

First record of *Caranx tille* (Teleostei: Carangidae) from Shikoku, southern Japan

By

Harutaka HATA^{1*} and Keita KOEDA²

1. Center for Molecular Biodiversity Research, National Museum of Nature and Science, 4-1-1 Amakubo, Tsukuba, Ibaraki 305-0005, Japan
2. The University Museum, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

Abstract A single juvenile specimen of the trevally *Caranx tille* Cuvier, 1833 collected from Urado Bay, Kochi Prefecture in 1932, was found in the fish collection in The Department of Zoology, The University Museum, The University of Tokyo. Although the species is widely distributed in the Indo-West Pacific, confirmed records of the species in Japanese waters have been reported only from Mie, Miyazaki, Kagoshima, and Okinawa prefectures. The present specimen, representing the first record of the species from Shikoku, is described herein.

Key words: fish fauna, distribution, Actinopterygii, *Caranx sexfasciatus*, trevally, Kochi Prefecture

Introduction

The trevally genus *Caranx* Lacepède, 1803 is represented by seven species in Japanese waters (Senou 2013). Among them, *Caranx tille* Cuvier, 1833 has been rarely recorded, voucher specimens from the Kuroshio Basin (southern Japan) having been obtained only from Mie, Miyazaki, Kagoshima, and Okinawa prefectures (Senou 2013; Hata et al. 2017; Yadome et al. 2018; Murase 2019b, 2021b). During a recent examination of the fish collection in the Department of Zoology, The University Museum, The University of Tokyo, a single example of the species, collected from Urado Bay, Kochi Prefecture in 1932, was discovered. Representing the first record of *C. tille* from waters of Shikoku Region, the specimen is described in detail herein.

* Corresponding author TEL: 029-853-8153; E-mail: k2795502@kadai.jp

Material and methods

Methods for counts and proportional measurements followed Kimura et al. (2013). All measurements were made with calipers to the nearest 0.1 mm. Abbreviations: SL (standard length), FL (fork length), and ZUMT (The Department of Zoology, The University Museum, The University of Tokyo).

Results

Caranx tille Cuvier, 1833

(Standard Japanese name: Minami-gingameaji)

(Figs. 1, 2; Table 1)

Caranx tille Cuvier in Cuvier & Valenciennes, 1833: 124 [type locality: Puducherry (currently Pondicherry), India; Gushiken 1983: 211, fig. 44 (Chinen and Nago, Okinawa-jima Island, Okinawa Islands, Japan); Gushiken 1984: 151, pl. 139-D, E (Nakagusuku Bay, Okinawa-jima Island, Ryukyu Islands, Japan); Gunn 1990: 5 (Australia); Smith-Vaniz 1999: 2717, unnumbered fig. (Indo-West Pacific from eastern coast of Africa to Okinawa, Guam, and Fiji); Lin and Shao 1999:56 [Taichung and Tungkang (currently Donggang), Taiwan]; Kita 2007: 13, fig. 29 (east of Sakinoyama, Kataura, Kasasa, Minamisatsuma, Kagoshima Prefecture, Japan); Senou 2013: 890, unnumbered fig. (Shimonosaki, Yamaguchi Prefecture, Japan; Kasasa, Kagoshima Prefecture, Japan; Tanega-shima Island, Osumi Islands, Kagoshima Prefecture, Japan; Okinawa Island, Japan; Taiwan; Indo-West Pacific); Chiang et al. 2014: 126, unnumbered fig. (eastern coast of Taiwan); Kimura 2017: 113, unnumbered fig. (Panay Island, Philippines); Hata and Motomura, 2017: 131, fig. 1 (Uchinoura Bay, Kagoshima Prefecture, Japan); Hata 2018b: 241, unnumbered figs. (Uchinoura Bay, Kagoshima Prefecture, Japan); Nakae et al. 2018: 252 (Amami-oshima Island, Amami Islands, Kagoshima Prefecture, Japan); Kimura 2018: 148, unnumbered fig. (Amami-oshima Island, Amami Islands, Kagoshima Prefecture, Japan); Yadome et al. 2018: 3, fig. 2 (Goza, Shima City and Owase Bay, Mie Prefecture, Japan); Kimura 2019: 151, unnumbered fig. (Amami-oshima Island, Amami Islands, Kagoshima Prefecture, Japan); Torres and Santos 2019: 167, table 3 (Kakinada, India); Murase 2019b: 110, unnumbered fig. (Kadogawa Bay, Miyazaki Prefecture, Japan); Hata 2020b: 288, unnumbered figs. (Uchinoura Bay, Kagoshima Prefecture, Japan); Murase 2021b: 144, unnumbered fig. (Kadogawa Bay, Miyazaki Prefecture,



Figure 1. Preserved specimen of *Caranx tille* collected off Urado Bay, Kochi Prefecture, Japan (ZUMT 24378, 180.2 mm standard length; A: lateral, B: dorsal, C: ventral views).



Figure 2. Ventral view of breast of *Caranx tille* same individual as Fig. 1

Table 1. Counts and measurements of *Caranx tille* from Urado Bay (Kochi Prefecture), southern Japan.

	ZUMT 24378
Standard length (SL; mm)	180.2
Fork length (FL; mm)	195.9
Counts	
Dorsal-fin rays	VIII + I, 21
Anal-fin rays	II + I, 18
Pectoral-fin rays	20
Pelvic-fin rays	I, 5
Gill rakers on first gill arch	6 + 16 = 22
Cycloid scales on curved part of lateral line	49
Scutes on posterior curved part of lateral line	2
Scutes on straight part of lateral line	36
Pseudobranchial filaments	41
Measurement shown as % of SL (% of FL)	
Head length (HL)	29.9 (27.5)
Predorsal length	39.9 (36.7)
First dorsal-fin base length	16.9 (15.6)
Second dorsal-fin base length	40.3 (37.1)
Anal-fin base length	39.9 (36.1)
Snout to pectoral-fin insertion	30.3 (27.9)
Snout to pelvic-fin insertion	32.3 (29.7)
Snout to anal-fin origin	53.3 (49.0)
Pelvic-fin insertion to anal-fin origin	22.2 (20.4)
Snout to anus	45.2 (41.6)
Caudal-peduncle length	13.0 (12.0)
Body depth	35.8 (32.9)
Caudal-peduncle depth	3.9 (3.6)
Pectoral-fin length	36.5 (33.6)
Pelvic-fin length	14.8 (13.6)
Length of second spine of first dorsal fin	13.8 (12.7)
First anal-fin spine length	3.1 (2.9)
Measurements shown as % of HL (% of FL)	
Snout length	27.8 (7.6)
Upper-jaw length	46.3 (12.7)
Eye diameter	25.0 (6.9)
Postorbital head length	54.7 (15.0)
Interorbital width	25.6 (7.0)

Japan).

Caranx cynodon Bleeker, 1851: 362 (type locality: Jakarta, Java, Indonesia).

Caranx semisomnus Fowler, 1904: 510, pl. 16 (upper fig.) (type locality: Padang, Sumatra, Indonesia).

Caranx auriga Seale, 1910: 505, pl. 6 (type locality: Manila, Luzon, Philippines).

Citula virga Ogilby, 1915: 134 (replacement name for *Caranx auriga* Seale, 1910, preoccupied by *Caranx auriga* De Vis, 1884).

Caranx manilensis Roxas and Martin, 1937: 92 (type locality: Manila Bay, Luzon, Philippines).

Caranx hippos (not of Linnaeus): ?Suzuki 1962: 158 (Shimonoseki, Yamaguchi Prefecture, Japan).

Material examined ZUMT 24378, 180.2 mm SL, 195.9 mm FL, Urado Bay, Kochi City, Kochi Prefecture, Japan 15 Mar. 1932, coll. M. Fukutomi.

Description Counts and measurements, expressed as percentages of SL, are given in Table 1. Body oval, laterally compressed; dorsal profile elevated from snout tip to second dorsal-fin origin, subsequently lowering to end of second dorsal-fin base; ventral profile gently lowering from lower-jaw tip to anal-fin origin, subsequently rising to posteriormost point of anal-fin base; dorsal and ventral profiles of caudal peduncle nearly straight, parallel to body axis. No finlets on caudal peduncle. Dorsal profile of head strongly convex anteriorly. Pectoral-fin insertion posterior to posterior margin of opercle, below level of snout tip. Pectoral fin falcate, dorsal contour convex, ventral contour concave; posterior tip of fin pointed, extending beyond anal-fin origin. Pelvic-fin insertion just below pectoral-fin insertion. Posterior tip of depressed pelvic fin not reaching to anus. First dorsal-fin origin posterior to insertions of pectoral and pelvic fins; outer margin of fin rising from fin origin to posterior tip of third spine, thereafter lowering to posterior tip of last (eighth) fin spine. Second dorsal fin originating slightly posterior to origin of first detached anal-fin spine, ending just below posteriormost point of anal-fin base; anterior part lobe-like (higher than first dorsal fin), outer margin rising from fin origin to posterior tip of third fin ray, lowering to posterior tip of eighth fin ray; dorsal contour subsequently parallel to dorsal contour of body; two detached spines located anterior to anal-fin origin. Anal-fin origin just below origin of fourth ray of second dorsal fin; fin falcate, anteriorly forming anterior lobe. Caudal fin forked; posterior margins of both lobes nearly straight. Orbit and eye elliptical and round, respectively. Posterior part of eye covered with well-developed fleshy adipose eyelid. Nostrils paired, slit-like, close to

each other, located anterior to orbit. Maxilla with outer single series of strong canine-like conical teeth and inner band of villiform teeth. Fine teeth on vomer and palatine. Teeth patch on vomer triangular. Single row of conical teeth on lower jaw. Narrow teeth band on tongue. Body covered with small cycloid scales; breast completely scaled (Fig. 2). Head scaleless, except cheek. Lateral line originating at upper margin of opercle, rising to just below fifth dorsal-fin spine origin before lowering to just below fifth dorsal-fin ray origin, thereafter running straight on posterior part of body and covered with well-ridged scutes.

Coloration of preserved specimen—Body light brown, dorsum darker. Fins pale, outer margins of dorsal and caudal fins blackish. No distinct markings on body. Pupil pale yellow, iris black.

Distribution *Caranx tille* is widely distributed in the Indo-West Pacific from the eastern coast of Africa to southern Japan, Guam, and Fiji (Smith-Vaniz 1999; Senou 2013; Torres and Santos 2019; see synonym list). In Japanese waters, the species has been recorded from Mie Prefecture (Shima City and Owase Bay), Kochi Prefecture (Urado Bay), Miyazaki Prefecture (Kadogawa Bay), Kagoshima Prefecture (Kasasa, Uchinoura Bay, Tanega-shima and Amami-oshima islands), and Okinawa-jima Island (Gushiken 1983; Kita 2007; Motomura and Sakurai 2008; Miura 2012; Senou 2013; Hata and Motomura 2017; Hata et al. 2017; Hata 2018b, 2020b; Yadome et al. 2018; Nakae et al. 2018; Kimura 2018, 2019; Murase 2019b, 2021b; this study; Fig. 3). A record from Yamaguchi Prefecture is doubtful (see Remarks).

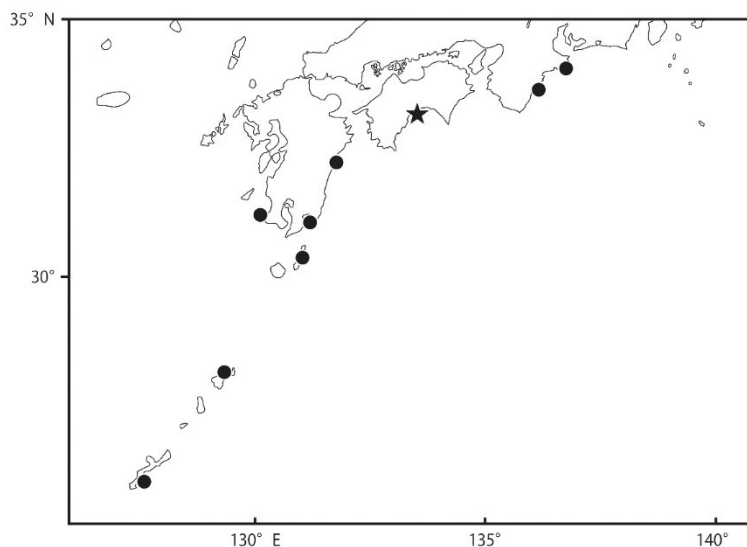


Figure 3. Distributional records of *Caranx tille* in Japanese waters. Star and circles represent locality of the specimen examined in this study, and previously reported records, respectively.

Remarks The Japanese distribution of *C. tille* was detailed by Hata and Motomura (2017), Hata et al. (2017), and Yadome et al. (2018). Voucher-supported records of the species from Japan exist only from Mie (Yadome et al. 2018), Miyazaki (Murasé 2019b, 2021b), Kagoshima (Kita 2007; Hata and Motomura 2017; Hata et al. 2017; Hata 2018b, 2020b), and Okinawa prefectures (Gushiken 1983, 1984; Senou 2013). As suggested by Yadome et al. (2018), the record of the species from Yamaguchi Prefecture (Shimonoseki City) by Suzuki (1962) is doubtful (therefore not accepted here) because his specimen had the maxilla reaching posteriorly to the anterior margin of the eye (reaching or extending beyond the center of eye in *C. tille*; Smith-Vaniz 1999; Senou 2013); nor did the description mention scale condition on the breast. The present specimen, collected from Urado Bay (off Kochi City), represents the first record of the species from the region, despite the fish fauna off the Pacific coast of Shikoku (including Kochi Prefecture) having been well investigated (e.g., Kamohara 1958, 1964; Aizawa and Senou 1991; Shinohara et al. 2001; Nakabo et al. 2001; Kameda et al. 2005; Takagi et al. 2010; Matsunuma et al. 2017; Inoue et al. 2021). Therefore, the species is considered rare in that area. On the other hand, *Caranx sexfasciatus* Quoy and Gaimard, 1825, a species genetically related to and morphologically resembling *C. tille* (Smith-Vaniz 1999; Senou 2013; Torres and Santos 2019), is a common species off southern Japan, including the Pacific coast of Shikoku (Kamohara 1958, 1964; Takagi et al. 2010; Iwatsuki et al. 2017; Hata 2018a, 2020a; Murase 2019a, 2021a). Because all of the Japanese records of *C. tille* are from areas significantly influenced by the Kuroshio Current, the occurrence of the latter species in Japan is likely the result of transportation by that current. In Japanese waters, adult individuals have only been observed off the Ryukyu Islands, with only juveniles (<31 cm SL) having been recorded further north to Kyushu (Senou 2013; Hata et al. 2017; this study). It is likely, therefore, that the more northern occurrences of the species represent unsuccessful dispersal. Despite the suggestion by Hata et al. (2017) that *C. tille* occurrences off the Pacific coast of Kyushu have been increasing in recent years, it is now apparent that the present specimen (collected in 1932) also represents transportation by the Kuroshio Current; that such transportation is not simply a recent phenomenon.

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