabo and Doiuchi 2013: 1268, unnumbered figs. [Kumanonada Sea, Tosa Bay, Kagoshima Prefecture, Shimane Prefecture (off Uyagawa), Japan Sea coast off Yamaguchi Prefecture and East China Sea, Japan; Kojedo (Geoje) Island, southern Korea; Guangdong Province and Hainan Island, China, Philippines; Sunda Islands, Indonesia; northern coast of Australia]; Kawano et al. 2014: 24, suppl. (coast of Japan Sea off Shimane and Yamaguchi prefectures, Japan); Moon et al. 2015: 520 (south sea of Korea); Joshi et al. 2016: 47, table 1 (Gulf of Mannar, Tamil Nadu, India); Kawano and Yamamoto 2016: 11, table 1 (coast of Japan Sea off Yamaguchi Prefecture, Japan); Iwatsuki et al. 2017: 43 (Hyuganada Sea, southern Japan); Tashiro 2017: 222, unnumbered fig. (Kagoshima Bay, Kagoshima Prefecture, southern Japan); MSMSECTU 2019: 1 (?Suruga Bay, Shizuoka Prefecture, Japan; see Remarks); Ho 2019: 1093, unnumbered fig. (Ke-tzu-liao, southwestern Taiwan); Sonoyama et al. 2020: 97 (Japan Sea coast off Yamaguchi Prefecture, Japan); Motomura 2020: 136 (Japan); Hoshino and Sawada 2020: 12 (Emperor Seamounts).

Material examined NSMT-P 140055, 133.1 mm SL, 10 km off Numazu, Suruga Bay, Shizuoka Prefecture, Japan, 22, Dec. 2020, T. Fujiwara.

Description Counts and measurements, expressed as percentages of SL, given in Table 1. Body

Table 1. Counts and measurements of *Bembrops curvatura* from Suruga Bay (Shizuoka Prefecture), Japan

	NSMT-P 140055
Standard length (SL; mm)	133.1
Counts	
Dorsal-fin rays	VI, 14
Anal-fin rays	15
Pectoral-fin rays	21
Pelvic-fin rays	I, 5
Scale rows between lateral line and origin of first dorsal fin	3
Scale rows between lateral line and origin of anal fin	4
Scale rows between lateral line and end of anal-fin base	3
Gill rakers	3 + 13
Measurement (% of SL)	
Head length	38.0
Head width	14.5
Snout length	11.6
Postorbital length	18.2
Body depth	13.7
Predorsal length (1st)	37.1
Predorsal length (2nd)	53.3
Postdorsal length (1st)	55.3
Postdorsal length (2nd)	12.0
Interpectoral distance	13.2
Interpelvic distance	6.0
Length of caudal peduncle	11.8
Depth of caudal peduncle	6.0
Eye diameter	8.6
Interorbital width	1.5
Maxilla length	14.9
Mandibular length	16.1

subcylindrical, posteriorly rather compressed. Dorsal profile of body gently elevating from snout tip to first dorsal-fin origin, thereafter gently lowering to uppermost point of caudal-fin base. Ventral profile of body lowering from lower-jaw tip to anteriormost point of pelvic-fin base, subsequently nearly straight (parallel to body axis) to lowermost point of caudal-fin base. Head somewhat depressed. Eye large, elliptical, elongated longitudinally. Upper margin of eye bulging beyond dorsal profile of head. Nostrils round, close to each other, anterior to orbit. Pseudobranchial filaments present. Gill rakers thin, cylindrical. Numerous fine teeth on premaxilla, vomer, palatine and mandible. No teeth on maxilla. Maxilla with a tentacle on posterior tip, a deep notch on posterior margin. Two distinct spines on angle of preopercle. Opercle with two spines on upper part, a single spine on lower margin. Posterior margins of preopercle and opercle smooth. Anteriormost point of pelvic-fin base slightly posterior to posterior margin of preopercle. All soft fin rays of pelvic fin branched. Dorsalmost point of pectoral-fin base slightly anterior to posterior tip of opercle. Posterior tip of pectoral fin reaching to anal-fin origin. Origin of dorsal fin slightly posterior to dorsalmost point of pectoral-fin base. Outer profile of first dorsal fin rising steeply from fin origin to posterior tip of first dorsal-fin spine, thereafter gently lowering to posterior tip of last spine. Origin of second dorsal fin slightly anterior to anal-fin origin; outer profile rising rapidly from fin origin to tip of first soft ray, thereafter becoming slightly concave in mid-section (gently rising to 12th dorsal-fin ray tip) before lowering to tip of last fin ray. Anal-fin origin located slightly posterior to anus. Posteriormost point of anal-fin base posterior to that of dorsal-fin base. Caudal fin truncate, dorsal, ventral and posterior margins nearly straight; upper part of fin slightly extended. Body covered with deciduous ctenoid scales. Dorsum of head fully scaled, extending to snout tip. Both jaws scaled. Ventral surface of head, except chin, fully scaled. Lateral line originating on upper end of opercle, sloping abruptly downward below first dorsal-fin base, subsequently parallel to body axis and terminating at central part of caudal-fin base. First five lateral scales bearing a spine. Peritoneum pale.

Fresh coloration—Body light yellow, with yellow blotches (slightly smaller than eye) scattered on lateral surface; ventrally whitish. Dorsum of head blackish. Spines of first dorsal fin semi-transparent. Fin membrane of anterior part of first dorsal fin jet black. Fin rays of pelvic, anal, and second dorsal fins yellowish-white. Pectoral fin uniformly dusky. Caudal fin pale with two vertical dark bands. Black blotch smaller than pupil on upper part of caudal fin. Iris yellow.

Distribution *Bembrops curvatura* is widely distributed in the Indo-West Pacific (Korea, Japan,

Philippines Islands, Indonesia, northern coast of Australia, and Gulf of Mannar, India) and on the Emperor Seamounts (Das and Nelson 1996; Lee and Kim 1999; Hutchins 2001; Thompson and Suttkus 2002; Nakabo and Doiuchi 2013; Larson et al. 2013; Joshi et al. 2016; Hoshino and Sawada 2020). In Japanese waters, it has been recorded from the Pacific coast from Sagami Bay to south of Makurazaki (Kagoshima Prefecture), Uyagawa (Shimane Prefecture), coast of Japan Sea of Yamaguchi Prefecture, and the East China Sea (Ozawa 1983; Okiyama 1997; Shiina 2009; Arao and Tamai 2011; Nakabo and Doiuchi 2013; Taiga 2015; Iwatsuki et al. 2017; Tashiro 2017; Sonoyama et al. 2020; this study).

Identification The present specimen is assignable to the genus *Bembrops* as defined by Das and Nelson (1996) and Thompson and Suttkus (2002), having the following characters: a tentacle on maxilla posterior tip; a deep notch on maxilla posterior margin; large eye, 8.6% of SL; 45 lateral-line scales; dorsal fin with six spines and 14 soft rays; anal fin with 15 rays; and pectoral fin with 21 rays. Moreover, it was identified as *B. curvatura* on the basis of the following combination of characters, which closely matched the diagnostic features of *B. curvatura* given by Das and Nelson (1996), Nelson (2001), Thompson and Suttkus (2002), and Nakabo and Doiuchi (2013): lateral line sloping abruptly downward below first dorsal fin; anterior portion of first dorsal fin jet black; dorsal profile of second dorsal fin not deeply notched; and pale-colored peritoneum. Although *B. curvatura* is similar to *Bembrops gobioides* (Goode, 1880) (distributed only in the western Atlantic) in having the lateral line sloping abruptly, the former is easily distinguished from the latter by the lower counts of lateral-scales (40–49 in *B. curvatura* vs. 60–66 in *B. gobioides*), second dorsal-fin rays (14 or 15 vs. 16 or 17), pectoral-fin rays (19–22 vs. 22–26), and anal-fin rays (15 or 16 vs. 17 or 18) (Das and Nelson 1996). Furthermore, the meristics and morphometrics of the present specimen generally matched those of *B. curvatura* given by Das and Nelson (1996) and Thompson and Suttkus (2002), except for a slightly broader interorbital space [interorbital width 0.7–1.2% SL in Thompson and Suttkus (2002) vs. 1.5% SL in the present specimen], most likely an intraspecific variation.

Remarks *Bembrops curvatura* was described by Okada and Suzuki (1952) based on specimens collected from Owashi (currently Owase, a city facing the Kumanonada Sea), Mie Prefecture, Japan. Matsubara (1955) proposed the new Japanese name “Nami-aitoragisu” for the species, referring to the original description. Subsequently, the species has been widely recorded from the Pacific coast of Japan from Sagami Bay to southern Kyushu, the Japan Sea coast from Shimane

Prefecture to Yamaguchi Prefecture, and the East China Sea (see synonym list and Distribution). Kobayashi et al. (1999) reported that the species was collected by trawl in 1994 from Seno Umi, an area of sea in western Suruga Bay. However, neither photographs nor collection catalogue numbers were given, and whether or not the specimens were retained is unknown. Although MSMSECTU (2019) provided a color photograph of a live individual of male *B. curvatura* and stated that the species was occasionally trawled in Suruga Bay, the collection locality of the photographed individual was not given; nor is the specimen known to have been retained. In the absence of any previously retained specimens from Suruga Bay, despite the above-mentioned records, the present specimen represents the first Suruga Bay voucher specimen.

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