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Gobiodon okinawae, a New Coral-Goby from the Ryukyu Islands, Japan

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Abstract Seventeen specimens of a new species of *Gobiodon* were collected along with eight specimens of *G. quinquestrigatus* and three specimens of *G. citrinus* from the Yaeyama Islands, southernmost islands of Okinawa Prefecture. The new fish is similar to, but different from *G. atrangulatus* and *Pseudogobiodon macrochir*, and is named here *G. okinawae*. Several characteristics of the new species are described, with special reference to the differences from *G. quinquestrigatus, G. citrinus, G. atrangulatus*, and *Pseudogobiodon macrochir*.

Several species of the genus *Gobiodon* Bleeker, 1856, have been reported from the Indo-Pacific Ocean (McCulloch and Ogilby, 1919; Koumans, 1953; Smith, 1959).

In Japan, three species of coral-gobies have been recorded from the Nan-sei Islands including the Ryukyu Islands, southern Japan (Tomiyama, 1936; Aoyagi, 1943; Matsubara, 1955). These Japanese coral-gobies are identified at present with *G. rivulatus* (Rüppell, 1828), *G. quinquestrigatus* (Cuvier et Valenciennes, 1837), and *G. micropus* Günther (1861), although the classification of these fishes should be re-examined by further investigation.

Among the collections made in 1970–1971 from the Yaeyama Islands, 17 specimens which seem to represent a new species were found along with three specimens of *G. citrinus* (Rüppell, 1835) and eight specimens of *G. quinquestrigatus*.

In the following lines, the new fish will be described, with special reference to the differences from *G. citrinus, G. quinquestrigatus,* and *G. atrangulatus* Garman (1903).

Gobiodon ***okinawae*** sp. nov.

[Kiiro-sango-haze: new Japanese name]

Diagnosis. As shown in Table 1, the present new species resembles *Pseudogobiodon macrochir* Bleeker (1875), *G. citrinus* and *G. atrangulatus*. It, however, differs from *P. macrochir* in the following points: (1) two canines* on each side of lower jaw (Fig. 2), and (2) first dorsal fin obtuse (Fig. 3). *G. okinawae* sp. nov. also differs from the other two species in (1) pectoral fin rays, 16–17, (2) two pairs of canine teeth of lower jaw, (3) muscle pattern of ventral fin base characteristic (Fig. 4), and (4) no black spot on operculum.

Material. Holotype: NSMT-P 17438 (Department of Zoology, Natural History Institute, National Science Museum), 22.5 mm in standard length, 26.6 mm in total length; collected at Kayama Island, Yaeyama Islands, Okinawa, Japan, on August 11, 1970.

Paratopotypes: Three specimens, NSMT-P 17437, 17439, 17440, in the same Department described above, 17.8–22.0 mm in standard length.

Paratypes: Thirteen specimens, NSMT-P 17441–17453, 13.1–29.9 mm in standard length; collected at Kabira, Ishigaki Island, Yaeyama Islands, Okinawa, Japan, on August 5, 1971.

Description. In the succeeding paragraphs, body proportions and counts for the holotype are followed by those of paratypes (in parentheses).

D_1. VI (VI); D_2. I, 10 (I, 10–11); A. I, 9 (I, 9–10); P. 16 (16–17); V. I, 5 (I, 5); branched

* Dr. Boeseman kindly re-examined the holotype of *P. macrochir* on our request, and confirmed absence of canines in its lower jaw.

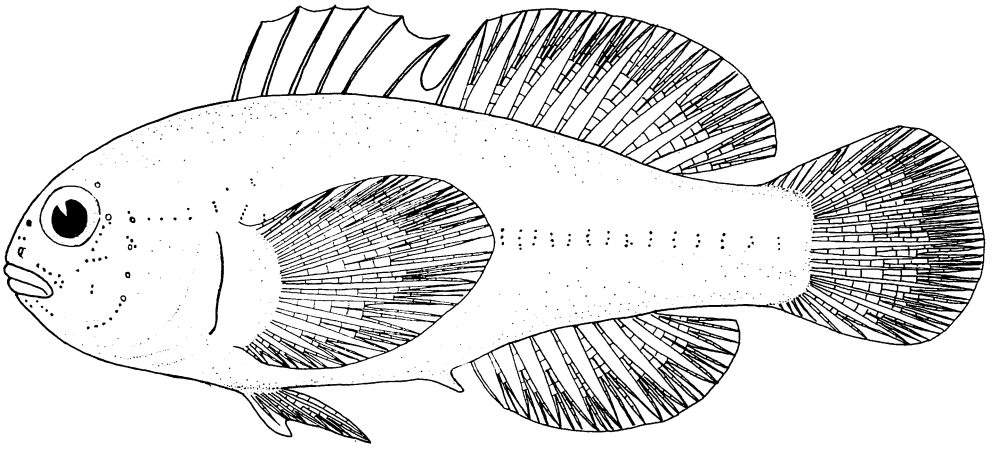

Fig. 1. *Gobiodon okinawae* sp. nov. A paratype, 26.0 mm in standard length, from Ishigaki Island.

Table 1. Comparison of several characteristics of 4 species of the genus *Gobiodon*.

		Pseudogobiodon macrochir (after Bleeker, 1875)	*Gobiodon*			
			okinawae	*atrangulatus*	*quinquestrigatus*	*citrinus*
Number of specimens		1	17	1	19	3
Total length (mm)		38.0	16.2—35.2	27.6	27.5—39.3	24.0—40.4
Standard length (mm)			13.1—29.9	23.0	23.5—33.9	18.3—33.7
First dorsal		VI	VI	VI	VI	VI
Second dorsal		I, 10 or 11	I, 10 (rarely 11)	I, 11	I, 10	I, 10–11
Anal		I, 9 or 10	I, 9 (rarely 10)	I, 9	I, 8–9	I, 9
Pectoral		16	16–17	19	18–19	18
Ventral		I, 5	I, 5	I, 5	I, 5	I, 5
Branched caudal		14	13	13	13	13
VN (hypural plate counted as one)			10+16	10+16	10+16	10+16
Pairs of canine teeth		0	2	1	1	3
Gill-opening		?	large	large	large	small
First dorsal fin		pointed	obtuse	obtuse	obtuse	pointed
Opercular spot		?	−	+	−	+
Stripes on anterior body		?	0	0	5	4
Body color in life		reddish orange	yellow	yellow	wine red	yellow or brown
% in total length	Head length	25.0	21.8—26.0	24.1	24.2—26.0	23.8—27.2
	Body depth	33.3	23.2—29.8	32.3	28.0—32.8	28.7—32.7
	Body width	11.1	8.1—12.6	9.4	10.5—13.4	9.8—12.7
	Length of maxillary		6.3— 8.4	7.5	6.0— 8.2	5.9— 7.3
	Length of snout		3.5— 5.3	5.4	3.6— 6.2	3.8— 5.1
	Diameter of orbit	8.3	5.5— 8.6	4.6	4.5— 6.3	5.8— 7.4
	Interorbital width	4.2	5.5— 8.5	5.0	5.5— 8.5	5.8— 7.1
	Depth of caudal peduncle		10.1—13.5	13.2	11.7—14.9	11.5—13.4

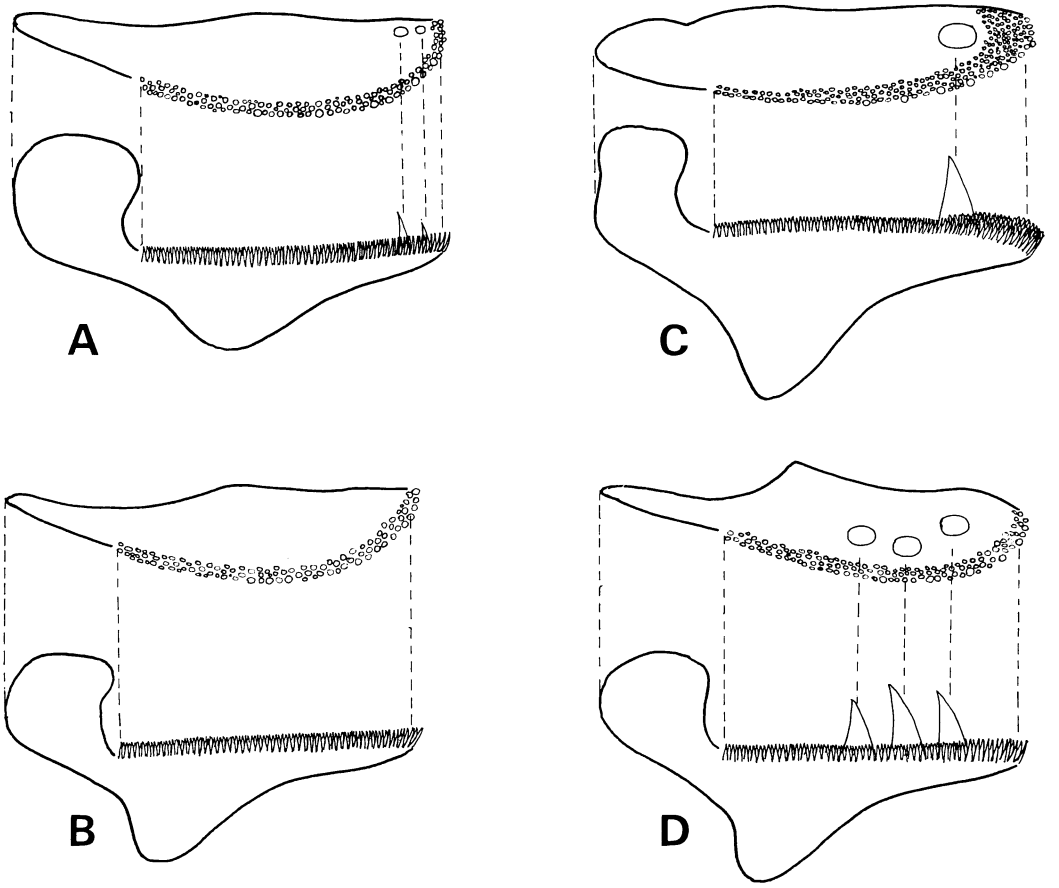

Fig. 2. Dentaries of *Gobiodon*. A and B, *G. okinawae* (A, S.L. 24.7 mm; B, S.L. 16.5 mm); C, *G. quinquestrigatus* (S.L. 25.0 mm); D, *G. citrinus* (S.L. 28.0 mm). Above, dorsal view; below, lateral view.

caudal, 13 (13). Vertebrae with hypural plate counted as one, 10+16 (10+16); branchiostegals, (5).

Measurements expressed in hundredths of standard length: body depth 33.3 (28.7–36.4), body width 13.6 (9.7–14.2), head length 28.1 (26.3–32.4), snout length 5.1 (5.1–6.3), orbit diameter 8.4 (6.8–10.1), maxillary length 7.4 (7.4–10.2), pectoral length 24.9, caudal length 22.7, and the least depth of caudal peduncle 14.4 (12.3–16.4).

Body strongly compressed, height 3.4 (3.2–4.2) in total length (Fig. 6A). Head compressed, a little more than 4 in total length, a little higher than long (Fig. 6B). Its upper profile convex, chin prominent. Orbit 3.4 (3.1–4.2) in head, interorbital width subequal to orbit (Fig. 6C). Snout very obtuse, shorter than orbit. Nostril tubular, the posterior placed just before eye. Mouth a little oblique, jaws subequal. Maxillary extending to below middle of orbit (Fig. 6D). In lower jaw teeth in rows, pointed, small, with two pairs of canines behind symphysis (Fig. 2A). In specimens smaller than 17.8 mm in standard length, canines none or difficult to see (Fig. 2B). Depth of caudal peduncle very narrow, 7 (6.1–8.1) in standard length (Fig. 6E).

Gill-opening as wide as base of pectoral, extending from the uppermost part of pectoral fin base to the lowest second ray of pectoral (Fig. 5A).

First dorsal commencing above base of pectoral, not or a little lower than second

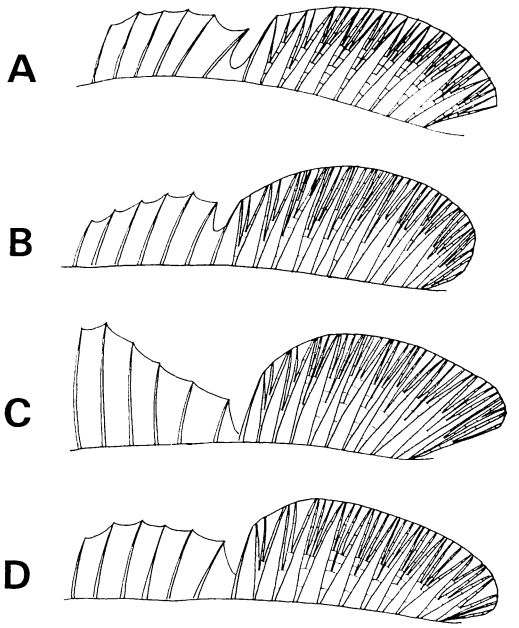

Fig. 3. Dorsal fins of *Gobiodon*. A, *G. okinawae*; B, *G. atrangulatus*; C, *G. citrinus*; D, *G. quinquestrigatus*.

dorsal; 4th spine the highest in first dorsal. The first spine of second dorsal separated from the sixth spine by a wide interspace, and united by membrane (Fig. 3A). Length of 10th soft ray of second dorsal subequal to that of spine of second dorsal. Anal commencing behind anterior origin of second dorsal. Urogenital papilla large. Pectoral rounded, a little shorter than head. Ventral small, 2 in head; cup-shaped, with a broad basal membrane, the median rays reaching from half to three-fourths of their distance from vent. As shown in Fig. 4, muscle pattern of ventral fin base intermediate type between those of *G. citrinus* and *G. atrangulatus*. Caudal rounded, a little shorter than head.

Head and body naked. Whole surface of head and body covered with thick granular mucous cells which obscure the characters beneath it. Twenty-one vertical series of minute pores which might represent lateral line arranged along median line from above gill-opening to caudal fin base. Each of plate-like units of lateral line with 3 or 4 micropores (Fig. 1).

Canal pores and pit organs on head: six large tubular pores extending around preopercular border to behind eye, two others on interorbital space and a pair between posterior nostrils. Microscopic pit organs present on lower preopercular border, beneath lower lip, above upper lip, between nostrils, behind eye, and upper opercular margin (Fig. 1).

Color in life: uniformly yellow, operculum with no spots and no stripes, no edged lines along bases of dorsal and anal fins.

Distribution. Kayama and Ishigaki Islands, the Yaeyama Islands, Okinawa Prefecture, southern Japan.

Etymology. The species name, *okinawae*, was coined to refer the locality of the new species.

Notes. Materials examined of the other species of *Gobiodon* are as follows,

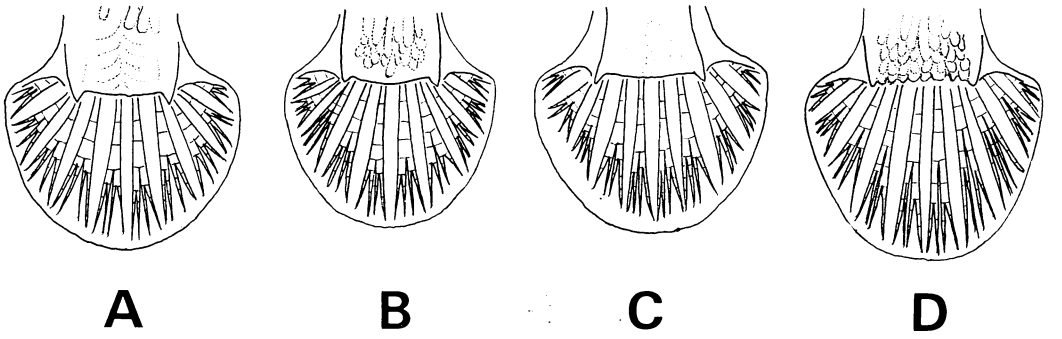

Fig. 4. Ventral fins of *Gobiodon*. A, *G. okinawae*; B, *G. atrangulatus*; C, *G. citrinus*; D, *G. quinquestrigatus*.

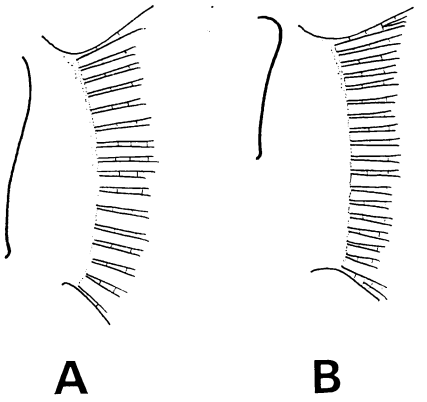

Fig. 5. Gill-opening (bold line) of *G. okinawae* (A), and *G. citrinus* (B).

G. citrinus: Two specimens, NSMT-P 17473, 17474, 28.0–33.7 mm in standard length, Kayama Island, on August, 1971. One specimen, NSMT-P 17475, 18.3 mm in standard length, Kabira, Ishigaki Island, on November, 1971.

G. quinquestrigatus: Eleven specimens, NSMT-P 17454-17464, 24.6–33.9 mm in standard length, Yadon, Amami-oshima, on August 9–15, 1971. Four specimens, NSMT-P 17469–17472, 23.5–29.9 mm in standard length, Kayama Island, on August, 1971.

G. atrangulatus: One specimen, NSMT-P 10813, 23.0 mm in standard length, Ogasawara Islands, on July 5, 1969.

Acknowledgments

The authors wish to express their gratitudes to Dr. M. Boeseman of Leiden Museum for his kindness in examining and sending a photocopy of the unpublished drawing by Bleeker of the holotype of *Pseudogobiodon*

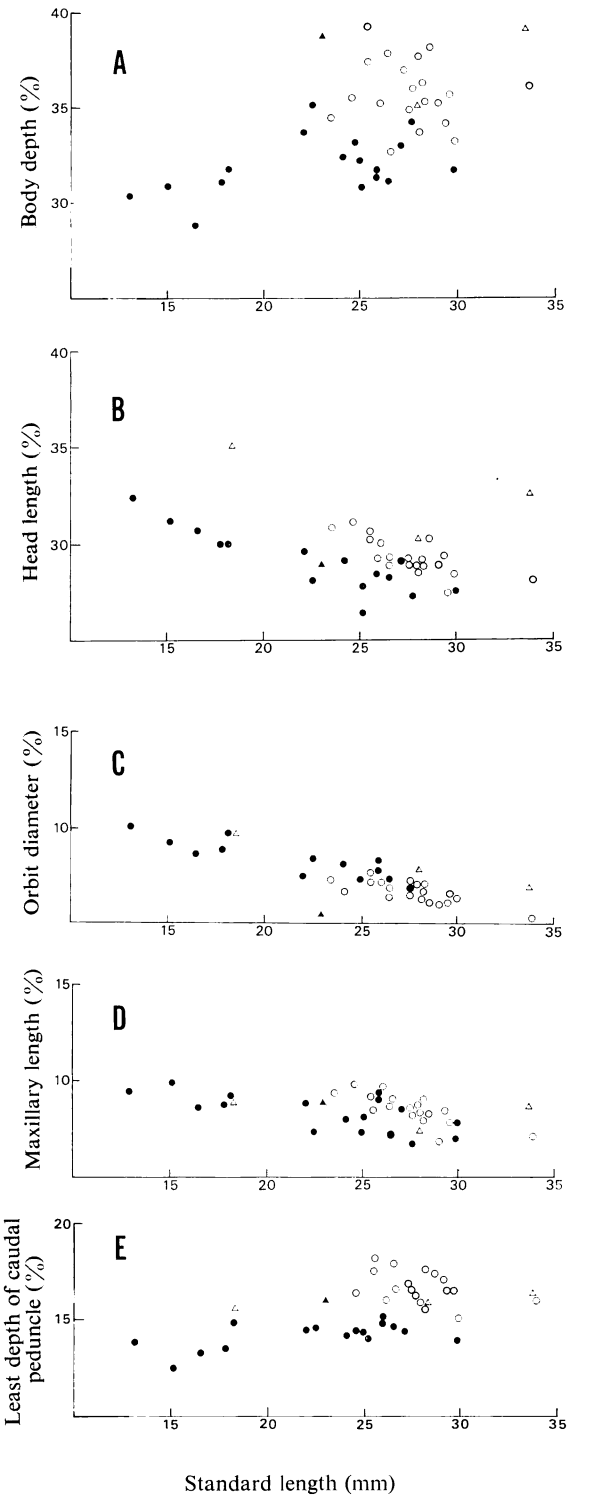

Fig. 6. Relative size of body depth (A), head length (B), orbit diameter (C), maxillary length (D), and the least depth of caudal peduncle (E) of four species of *Gobiodon*: *G. okinawae* (●), *G. quinquestrigatus* (○), *G. atrangulatus* (▲), and *G. citrinus* (△). Ordinate, proportional length in percent of standard length; abscissa, standard length in mm.

macrochir Bleeker. They are also indebted to Prof. Yoshiro Hashimoto of Laboratory of Marine Biochemistry, Faculty of Agriculture, Tokyo University, Dr. Hitoshi Ida, University Museum, Tokyo University and Dr. Minoru Imajima, Department of Zoology, National Science Museum, for offering materials.

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八重山群島より採集されたコバンハゼ属の一新種，*Gobiodon okinawae* について

澤田 幸雄・新井 良一・阿部 宗明

コバンハゼ類は南海のサンゴ礁に普通に見られる側偏した楕円形の小型のハゼであるが，本類の分類は学者によりまちまちで必らずしも明確とはいえない．

このたび，八重山諸島より採集した標本のなかに，3尾の *Gobiodon citrinus*, 8尾の *G. quinquestrigatus* と共に17尾の新種と考えられるコバンハゼが見いだされた．本種を *G. okinawae* として記載し，和名としてキイロサンゴハゼを提唱する．本種の特徴を *G. citrinus, G. quinquestrigatus, G. atrangulatus* および *Pseudogobiodon macrochir* と比較して報告した．

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