

First Japanese Specimen-based Records of *Cypho zaps* (Perciformes: Pseudochromidae) from Yonaguni-jima Island, the Yaeyama Islands

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Three specimens (31.6–38.2 mm standard length) of *Cypho zaps* Gill, 2004 (Pseudochromidae), previously known from voucher specimens only from Indonesia, the Philippines, and southern Taiwan, were collected off Yonaguni-jima island, Yaeyama Islands, southern Ryukyu Islands. They were clearly distinguished from the only known other congener, *C. purpurascens* (De Vis, 1884), by the staggered arrangement of the dark vertical lines in the center of each body scale, which do not form continuous bars as they do in the latter species. These specimens represent the first records of *C. zaps* from Japan supported by voucher specimens, and the northernmost distributional records of the species.

Key Words: new record, distribution, Okinawa, Ryukyu Archipelago, Chequered Dottyback.

Introduction

The family Pseudochromidae comprises four subfamilies: viz., Anisochrominae, Congrogadinae, Pseudochrominae, and Pseudoplesiopinae (Godkin and Winterbottom 1985). The subfamily Pseudochrominae contains 10 genera with 80 species in the Indo-Pacific Ocean (Gill 2004), of which four genera with nine species have been recorded from Japanese waters (Hayashi *et al.* 2013). The genus *Cypho* Myers, 1940 of the Pseudochrominae contains two valid Pacific species (Gill 2004): *C. purpurascens* (De Vis, 1884) and *C. zaps* Gill, 2004. *Cypho purpurascens* is known only from the southwestern Pacific (northeast of Australia to Tonga; Gill 2004). *Cypho zaps* was originally described by Gill (2004) on the basis of 46 specimens collected from Indonesia, the Philippines, and Taiwan. Although he also reported this species from Yonaguni-jima island in the Yaeyama Islands, southern Japan, on the basis of an underwater photograph, the photograph was not shown in his article. Senou *et al.* (2007) subsequently reported this species from Shimoji-jima island in the Miyako Islands, again based on an underwater photograph. Allen and Erdmann (2012) included the Ryukyu Islands in the distributional range of this species, probably based on Gill's (2004) photographic record. During a joint ichthyofaunal survey at Yonaguni-jima island in September, 2015, by researchers from five Japanese universities, three specimens of *C. zaps* were collected off the island, which is the westernmost island in Japan (*ca.* 500 km southwest of Okinawa-jima island). These specimens are herein described as the first specimen-based records of *C. zaps* from

Japan, and the northernmost record of the species based on voucher specimens.

Materials and Methods

Counts and measurements follow Gill (2004). Measurements were made to the nearest 0.1 mm with needle-point digital calipers under a dissecting microscope. The morphological description is based on the three specimens collected from Yonaguni-jima island. Curatorial procedures for the collected specimen followed Motomura and Ishikawa (2013). Institutional codes follow Sabaj Pérez (2014). The specimens of *C. zaps* examined in this study are deposited in the Kagoshima University Museum, Kagoshima, Japan (KAUM). Underwater photographs of *C. zaps* referenced in this study are registered at the Image Database of Fishes in the Kanagawa Prefectural Museum of Natural History, Odawara, Japan (KPM-NR).

Cypho zaps Gill, 2004

[New Japanese generic name: Donan-megisu-zoku]

[New standard Japanese name: Donan-megisu]

(Figs 1–2; Tables 1–2)

Cypho zaps Gill, 2004: 23, figs 8–10 (type locality: Batan Island, Philippines); Senou *et al.* 2007: 52, fig. 6 (Shimoji-jima island, Miyako Islands, Japan); Ho and Shao 2011: 42 (Green and Orchid islands and Kenting, Taiwan); Allen and Erdmann 2012: 323, lower figs (Halmahera and Raja Ampat Islands, Indonesia); Yang *et al.* 2013: 79, lower left



Fig. 1. Fresh specimens of *Cypho zaps* collected from Yonaguni-jima island, Japan. A, KAUM-I. 78334, 35.6 mm standard length (SL), Rakuda Rock; B, KAUM-I. 78364, 38.2 mm SL, off Hinan Port; C, KAUM-I. 78543, 31.6 mm SL, off Umabana.

side fig. (Orchid Island, Taiwan).

Material examined. All from Yonaguni-jima island, Yaeyama Islands, Okinawa Prefecture, Japan: KAUM-I. 78334, 35.6 mm SL, Rakuda Rock, 24°26'27"N, 122°57'02"E, 20 m depth, 17 September 2015, K. Koeda; KAUM-I. 78364, 38.2 mm SL, off Kubura Hinan Port, 24°26'35"N, 122°56'22"E, 26 m depth, 18 September 2015, K. Koeda; KAUM-I. 78543, 31.6 mm SL, off Umabana, 24°28'21"N, 122°57'49"E, 26 m depth, 22 September 2015, K. Koeda.

Description. Body oblong, moderately deep and compressed, deepest at anus. Dorsal profile of head and body in

side view convex from snout tip to caudal-fin base. Ventral profile of head and body in side view convex from lower-jaw tip to end of anal-fin base, straight at caudal peduncle. Head pointed, large, 3.7–3.8 in SL. Anterior lateral line ending below base of 18th dorsal-fin soft ray. Posterior lateral line beginning below base of 18th dorsal-fin soft ray. Eye rounded, large, 3.0–3.1 in HL. Pupil tear-drop shaped. Mouth small, slightly oblique, forming angle of *ca.* 30° to horizontal axis of body. Posterior margin of maxilla extending slightly beyond vertical drawn through center of pupil; upper-jaw length less than half head length.

Two pairs of enlarged canine teeth on anterior part of

Table 1. Meristics of *Cypho zaps* specimens from Japan and type specimens (western Pacific Ocean).

	This study	Gill (2004)	
	Non-types Yonaguni-jima island <i>n</i> =3	Holotype Philippines	Paratypes Western Pacific <i>n</i> =17
Standard length (SL; mm)	31.6–38.2	35.4	30.4–51.0
Dorsal-fin rays	III, 23	III, 23	III, 22–23
Anal-fin rays	III, 14	III, 14	III, 14
Pectoral-fin rays	16–17	17	16–19
Upper procurrent caudal-fin rays	6	—	6–7
Lower procurrent caudal-fin rays	5	5	5–6
Total caudal-fin rays	29	28	28–30
Scales in lateral series	35	35	29–37
Anterior lateral-line scales	24–28	28	24–31
Anterior lateral line terminating beneath segmented dorsal-fin ray	15–18th	17th	15–21st
Posterior lateral-line scales	5–9+1	7+1	3–13+0–2
Scale rows between lateral lines	3	3	2–4
Horizontal scale rows above anal-fin origin	14	15	14–18
Circumpeduncular scales	14–16	14	14–16
Pre-dorsal-fin scale rows	14–15	15	13–18
Gill rakers	4–5+11=15–16	4+10=14	3–5+9–11=13–16
Pseudobranch filaments	10	10	7–14
Circumorbital pores	17–18	20	16–26
Preopercular pores	8	10	8–16
Dentary pores	4	4	4–5
Posterior interorbital pores	0	0	0

each jaw; villiform teeth in 4–6 rows at symphysis, diminishing to 1 or 2 rows on sides of jaw in upper jaw. Villiform teeth in 1 or 2 rows in lower jaw. Two to 4 rows of tiny teeth on vomer and ectopterygoids.

Anterior nostril with short tube, uppermost margin level with ventral margin of pupil. Posterior nostril oval, opening vertically, uppermost margin below level of middle of pupil. Opercular and preopercular margins smooth. Gill rakers slender, moderately long but shorter than gill filaments. Head nearly full-scaled, only region around nostrils and pores on snout unscaled; small scales on base of dorsal, anal, and caudal fins.

Origin of dorsal fin anterior to vertical drawn through pectoral- and pelvic-fin origins; third spine of dorsal fin longest; 20th or 21st soft ray of dorsal fin longest. Origin of anal fin below base of eighth soft ray of dorsal fin; third spine of anal fin longest; 13th soft ray of anal fin longest. Origin of pelvic fin below central part of pectoral-fin base. Pectoral fin rounded, posterior tip reaching vertical drawn through base of seventh soft ray of dorsal fin. Posterior tip of depressed pelvic fin reaching vertical drawn through base of eighth soft ray of dorsal fin. Caudal fin rounded.

Coloration when fresh—Strength and intensity of color varying between specimens. Head bright orange-red to yellow, body bright orange-red to orange, with orange to yellow abdomen. Posterior and ventral margin of orbit dark-blue to blue. Scales of head and body, except abdomen, each with dark-blue to blue oblique bar in middle. Bars wider posteriorly on body. Bluish-grey stripe along dorsal margin of upper jaw curving posterodorsally and ending behind margin of eye. Pupil black; iris bright orange to yellow with two



Fig. 2. Underwater photograph of *Cypho zaps*, off Yonaguni-jima island, 16 January 2012, taken by T. Uchiyama.

diagonal and parallel dark-blue to blue bars, respectively located above and below pupil. Dorsal and anal fins bright orange-red to orange, lighter distally. One or two faint bluish-grey mid-lateral stripes on dorsal and anal fins. Outer margin of both fins bluish-grey. Pectoral fin semi-transparent without distinct markings. Pelvic fins semi-transparent yellow to orange with pale-blue anterior margin. Caudal fin bright orange-red to lighter orange distally, with faint bluish-grey mid-caudal stripe and bluish-grey outer margin.

Coloration in life—Based on underwater photographs taken at Yonaguni-jima island (Fig. 2): similar to coloration of fresh specimens, but whole body generally pale.

Coloration of preserved specimens—Head and body pale

Table 2. Morphometrics of specimens of *Cypho zaps* (expressed as percentages of SL) from Japan and type specimens (western Pacific Ocean).

	This study	Gill (2004)	
	Non-types Yonaguni-jima island <i>n</i> =3	Holotype Philippines	Paratypes Western Pacific <i>n</i> =45
Standard length (SL; mm)	31.6–38.2	35.4	30.4–51.0
Head length	26.4–27.3	25.1	23.1–27.0
Orbit diameter	8.5–9.0	9.9	8.0–10.9
Snout length	6.0–6.5	5.1	4.8–6.3
Fleshy interorbital width	4.1–5.2	4.8	4.5–5.6
Bony interorbital width	3.0–3.9	3.1	2.8–3.7
Body width	14.2–14.6	12.4	11.4–14.8
Distance from snout tip to posterior tip of retroarticular bone	13.9–14.9	14.7	13.2–15.1
Pre-dorsal-fin length	33.9–35.1	32.8	30.5–35.2
Pre-pelvic-fin length	32.0–34.3	32.2	29.6–33.4
Distance from posterior tip of retroarticular bone to pelvic-fin origin	17.7–21.5	18.6	17.3–20.5
Distance from dorsal-fin origin to pelvic-fin origin	27.6–28.2	28.0	26.9–30.6
Distance from dorsal-fin origin to base of middle part of dorsal-fin ray	35.8–36.4	37.3	35.0–37.8
Distance from dorsal-fin origin to anal-fin origin	39.9–40.7	41.5	39.4–42.5
Distance from pelvic-fin origin to anal-fin origin	21.5–25.9	26.3	25.3–30.6
Distance from middle of dorsal-fin ray base to end of dorsal-fin base	24.9–26.3	26.3	23.3–27.3
Distance from middle of dorsal-fin ray base to anal-fin origin	27.5–29.8	28.8	26.0–27.9
Distance from anal-fin origin to end of dorsal-fin base	37.4–38.3	37.3	35.0–39.0
Anal-fin base length	31.0–31.9	30.8	28.1–32.0
Distance from end of dorsal-fin base to end of anal-fin base	16.1–16.5	15.8	13.3–16.8
Distance from end of dorsal-fin base to end of dorsal edge of caudal peduncle	10.9–11.1	10.2	8.9–11.4
Distance from end of dorsal-fin base to end of ventral edge of caudal peduncle	16.9–18.7	18.1	15.9–18.7
Distance from end of anal-fin base to end of dorsal edge of caudal peduncle	18.3–19.6	18.9	17.1–20.1
Distance from end of anal-fin base to end of ventral edge of caudal peduncle	10.7–11.5	11.9	10.7–12.9
1st dorsal-fin spine length	1.9–2.4	2.3	1.7–3.2
2nd dorsal-fin spine length	3.4–4.4	4.5	4.1–5.7
3rd dorsal-fin spine length	5.8–7.0	7.1	5.8–7.7
1st segmented dorsal-fin ray length	10.8–11.5	13.0	9.9–13.8
Length of 4th-to-last segmented dorsal-fin ray	16.4	18.9	17.7–21.8
1st anal-fin spine length	1.9–2.2	2.3	1.6–3.9
2nd anal-fin spine length	4.1–4.7	4.8	3.9–6.7
3rd anal-fin spine length	6.3–7.1	7.6	5.8–9.0
First segmented anal-fin ray length	10.8–11.7	12.1	10.6–13.6
Length of 4th-to-last segmented anal-fin ray	16.2–18.7	18.1	17.1–20.8
Third pectoral-fin ray length	16.1–18.6	18.4	14.5–19.3
Pelvic-fin spine length	9.8–9.9	9.9	8.8–11.0
Second segmented pelvic-fin ray length	21.5–23.4	23.2	21.2–24.4
Caudal-fin length	25.7–27.5	28.2	25.2–32.3

tan; dark markings persistent on head and body scales. Dorsal, anal, and caudal fins with blackish distal margins and mid-lateral stripes.

Distribution. *Cypho zaps* has been recorded from the western Pacific Ocean at the following localities: Kawa Island, Raja Ampat Islands, Indonesia (Gill 2004); Batan, Maulis, and Sabtang islands, Batan Islands, and Luzon, Philippines (Gill 2004); Green and Orchid islands and Kenting, Taiwan (Gill 2004; Ho and Shao 2011); and Yonaguni-jima island, Yaeyama Islands, Japan (this study). Underwater photographs of *C. zaps* have been taken at West Papua and Sulawesi, Indonesia (Allen and Erdmann 2012); Orchid Island, Taiwan (Yang *et al.* 2013); Yonaguni-jima island, Japan (Gill 2004—used for color description, but unpublished; this study); Nakanougan-jima island (KPM-NR 22932), Hateru-

ma-jima island (KPM-NR 13185, 26770), and Iriomote-jima island (KPM-NR 17116) (all Yaeyama Islands, Japan); Shimoji-jima island, Miyako Islands, Japan (Senou *et al.* 2007); and Kume-jima island, Okinawa Islands, Japan (KPM-NR 38916, 38917). The collection data for the preserved specimens indicates capture depths of 0–26 m, and the underwater photographs were taken at depths of 5–35 m.

Remarks. The present specimens from Yonaguni-jima island were identified as a species of the genus *Cypho*, being clearly distinguished from other genera by the following combination of characters: dorsal-fin rays III, 22–24; anal-fin rays III, 13–15; circumpeduncular scales 14–17; vertebrae 10+16 (Gill 2004). They were subsequently identified as *C. zaps* on the basis of having a vertical dark line centrally on each body scale, but with these lines being separated

from each other and not forming continuous bars. This is a diagnostic character of the species according to Gill (2004). Most meristic and morphometric values for the present specimens lie within the ranges of those of the holotype and paratypes of *C. zaps* given by Gill (2004) (Tables 1–2). However, the Yonaguni-jima island specimens differed slightly in morphometric measurements from the type series of *C. zaps* as follows: head length 26.4–27.3% SL [vs. 23.1–27.0% SL in the latter]; snout length 6.0–6.5% SL (vs. 4.8–6.3%); fleshy interorbital width 4.1–5.2% SL (vs. 4.5–5.6%); pre-pelvic-fin length 32.0–34.3% SL (vs. 29.6–33.4%); distance from posterior tip of retroarticular bone to pelvic-fin origin 17.7–21.5% SL (vs. 17.3–20.5%); distance from pelvic-fin to anal-fin origin 21.5–25.9% SL (vs. 25.3–30.6%); distance from middle dorsal-fin ray base to anal-fin origin 27.5–29.8% SL (vs. 26.0–27.9%); second dorsal-fin spine length 3.4–4.4% SL (vs. 4.1–5.7%); length of fourth to last segmented dorsal-fin ray 16.4% SL (vs. 17.7–21.8%); and length of fourth to last segmented anal-fin ray 16.2–18.7% SL (vs. 17.1–20.8%) (Table 2). Since the SL range of the specimens examined in this study was within that of the specimens described by Gill (2004), these minor morphometric differences are regarded as intraspecific variation of *C. zaps*.

Gill (2004) provided color descriptions of both fresh and preserved mature male and preserved female specimens of *C. zaps*, but did not mention the fresh female coloration. Allen and Erdmann (2012: 323) later presented underwater photographs of mature male and female individuals, and indicated sexual coloration differences. All specimens collected from Yonaguni-jima island and those photographed underwater there and elsewhere in Japanese waters were males, the coloration of which agreed well with that of males described by Gill (2004) and illustrated by Allen and Erdmann (2012).

Although *C. zaps* has been recorded previously from the Ryukyu Islands on the basis of underwater photographs (see distribution), the northernmost record of the species based on collected specimens has been considered to be Green Island, Taiwan (ASIZT P. 57275; BMNH 1999.12.30.1). Therefore, the present three specimens collected from Yonaguni-jima island represent the first records of *C. zaps* from Japan supported by voucher specimens, and the northernmost record of the species.

New Japanese names, “Donan-megisu-zoku” and “Donan-megisu”, are herein proposed for the genus and species, respectively, on the basis of one specimen (KAUM-I. 78334). The proposed species name is a combination of “donan”, from the local name for Yonaguni-jima island, and “megisu”, the common Japanese name for members of the family Pseudochromidae.

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