

## First record of *Paracaristius maderensis* from the central North Pacific and a second specimen of *Platyberyx rhyton* (Perciformes: Caristiidae)

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**Abstract.** Two significant specimens of the perciform fish family Caristiidae were recently collected in the North Pacific near Japan. One of these, identified as *Paracaristius maderensis* (Maul, 1949), was collected from the Kinmei Seamount, in the Emperor Seamount chain. This specimen represents the first record of the species from the central North Pacific. Another specimen, collected from off Iwate Prefecture, northeastern Japan, is only the second known specimen of *Platyberyx rhyton* Stevenson and Kenaley, 2013. Here we report morphological details of these two specimens, propose a new Japanese name for *Pl. rhyton*, and provide a key to the species of Caristiidae known from Japan.

**Key words:** Caristiidae, manefish, distribution, North Pacific, new record.

### Introduction

The mesopelagic fish family Caristiidae, commonly known as manefishes or veiflins, is currently comprised of four genera and about 18 species, which occurs in tropical, temperate and subarctic oceans (Stevenson & Kenaley 2011, 2013; Kukuev *et al.* 2012, 2013). The family is characterized by a having deep, laterally compressed head and body, large and delicate dorsal and anal fins, and a sheath on the dorsal and ventral surface of the body. These fishes are caught mainly by bottom- or mid-water trawls, but are rarely collected.

In an ongoing taxonomic study of the mesopelagic fishes from the North Pacific, the first author obtained several specimens of caristiid fishes. These include a single specimen from the Emperor Seamount

chain, identified as *Paracaristius maderensis* (Maul, 1949), and a single specimen from off northeastern Japan, identified as *Platyberyx rhyton* Stevenson & Kenaley, 2013. These specimens represent the first record of *Pa. maderensis* from the central North Pacific and only the second known specimen of *Pl. rhyton*. In this article, we note the morphological characters of these specimens, present a new Japanese name for *Pl. rhyton*, and provide a key to the species of Caristiidae in Japan.

### Materials and methods

Methods of counting and measuring follow Hubbs & Lagler (1958), except that body depth is measured through the dorsal insertion of the pectoral fin. The last two soft rays of the dorsal and anal fins are counted as single rays, each pair being associated with a single pterygiophore. Counts of dorsal- and anal-fin rays and vertebrae were taken from radio-

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graphs. The lateral-line scale count of *Pl. rhyton* is not included in the table because the series is broken. Standard length and head length are expressed as SL and HL, respectively. Sex was confirmed by dissection of the right side of the abdomen. The diagnoses of *Pa. maderensis* and *Pl. rhyton* given here are based on the present specimens and Stevenson & Kenaley (2011, 2013). Specimens examined for this study are deposited at the Kagoshima University Museum in Kagoshima, Japan (KAUM) and the University of Washington Fish Collection (UW) in Seattle, Washington, USA.

***Paracaristius maderensis*** (Maul, 1949)

[Japanese name: Madeira-kokuchi-yaegisu]

(Fig. 1A; Table 1)

*Caristius macropus* (not of Bellotti) Norman, 1930: 343 (eastern South Atlantic).

*Caristius maderensis* Maul, 1949: 22 (type locality: off Madeira); Nielsen 1979: 339 (list; eastern North Atlantic); Post 1986: 747 (off Madeira); Post 1990: 765 (list; eastern Atlantic); Trunov & Kukuev 2004: 180 (Nova Scotia).

*Paracaristius maderensis* Trunov *et al.* 2006: 442 (eastern central Pacific, eastern South Atlantic, western North Atlantic); Tweddle & Anderson 2008: 11 (off Angola); Hartel *et al.* 2008: 329 (based on Trunov and Kukuev 2004); Stevenson & Kenaley 2011: 392 (tropical North Atlantic, western North Pacific, and southern Indian Ocean); Amaoka 2013: 97 (near Bonin Islands); Tatsuta *et al.* 2014 (Ogasawara Islands, western North Pacific).

**Material examined.** KAUM-I. 59002, 215 mm SL, female, Kinmei Seamount, Emperor Seamount chain, 720 m depth, 23 August 2013.

**Diagnosis.** A species of *Paracaristius* with the following combination of characters: fingerlike papillae absent along dorsal margin of hyoid arch

and interhyal and posterior ceratohyal articulation; dorsal-fin rays 29–31; anal-fin rays 18–19; position of dorsal-fin origin posterior to orbit; and jaw teeth arranged in multiple rows.

**Remarks.** The genus *Paracaristius* is distinguished from all other caristiid genera by the absence of vomerine and palatine teeth, and four species are regarded as valid (Stevenson & Kenaley 2011). Two species of the genus, *Pa. maderensis* and *Paracaristius nudarcus* Stevenson & Kenaley, 2011, are distributed in Japan (Fujii 1984 as *Caristius* sp.; Stevenson & Kenaley 2011; Tatsuta *et al.* 2014). These species differ in the position of the dorsal-fin origin and the arrangement of jaw teeth (Stevenson & Kenaley 2011, see below key to the species).

The specimen of *Pa. maderensis* reported here (KAUM-I. 59002) matches the morphological description given by Stevenson & Kenaley (2011), and the meristics and morphometrics agree closely with

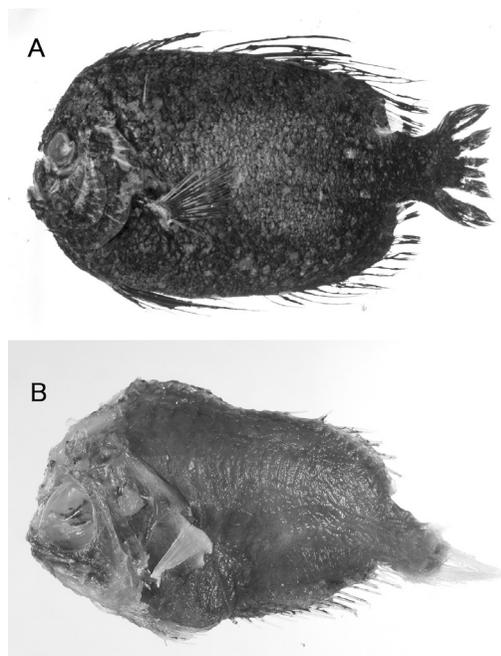


Fig. 1. Two caristiids from the North Pacific. A, *Paracaristius maderensis*, KAUM-I. 59002, 215 mm SL, Emperor Seamount chain; B, *Platyberyx rhyton*, KAUM-I. 59004, 88 mm SL, off northeastern Japan.

Table 1. Meristic and morphometric characters of *Paracaristius maderensis* and *Platyberyx rhyton*.

	<i>Paracaristius maderensis</i>		<i>Platyberyx rhyton</i>	
	Present study	Stevenson & Kenaley (2011)	Present study	Stevenson & Kenaley (2013)
	<i>n</i> = 1	<i>n</i> = 8	<i>n</i> = 1	<i>n</i> = 1
Standard length (mm)	215	180–247	88	146
Vertebrae	16 + 20 (36)	16–17 + 19–20 (35–36)	15 + 18 (33)	15 + 19 (34)
Dorsal-fin rays	29	29–31	31	30
Anal-fin rays	19	18–19	18	18
Pectoral-fin rays	17	16–18	18	18
Vomerine teeth	Absent	Absent	6	11
Palatine teeth	Absent	Absent	10	14
Upper-jaw teeth	60	34–85	35*	40
Lower-jaw teeth	45	20–72	25*	34
Gill rakers	7 + 15 (22)	7 + 15–16 (22–23)	6 + 15 (21)	6 + 15 (21)
As % SL				
Body depth	56.3	49.6–57.6	52.5	45.3
Head length	30.7	29.0–34.3	33.9	30.6
Predorsal length	17.6	15.9–24.5	16.9	14.9
Prepectoral length	31.5	31.7–40.4	34.0	31.4
Prepelvic length	29.9	27.8–46.2	28.5	27.6
Pectoral-fin base	6.9	6.7–7.6	8.4	7.2
Preanal length	59.7	59.0–69.6	52.4	52.9
Dorsal-fin base	75.8	66.0–75.3	77.0	76.0
Anal-fin base	40.2	33.7–38.0	39.5	36.8
Peduncle length	14.1	11.4–14.5	13.5	13.5
Peduncle depth	16.0	14.9–16.0	12.8	13.2
As % HL				
Upper-jaw length	34.8	44.4–52.2	59.4	56.9
Lower-jaw length	31.1	39.5–49.2	56.4	57.6
Bony orbit width	36.7	37.0–43.8	45.6	47.2

\*Tooth counts are approximate due to specimen damage.

previously reported ranges. The only exceptions are the upper- and lower-jaw lengths in this specimen (34.8% HL and 31.1% HL vs. 44.4–52.2% HL and 39.5–49.2% HL in Stevenson & Kenaley 2011, respectively: see Table 1), which are outside the ranges listed in Stevenson & Kenaley (2011). However, the previously published morphometric ranges for this species are based on a relatively small sample size (8 specimens), and therefore may not represent the full range of morphometric variation in the species. There is no indication that relative jaw length is a significant taxonomic character in this genus, and

our data for this specimen extend the ranges for *Pa. maderensis* to approximately parallel those of other congeners. Thus, we find no significant morphological differences between this specimen and the specimens of *Pa. maderensis* examined by Stevenson & Kenaley (2011).

*Paracaristius maderensis* is distributed in the both the eastern and western tropical North Atlantic, Kyushu-Palau Ridge and near Bonin Islands (western North Pacific), and the southern Indian Ocean (Stevenson & Kenaley 2011; Amaoka 2013; Tatsuta *et al.* 2014). In the central North Pacific, Loeb (1979)

reported five larval and juvenile specimens (4.3–13.5 mm) of “*Caristius* sp. (prob. *maderensis*)” collected from the Hancock Seamounts. On the basis of this statement, Mundy (2005) treated *Pa. maderensis* as an uncertain species in his checklist of Hawaiian fishes. However, at the time of Loeb’s (1979) publication *Pa. maderensis* was the only recognized species of the small-mouth group (Paracaristiinae *sensu* Kukuev 2013), so her material could have represented *Pa. nudarcus*, and *Pa. maderensis* has not subsequently been clearly documented from the central North Pacific. Thus, our specimen represents the first confirmed record of the species from the central North Pacific (Fig. 2).

Moser (1996) provided figures and a description of larval and juvenile specimens of *Pa. maderensis* (as *Caristius maderensis*) from the eastern North Pacific with a brief description of larval *Caristius macropus* (Bellotti, 1903) collected from the equatorial region of the eastern Pacific. His identification was based on his understanding that the only two species of Caristiidae found in the North Pacific were *C.*

*macropus* and *Pa. maderensis*. However, according to Stevenson & Kenaley (2011, 2013), four species of the family are distributed in the eastern North Pacific: *C. macropus*; *Pa. nudarcus*; *Platyberyx andriashevi* (Kukuev, *et al.* 2012); and *Platyberyx paucus* (Stevenson & Kenaley, 2013). Similarly, Okamoto *et al.* (2010) reported larval specimens of *C. macropus* from Japan identified based on the same limited taxonomic framework. Because it is now clear that at least four species of the family are distributed in Japan (Stevenson & Kenaley 2011, 2013, see the following key to species), these previous investigations should be re-evaluated and more taxonomic research on the early life stages of Caristiidae is needed.

***Platyberyx rhyton* Stevenson & Kenaley, 2013**

[New Japanese name: Sanriku-yaegisu]

(Fig. 1B; Table 1)

*Platyberyx rhyton* Stevenson & Kenaley, 2013: 424 (type locality: off northeastern Japan, western North Pacific).

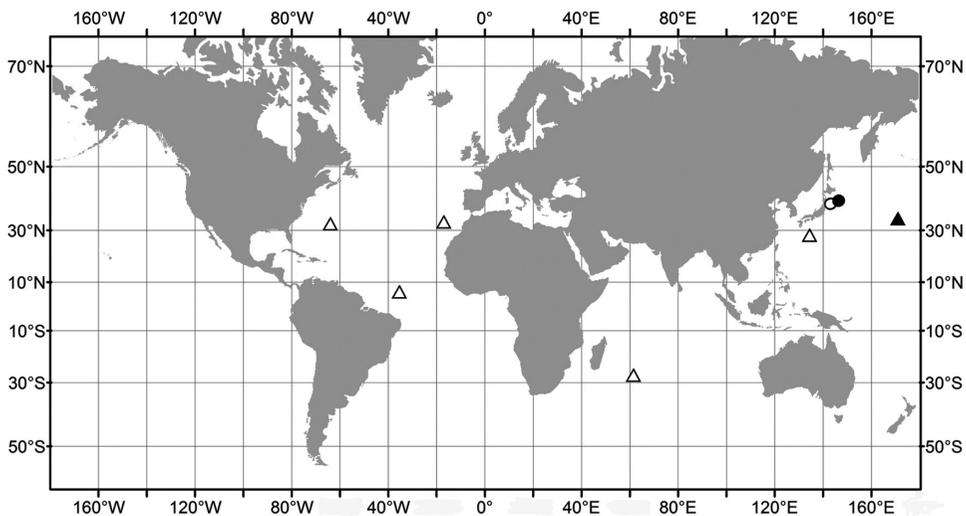


Fig. 2. Distributional records of *Paracaristius maderensis* (solid triangle = present study; open triangles = Stevenson & Kenaley 2011) and *Platyberyx rhyton* (solid circle = present study; open circle = Stevenson & Kenaley 2013).

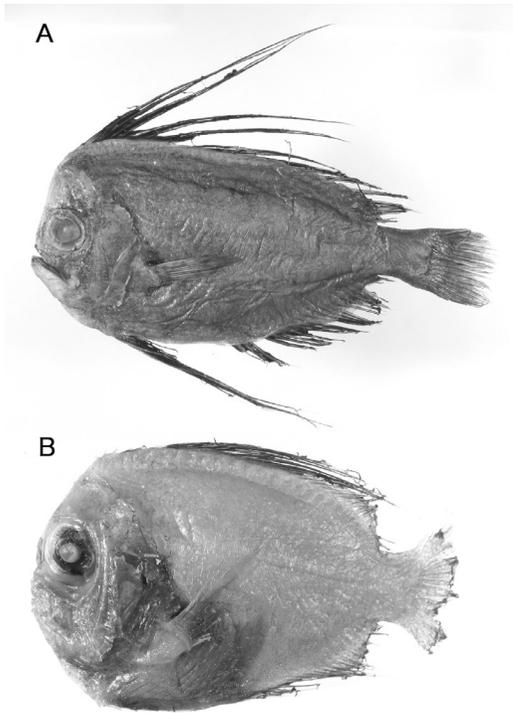


Fig. 3. Other two species of Japanese caristiids. A, *Caristius macropus*, KAUM-I. 59000, 192 mm SL, off northeastern Japan; B, *Paracaristius nudarcus*, KAUM-I. 59001, 62 mm SL, off northeastern Japan.

**Material examined.** KAUM-I. 59004, 88 mm SL, sex unknown, 39°57.60' N, 146°04.76' E, off Iwate Prefecture, northeastern Japan, 0–750 m depth, mid-water trawl, 15 March 2005.

**Diagnosis.** A species of *Platyberyx* with the following combination of characters: dorsal-fin rays 30–31; anal-fin rays 18; pectoral-fin rays 18; vertebrae 33–34; ventral caudal spur absent; prepectoral length 31.4–34.0% SL; dorsal-fin base 76.0–77.0% SL; upper jaw extending approximately to posterior margin of orbit; gill rakers narrow, bladelike, with few bristles concentrated near tip; jaw teeth arranged in single row; dorsal pharyngeal papillae saclike, multifid papillae absent inside mouth.

**Remarks.** The genus *Platyberyx*, which includes six species, is distinguished from all other caristiid

genera by the presence of a conspicuous lateral line with large scales (Stevenson & Kenaley 2013). Of these, only *Pl. rhyton* has been reported from Japan. This species was originally described based on a single specimen from northeastern Japan off Iwate Prefecture (39°02' N, 143°30' E) at 650–677 m depth (Stevenson & Kenaley 2013). Our specimen, which represents only the second recorded specimen of the species, was also collected by mid-water trawl from near the type locality at 0–750 m depth (Fig. 2). Our specimen (KAUM-I. 59004) matches the morphological description given by Stevenson & Kenaley (2013), and the meristics and morphometrics are very similar to those of the holotype. Counts of dorsal-fin rays (30 in the holotype vs. 31 in the present specimen) and vertebrae (34 vs. 33) are slightly different between the holotype and the second specimen, but well within the typical range of meristic variation in caristiids. Tooth counts are all lower in our specimen than in holotype, but the specimen has sustained some damage to the jaw and mouth, so these counts should be considered estimates. Even if they are accurate, they would fall within the typical range of variation for caristiid species. Therefore, we find no significant differences between this specimen and the holotype of *Pl. rhyton* (NSMT-P 59274). We propose two new Japanese names, Sanriku-yaegisu-zoku and Sanriku-yaegisu (“Sanriku” is collecting locality, the name of a district of the Pacific coast of northeastern Japan), for the genus *Platyberyx* and *Pl. rhyton*, respectively.

**Key to the species of Caristiidae in Japan**

- 1a. Lateral line present, with enlarged pored scales ..... *Platyberyx rhyton* (Fig. 1B)
- 1b. Lateral line absent, without enlarged pored scales ..... 2
- 2a. Suborbital series expanded, overlapping bones of upper jaw and forming a broad space be-

- tween orbit and mouth; upper jaw short, extending approximately to mid-orbit ..... 3
- 2b. Suborbital series not expanded, space between orbit and mouth narrow; upper jaw long, extending to posterior margin of orbit  
..... *Caristius macropus* (Fig. 3A)
- 3a. Dorsal-fin origin posterior to orbit; jaw teeth arranged in multiple rows  
..... *Paracaristius maderensis* (Fig. 1A)
- 3b. Dorsal-fin origin above orbit; jaw teeth arranged in single row, except near symphyses  
..... *Paracaristius nudarcus* (Fig. 3B)

**Comparative material examined.** *Caristius macropus*: 2 specimens (KAUM–I. 59000, 192 mm SL; UW 153100, 163 mm SL), 39°58.47' N, 146°06.52' E, off Iwate Prefecture, northeastern Japan, 0–950 m depth, MOHT trawl, 8 March 2005. *Paracaristius nudarcus*: KAUM–I. 59001, 62 mm SL, 38°03.12' N, 147°18.14' E, off Miyagi Prefecture, northeastern Japan, 0–300 m depth, MOCNESS, 11 February 2004; UW 153101, 85 mm SL, 39°57.60' N, 146°04.76' E, off Iwate Prefecture, northeastern Japan, 0–750 m depth, mid-water trawl, 15 March 2005. *Platyberyx andriashevi*, KAUM–I. 59003, 205 mm SL, Kinmei Seamount, Emperor Seamount chain, 720 m depth, 23 August 2013.

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