

Two new cardinalfish (Apogonidae: genus *Apogon*) from the Indo-West Pacific

Masayoshi HAYASHI*

インド-西部太平洋産のテンジクダイ科魚類の2新種

林 公 義*

静岡県伊東および和歌山県宇久井地先の水深40~60mとインド洋のチャゴス諸島で採集されたテンジクダイ科 (Apogonidae) 魚類の1種と、台湾南部沿岸および沖縄県伊江島沖で採集された同科魚類の1種について分類学的な比較検討をした結果、両種はテンジクダイ属 (*Apogon*) に帰属する新種であることが判ったので種の記載をした。前種には *Apogon fukuii*, 後種には *Apogon cheni* と命名した。両新種は体側背方に黒色の2条の縦線があり、尾柄部後方に黒色の1円斑がある点で類似している。*A. fukuii* は、また同属のネンブツダイ *A. semilineatus* と外部形態や体側の模様がきわめて類似するが、背鰭前部鱗数が5~6 (vs. 4) であること、第1鰓弓の鰓耙数が19~20 (vs. 24) であること、体側中央の黒色縦線は尾柄部の円斑に達すること、尾柄部円斑が眼径大であること、第1背鰭の鰭膜上方に黒色斑がないことなどの形質により区別できる。*A. cheni* は *A. fukuii* と混同されていたが、体高が高いこと (体高/体長比は *cheni* が37.6~39.4%, *fukuii* が31.9~35.7%), 体側背方の2縦線が細いこと、体側中央の黒色縦線は尾柄部の円斑に達しないこと、尾柄部円斑が瞳孔径大であること、第1背鰭前基部と胸鰭基部の中間位置に黒色小円斑があること、第1鰓弓の鰓耙数が21~23 (vs. 19~20) であることなどの形質により、*A. fukuii* と区別できる。沖縄県伊江島沖の *A. cheni* は水深100mから採集され、テンジクダイ属のなかでは深場に生息する。*A. fukuii* には和名フタスジシモチを採用し、*A. cheni* には新和名ムナホシシモチを提唱する。

Introduction

The perciform family Apogonidae or cardinalfishes contains nearly 200 species belonging to 26 genera from the Indo-West Pacific (FRASER, 1972; NELSON, 1984). Most members are found on or in the vicinity of coral reefs and rocky reefs. Approximately 73 species of the family Apogonidae (subfamily Apogoninae) occur in the coastal waters of Japan (HAYASHI in MASUDA *et al.*, 1984). Two new species of dark-striped cardinalfish of the genus *Apogon* LACÉPÈDE are described in the

present paper based on specimens from southern Japan and Taiwan. I followed the classification of HAYASHI and KISHIMOTO (1983) and also prepared a new key to all known species of the dark-striped cardinalfish in Japan.

Type specimens are deposited at the Museum of the Institute of Zoology, Academia Sinica, Taipei (ASIZ); Institute of Oceanic Research and Development, Tokai University, Shimizu (IORD); Department of Zoology, National Science Museum, Tokyo (NSMT); Royal Ontario Museum, Toronto (ROM); and Yokosuka City

* 横須賀市自然博物館 Yokosuka City Museum, Yokosuka 238.

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Museum (YCM).

Methods

Length given for specimens are standard length (SL), measured from the front of the upper lip to the base of caudal fin (posterior end of hypural plate); body depth is the maximum depth from the base of the dorsal spines; body width is measured just posterior to the gill opening; head length (HL) is taken from the front of upper lip to the end of the opercular membrane, and snout length from the same anterior point to the fleshy edge of the orbit; orbit diameter is the greatest fleshy diameter, and interorbital width the least bony width; caudal peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal fin base; lengths of fin spines and soft rays are measured to their extreme bases; caudal concavity is the horizontal distance between verticals at the tips of the shortest and longest caudal fin rays.

Pectoral ray counts include the upper rudimentary ray (showed i+); lateral-line scale counts are made to the base of the caudal fin (hence do not include the three pored scales posterior to the hypural plate); gill-raker counts are made on the first gill arch and include all rudiments; the count of the upper-limb rakers is given first, followed by the lower-limb count; the raker at the angle is contained in the lower-limb count (showed upper+lower-limb counts). The term developed raker refers to one which is higher than its base.

Proportional measurements of type specimens are given in Tables 1 and 2 as percentages of standard length. Body and fin proportions contained in the text are step-in measurements rounded to the nearest 0.05. In the following descriptions the range of counts and proportions for paratypes are indicated in parentheses if different from the holotype.

Soft X-ray photo was used to examine for internal body characters.

Apogon fukuui, sp. nov.

(Japanese name: Futasuji-ishimochi)

(Figs. 1, 2a, 4a; Table 1)

Apogon sp. 1.: HAYASHI in MASUDA *et al.*, 1984: 142, pl. 130, fig. M (Izu Peninsula, Shizuoka Pref.: Ugui, Wakayama Pref.

Apogon sp. 1.: WINTERBOTTOM *et al.*, 1987: 30, fig. 168 (off Peros Banhos, Chagos Islands).

Holotype. YCM-P9539, ♀, 91.3 mm SL, coastal water off Ugui, Wakayama Pref., rocky reef, 40 m, hook-and-line of scorpionfish, collected by S. FUKUI on 11 July 1981.

Paratype. YCM-P6504, 93.4 mm SL, beach at Kii-nagashima, Wakayama Pref., from collection into wash-ashore, A. OSATO, 1 April 1979; YCM-P25102, 78.6 mm SL, Futo Beach, Izu Ocean Park, Shizuoka Pref., near shelf of rocky reef, 45 m, quinaldine and hand net, A. ONO, 5 Nov. 1983; NSMT-P34103, 68.7 mm SL; ROM60703, 32.8 mm SL; IORD83-446, 32.5 mm SL; YCM-P25103, 25.0 mm SL—all with same data as YCM-P25102.

Experimental materials. ROM44344, 49.8 mm SL; Chagos Islands, drop-off at Peros Banhos, 40–43 m, rotenone, R. WINTERBOTTOM and A. R. EMERY, 1 April. 1979.

Diagnosis. Dorsal rays VII-I, 9; anal rays II, 8; pectoral rays 13; lateral-line scales 25; predorsal scales 5 (rarely 6); gill rakers 19–20; preopercular ridge entire; edge of preopercle serrated; body depth 2.8–3.1 in SL; a clear black spot as large as eye diameter (scarcely small) centered on caudal fin base; two dusky and narrow stripes (mainly reddish-brown to metallic brown in life), one dorsolateral and the other midlateral; body reddish-scarlet in all, all fins deep pinkish.

Description. Dorsal rays VII-I, 9, all rays branched, the last to base; pectoral rays i+12=13, rudimentary upper and lower two unbranched; pelvic rays I, 5, all rays branched; principal caudal rays 9+8=17, the upper and lower rays unbranched; upper and lower procurent caudal rays 7–8, the most posterior segmented; lateral-

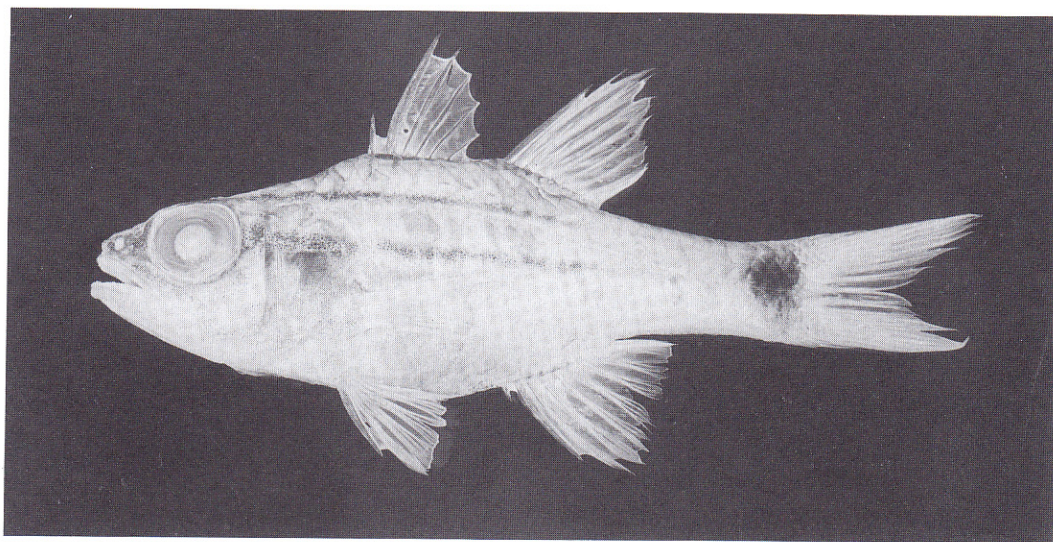


Fig. 1 Holotype of *Apogon fukuii*. YCM-P9539, 91.3mm SL, Ugui, Wakayama Pref., Japan.

line scales 25, plus 3 elongate terminal lateral-line scales posterior to hypural plate; scales above lateral-line to origin of dorsal fin $2\frac{1}{2}$; scales below lateral-line to origin of anal fin $6\frac{1}{2}$ or 7; median predorsal scales 5 (rarely 6), the fifth or sixth scale only notched posteriorly at origin of the first dorsal fin; circumpeduncular scales 12; gill rakers $4-5+15=19-20$ (2 or 3 upper and 12 or 13 lower rakers well developed); branchiostegial rays 7; predorsal bones 3; vertebrae $10+14$.

Body depth 2.9 (2.8–3.1) in SL; body width 2.1 (2.0–2.3) in body depth; head length 2.8 (2.5–2.7) in SL; dorsal profile of head slightly depressed except for rounded front of snout; snout length 3.7 (3.5–4.6) in HL; orbit diameter 2.7 (2.9–3.2) in HL; interorbital space flat, the least width 5.8 (4.9–6.4) in HL; caudal peduncle depth 2.6 (2.7–3.1) in HL; caudal peduncle length 2.1 (2.0–2.5) in HL.

Mouth large, the maxilla reaching a vertical at center of pupil, the upper jaw length 2.0 (2.0–2.1) in HL; mouth oblique, the gape forming of maxilla arched, posterior edge of maxilla slightly concave; supramaxilla absent; lower jaw tip slightly protruding, the tip thickened and fitting into a median indentation in upper jaw, narrowing to two or three rows toward front of jaw, the

teeth of outer row thickset, conical; few irregular rows of small teeth in lower jaw, those of outer row slender, conical and recurved; an irregular row of small teeth on vomer and palatines. Tongue broad-based, becoming slender distally with pointed tip.

Anterior nostril a small, short, membranous tube directly in front of center of eye about two third distance from edge of eye to front of upper lip; posterior nostril ovate without a rim, more than twice as large as anterior nostril. Largest pores of lateralis system of head as follows: one dorsally at edge of eye, one below nostrils, one in front of anterior nostril, two at lower edge of preorbital, and one at tip of mandible.

A single and obtuse opercular spine flattened. Preopercular margin weakly serrate (59 serrae on left side of holotype and 55–56 on few paratypes); preopercular ridge smooth; fleshy preopercular flap present and thin.

Scales ctenoid, portion of basal groove weakly; spines on network ridge of central lateral-line scales well developed. Lateral-line obviously, nearly paralleling dorsal contour of body, and ending a short distant posterior to caudal fin base (three pored scales posterior to hypural plate, the last elongated). No scales on dorsal and anal fins

Table 1 Counts and measurements (% of SL) of *Apogon fukuui* n. sp.

Specimens	HOLOTYPE	PARATYPE	PARATYPE	PARATYPE	PARATYPE	PARATYPE	
Characters	YCM-P 09539	YCM-P 06504	YCM-P 25102	NSMT-P 34103	IORD 83-446	ROM 60703	ROM 44344
Dorsal fin	VII-I, 9	VII-I, 9	VII-I, 9	VII-I, 9	VII-I, 9	VII-I, 9	VII-I, 9
Anal fin	II, 8	II, 8	II, 8	II, 8	II, 8	II, 8	10*
Pectoral fin (left)	i+12	i+12	i+12	i+12	i+12	i+12	i+12
Pelvic fin	1, 5	1, 5	1, 5	1, 5	1, 5	1, 5	1, 5
Branched caudal fin rays	8+7	8+7	8+7	8+7	8+7	8+7	8+7
Lateral-line scales	25	25	25	25	25	25	25
Scales above and below lateral-line	2/7	2/7	2/7	2/7	2/6	2/6	2/7
Predorsal scales	5	LOST	6	6	5	5	LOST
Gill raker	5+15	5+15	5+15	5+15	4+15	4+15	5+15
Vertebrae	10+14	10+14	10+14	10+14	10+14	10+14	10+14
Predorsal bone	3	3	3	3	3	3	3
Standard length (mm in SL)	91.3	93.4	78.6	68.7	32.5	32.8	49.8
Body depth	33.9	31.9	35.0	35.7	33.2	35.7	29.7
Body width	16.4	15.2	17.8	17.9	16.0	15.2	17.3
Head length	36.1	36.8	38.2	37.6	40.6	40.2	38.2
Snout length	9.7	10.6	9.0	9.3	8.9	9.5	9.8
Orbit diameter	13.6	12.6	12.0	11.6	13.5	14.0	12.2
Interorbital width	6.2	5.8	6.7	6.8	8.0	8.2	5.8
Upper jaw length	18.4	18.1	18.7	18.3	19.4	19.2	19.2
Caudal peduncle depth	13.7	11.9	12.8	13.8	13.2	14.3	11.8
Caudal peduncle length	17.0	18.5	19.1	18.5	20.0	16.2	24.7
Predorsal length	41.5	42.7	40.5	43.1	43.7	42.7	38.0
Preanal length	59.8	58.9	60.8	59.5	57.2	57.6	58.0
Prepelvic length	38.9	38.2	38.7	39.0	35.7	35.9	37.6
Length of 1st dorsal spine	1.8	2.1	1.8	1.8	1.8	1.8	1.8
Length of 2nd dorsal spine	6.7	7.6	7.5	9.3	9.8	9.1	6.6
Length of 3rd dorsal spine	20.2	19.4	21.8	20.4	21.2	20.1	17.5
Length of spine of 2nd dorsal fin	17.4	16.7	18.9	18.2	17.8	17.7	16.3
Length of longest dorsal ray	25.3	24.5	27.7	27.2	26.8	27.1	26.3
Length of 1st anal spine	3.1	3.9	4.8	4.1	3.1	3.4	LOST
Length of 2nd anal spine	14.2	13.5	14.9	15.4	14.8	15.5	LOST
Length of longest anal ray	20.8	20.0	24.0	24.3	23.4	23.8	22.5
Caudal fin length	30.7	26.0	31.0	35.4	36.9	36.9	28.7
Caudal concavity	19.4	18.5	20.0	22.3	23.4	20.4	20.7
Pectoral fin length	22.9	23.8	25.1	26.1	24.3	23.2	24.3
Pelvic spine length	14.2	14.2	15.9	14.3	13.8	15.2	14.5
Pelvic fin length	19.5	20.6	21.9	21.3	21.2	22.3	21.7
Length of caudal spot	8.8	8.7	9.9	10.6	9.8	9.8	10.4

* No anal spine is unusual and indicate to the aberrant specimen.

except a low sheath at base of second dorsal and anal fins; small scales basally on caudal fin extending less than one-third to posterior margin; no scales on pelvic fins except a midventral scaly process at base of pelvic fin more than half length of pelvic spine.

Origin of first and second dorsal spine above third lateral-line scale; first dorsal spine strong and shortest, about one-fourth length of second dorsal spine, 20.6 (17.2–22.0) in HL; third dorsal spine longest, 1.8 (1.8–2.0) in HL; first dorsal soft ray longest, 1.4 (1.4–1.5) in HL; origin of anal fin

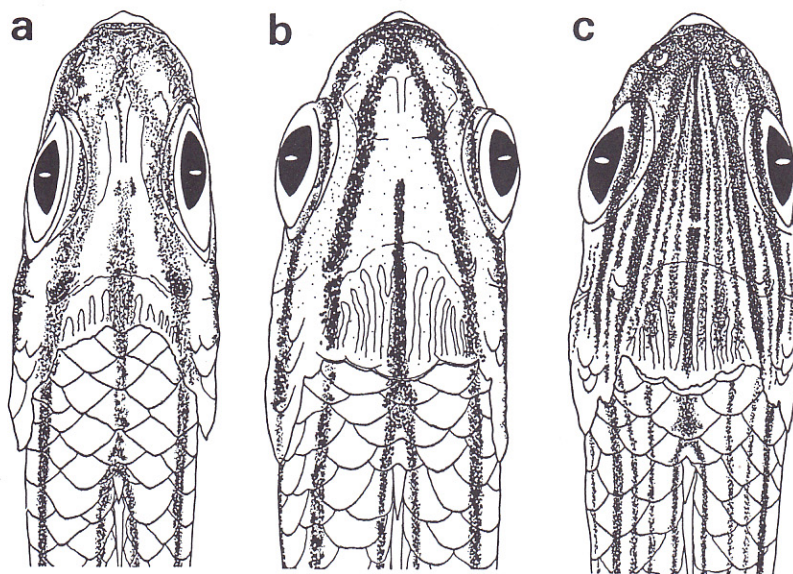


Fig. 2 Dorsal view of a fork stripe and other stripes in front of the first dorsal in three dark-striped *Apogon* species.

a: *A. fukuui* n. sp. b: *A. doederleini* c: *A. endekataenia*.

below base of second dorsal soft ray; first anal spine shortest, 11.8 (7.9–13.2) in HL; second anal spine 2.5 (2.4–2.8) in HL; first anal soft ray longest, 1.7 (1.5–1.8) in HL; caudal fin forked, 1.2 (1.1–1.4) in HL; caudal concavity 1.9 (1.7–2.0) in HL; origin of pelvic fins slightly anterior to pectoral fin base; first pelvic soft ray longest, reaching anus, its length 1.9 (1.7–1.9) in HL.

Color of holotype in alcohol. Body wholly pale with a round dark-brown or black spot nearly two-third of orbit covering the hypural region of caudal peduncle; a first blackish stripe from upper portion of anterior nostril through upper orbital margin, and passing dorsolaterally on body, and fainter posteriorly; a second blackish stripe from front and base of upper lip across snout (where narrow) through eye and across postorbital head (where upper part of operculum), and passing midlaterally on body, and fainter posteriorly (where in front of black spot of caudal fin base); a blackish fork stripe with melanophores from snout to first dorsal fin base (Fig. 2a); all fins pale.

Color of holotype in life. Body translucent

pale pinkish; head with light brilliant blue-green, especially from snout to anterior part of first dorsal fin base, and around opercles; snout to upper and lower border of iris silvery white; a large round spot on the hypural region clearly black; a midlateral and a dorsolateral dark stripe metallic brown, suffused with blackish on head; back along base of dorsal fins brownish; fins translucent light red, especially caudal fin more redish.

Distribution and habitat. This species distribute in the Izu and Kii Peninsulas, the middle coast of Pacific Ocean side in Japan and central Indian Ocean (see comparison); specimens were collected from the depth of 40–60 m where are open waters with rocky and coral reef; this species is known at a depth of 35 m in the Izu Ocean Park, Izu Peninsula by underwater photographs of Mr. A. ONO.

Etymology. This species is named in honor of Mr. Syojiro FUKUI who is a collector of the holotype of this species.

Comparison. I (HAYASHI in MASUDA *et al.* 1984) proposed the Japanese common name Futasuji-

ishimochi as undescribed species of *Apogon* sp. 1 from Japan. SHAO and CHEN (1986; p. 96, fig. 42) described *Apogon* sp. 2 as unrecorded species from Taiwan. SHAO and CHEN indicated that their species is similar to *Apogon* sp. 1 with a minor difference in their horizontal stripes. But I have been negative in their opinion. As the result of comparison, these species of both papers made a clear difference (see remarks of *cheni* in this paper). Also WINTERBOTTON *et al.* (1987; p. 30, fig. 168) described the *Apogon* sp. 1 from central Indian Ocean as a similar species to *Apogon* sp. 1 (now in *fukuii*) of HAYASHI in MASUDA *et al.* (1984). As the results of comparison between *Apogon* sp. 1 (ROM44344) and *fukuii* (specimens of the holotype and five paratypes), there are a few difference in their counts and characters as follows: body depth in SL (3.4 vs. 2.8–3.1 in *fukuii*); interorbital width in HL (6.6 vs. 4.9–6.4); caudal peduncle length in HL (1.5 vs. 2.7–3.1); length of third dorsal spine in HL (2.2 vs. 1.8–2.0); width of caudal spot in HL (3.6 vs. 3.8–4.3); serrae on preopercle margin (48 vs. 55–59); small sharp teeth in few irregular rows on side of upper jaw, conical and recurved; two irregular rows of small sharp teeth in lower jaw, those of outer row slender, conical and recurved, the longest at midside of jaw. I take into consideration with above difference, I disagree as the type-specimen of *fukuii* about a specimen of ROM44344.

fukuii falls within a large complex of striped species having the first dorsal fin of VII spines, many of which also have a black spot at the caudal-base (Fig. 4a–c). On the basis of color it seems closest to *semilineatus* TEMMINCK *et* SCHLEGEL, *doederleini* JORDAN *et* SNYDER and *endekataenia* BLEEKER. These species have a black caudal spot with a faint pale margin likely *fukuii*, and have similar dark horizontal stripes on body. However, they have four stripes in *doederleini* and six stripes in *endekataenia* (HAYASHI and KISHIMOTO, 1983; p. 30, fig. 1). A fork stripe pattern and numbers on head (from snout to the first dorsal base) also differ in each three species (Fig. 2a). A

black spot at the caudal-base of *fukuii* is rather bigger than *doederleini* or *endekataenia*. *A. semilineatus* has two narrow stripes on body and a small black caudal spot most similar to *fukuii*, but it also differs in having 5 instead of 4 predorsal scales and $6+18=24$ gill rakers (compared to $5+14-15=19-20$ for *fukuii*).

Remarks. By the personal communication of A. ONO, *doederleini* lives in shallow water than the depth of 35 m in Izu Ocean Park, but *fukuii* lives in more deep water (usually at depth of 36–60 m) than *doederleini*.

Apogon cheni, sp. nov.

(New Japanese name: Munahosi-ishimochi)

(Figs. 3, 4b; Table 2)

Apogon sp. 2.: SHAO and CHEN, 1986: 96, fig. 42 (Hou-bi-hu 後壁湖 and Hsiao-liu-chiu 小琉球, Kaoshiung, Taiwan).

Holotype. YCM-P25101, ♀, 111.4 mm SL, off north of Iejima Island, Okinawa Pref., coral reef, about 70–100 m, bait-trap of the deep-sea crab, collected by M. TODA on 23 Dec. 1981.

Paratype. ASIZP 055988-1, 113.7 mm SL; ASIZP 055988-2, 110.2 mm SL, Hsiao-liu-chiu, Kaohsiung, Taiwan, coral reef, hand net by SCUBA, K. T. SHAO, 20 July 1986; ASIZP 055978, 130.2 mm SL, Hou-bi-hu, Kaohsiung, Taiwan, coral reef, hand net by SCUBA, K. T. SHAO, 12 Sept. 1985.

Diagnosis. Dorsal rays VII-I, 9; anal rays II, 8; pectoral rays 13; lateral-line scales 25; predorsal scales 5; gill rakers 21–23; preopercular ridge entire; edge of preopercle weakly serrated; body depth 2.5–2.6 in SL; a clear black spot as large as pupil or slightly larger centered on caudal fin base; two dusky and narrow brown stripes (mainly reddish-brown in life), one dorsolateral and the other midlateral; a small black spot between the second dorsal spine and the pectoral fin base; upper part of the first dorsal blackish; body reddish-scarlet in all, all fins reddish.

Description. Dorsal rays VII-I, 9 (rarely VII-I,

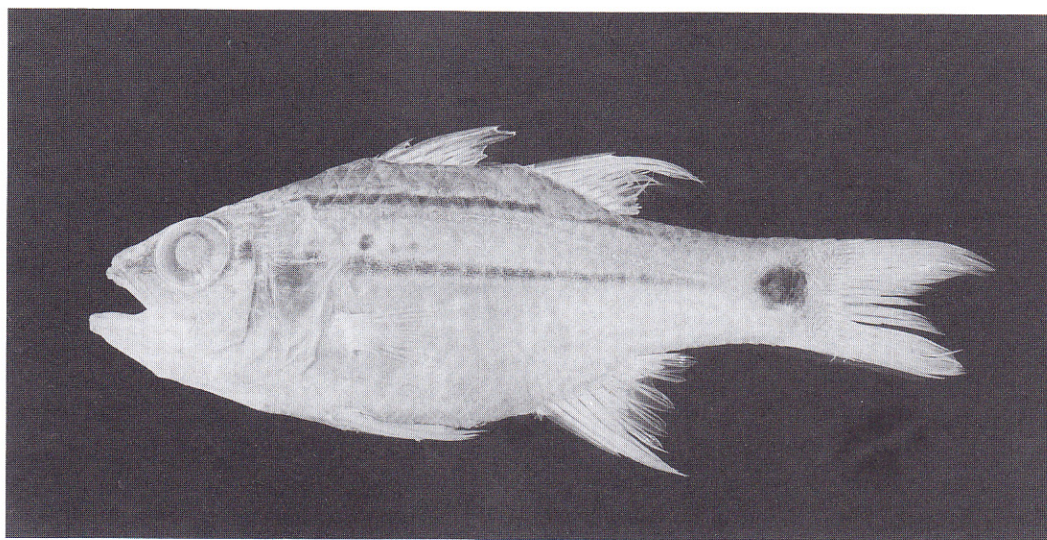


Fig. 3 Holotype of *Apogon cheni*. YCM-P25101, 111.4mm SL, off Iejima Is., Okinawa Pref., Japan.

8), all rays branched, the last to base; pectoral rays $i+12=13$, rudimentary upper and lower two unbranched; pelvic rays I, 5, all rays branched; principal caudal rays $9+8=17$, the upper and lower rays unbranched; upper and lower procurrent caudal rays 8–9, the most posterior segmented; lateral-line scales 25, plus 3 elongate terminal lateral-line scales posterior to hypural plate; scales above lateral-line to origin of dorsal fin $2\frac{1}{2}$; scales below lateral-line to origin of anal fin $6\frac{1}{2}$ or 7 (usually 7); median predorsal scales 5, the fifth scale deeply notched posteriorly at origin of the first dorsal fin; circumpeduncular scales 12; gill rakers $5-7+16-17=21-23$ (4 upper and 15 or 16 lower rakers developed); branchiostegal rays 7; predorsal bones 3; vertebrae $10+14$.

Body depth 2.6 (2.5–2.6) in SL; body width 2.2 (2.2–2.4) in body depth; head length 2.7 (2.5–2.6) in SL; dorsal profile of head straight except for rounded front of snout; snout length 3.9 (4.6–5.0) in HL; orbit diameter 3.3 (3.2–3.3) in HL; interorbital space flat, the least width 4.9 (5.4–5.7) in HL; caudal peduncle depth 2.4 (2.4–2.7) in HL; caudal peduncle length 2.5 (2.4–2.5) in HL.

Mouth large, the maxilla reaching posterior

end of two-third of pupil, the upper jaw length 2.0 (2.1) in HL; mouth oblique, the gape forming of maxilla arched, posterior edge of maxilla straight; no supramaxilla present; lower jaw tip slightly projecting, the tip thickened and fitting into a median indentation in upper jaw; a wide band of small villiform teeth in few irregular rows on side of upper jaw, narrowing to two rows toward front of jaw, the teeth of outer row slender, conical, and slightly recurved; few irregular rows of small teeth in lower jaw, those of outer row slender, conical and recurved; an irregular row of small teeth on vomer and palatines. Tongue broad-based, becoming slender distally with pointed tip.

Anterior nostril a small, short, membranous tube directly in front of center of eye about two third distance from edge of eye to front of upper lip; posterior nostril ovate without a rim, more than twice as large as anterior nostril. Largest pores of lateralis system of head as follows: one dorsally at edge of eye, one below nostrils, one in front of anterior nostril, two at lower edge of preorbital, and one at tip of mandible.

Operculum with one flat and obtuse spine. Preopercular margin weakly serrate (77 serrae on left side of holotype and 82 on paratype);

Table 2 Counts and measurements (% of SL) of *Apogon cheni* n. sp.

Characters	Specimens HOLOTYPE YCM-P 25101	PARATYPE ASIZP 055978	PARATYPE ASIZP 055988-2	PARATYPE ASIZP 055988-1
Dorsal fin	VII-I, 9	VII-I, 9	VII-I, 8	VII-I, 9
Anal fin	II, 8	II, 8	II, 8	II, 8
Pectoral fin (left)	i+12	i+12	i+12	i+12
Pelvic fin	I, 5	I, 5	I, 5	I, 5
Branched caudal fin rays	8+7	9+8	8+7	9+8
Lateral-line scales	25	25	25	25
Scales above and below lateral-line	2/6	2/7	2/7	2/7
Predorsal scales	5	5	5	5
Gill raker	6+17	6+16	5+16	7+16
Vertebrae	10+14	10+14	10+14	10+14
Predorsal bone	3	3	3	3
Standard length (mm in SL)	111.4	130.2	110.2	113.7
Body depth	38.6	38.1	37.6	39.4
Body width	17.6	16.3	16.9	16.7
Head length	37.7	38.5	38.7	39.4
Snout length	9.7	8.3	7.7	8.5
Orbit diameter	11.6	11.9	12.2	11.9
Interorbital width	7.6	7.1	6.8	7.2
Upper jaw length	19.0	18.7	18.4	18.7
Caudal peduncle depth	15.4	16.2	15.6	14.8
Caudal peduncle length	15.2	15.6	16.1	15.7
Predorsal length	41.7	36.3	36.0	37.5
Preal length	63.4	62.4	57.6	61.9
Prepelvic length	40.6	33.3	34.5	34.4
Length of 1st dorsal spine	1.3	2.4	2.3	2.2
Length of 2nd dorsal spine	6.4	8.6	7.8	6.2
Length of 3rd dorsal spine	17.8	21.4	18.9	19.9
Length of spine of 2nd dorsal fin	14.2	18.2	17.2	16.9
Length of longest dorsal ray	25.4	33.5	25.8	29.7
Length of 1st anal spine	2.0	2.2	2.5	2.8
Length of 2nd anal spine	13.5	13.1	15.1	14.1
Length of longest anal ray	21.6	28.1	BROKEN	25.8
Caudal fin length	32.0	37.5	BROKEN	37.9
Caudal concavity	21.3	12.6	18.9	15.3
Pectoral fin length	25.0	31.8	26.9	29.7
Pelvic spine length	14.6	13.7	14.9	14.9
Pelvic fin length	21.6	26.9	24.0	24.3
Length of caudal spot	8.5	8.5	7.9	8.0

preopercular ridge smooth; fleshy preopercular flap present.

Scales ctenoid. Lateral line obviously, nearly paralleling dorsal contour of body, and ending a short distant posterior to caudal fin base (three pored scales posterior to hypural plate, the last pointed). No scales on dorsal and anal fins except a low sheath at base of second dorsal and anal fins; small scales basally on caudal fin extending

more than one-third to posterior margin; no scales on pelvic fins except a midventral scaly process at base of pelvic fins more than one-third length of pelvic spine.

Origin of first and second dorsal spine above fourth lateral-line scale; first dorsal spine shortest, one-fifth length of second dorsal spine, 19.1 (16.0–17.9) in HL; third dorsal spine longest, 2.1 (1.8–2.1) in HL; first dorsal soft ray longest, 1.5

(1.1–1.5) in HL; origin of anal fin below base of second dorsal soft ray; first anal spine shortest, 19.0 (14.0–17.5) in HL; second anal spine 2.8 (2.6–2.9) in HL; first anal soft ray longest, 1.6 (1.4–1.5) in HL; caudal fin forked, 1.2 (1.0) in HL; caudal concavity 1.8 (2.1–3.1) in HL; origin of pelvic fins slightly anterior to pectoral fin base; first pelvic soft ray longest, reaching anus or over, its length 1.7 (1.4–1.6) in HL.

Color of holotype in alcohol. Body pale with a round dark-brown or blackish spot nearly as large as orbit covering the hypural region of caudal peduncle; a first blackish stripe from upper portion of anterior nostril through upper orbital margin, and passing dorsolaterally on body, and fainter posteriorly; a second blackish stripe from front and base of upper lip across snout through eye and across postorbital head (where upper part of operculum), and passing midlaterally on body, and fainter posteriorly (where in end of second dorsal and anal fin base); a blackish fork stripe with melanophores from snout to first dorsal fin base; a small black spot between the second dorsal spine and upper part of the pectoral fin base, just posterior portion of the operculer spine; upper margin of the first dorsal blackish (where the dorsal membrane among the third and sixth dorsal spine); other all fins pale.

Color of holotype in fresh. Body translucent pale pinkish, becoming silvery on lower half of head and silvery white ventrally on thorax and abdomen; a large round spot on the hypural region fainted black, a small brownish spot above the pectoral fin base more fainted; a midlateral and a dorsolateral dark stripe metallic brown, suffused with blackish on head; back along base of dorsal fins brownish; fins translucent light red, especially lobes of caudal fin more blackish.

Distribution and habitat. This species distribute only in southern part of Taiwan and northern part of Okinawa, Ryukyu Islands in Japan; specimens were collected from the depth of 70–100 m, and a holotype in Okinawa was collected from more deep water than Taiwan; localities are mainly coral reef, but detailed

informations on the environment are uncertain.

Etymology. This species is named in honor of Mr. Jen-Ping CHEN, Scholar of the Institute of Zoology of Academia Sinica, in recognition of his studies on the Apogonidae of Taiwan. He and Dr. K. T. SHAO loaned specimens.

Remarks. In the past, SHAO and CHEN (1986; p. 96, fig. 42) described *Apogon* sp. 2 (now in *cheni*) as unrecorded species from Taiwan. They indicated that *Apogon* sp. 2 is similar to *Apogon* sp. 1 (HAYASHI in MASUDA *et al.*, 1984; now in *fukuui*) with a minor difference in their horizontal stripes. These two species are really similar, but *cheni* is distinguished from *fukuui* in having following characters: a brownish small spot on just posterior part of the operculer spine and dark margin of the first dorsal membrane (both not for *fukuui*); a black spot on the caudal peduncle about the size of pupil (equal to eye diameter for *fukuui*); $5-7+16=21-23$ gill rakers (compared to $5+14-15=19-20$ for *fukuui*); body depth 2.5–2.6 in SL (2.8–3.4 in SL for *fukuui*).

Key to species of the dark-striped *Apogon* in Japan

- 1a. Body with two to six dark longitudinal stripes on each side and no fork stripe along dorsal fin base; caudal spot present or absent; dorsal spine VIII (VII-I, 9); anal fin II, 8 or 9, usually 8.....2
- 1b. Body with two to six dark longitudinal stripes on each side and a fork stripe along dorsal fin base; caudal spot present; dorsal spines VII (VI-I, 9); anal fin II, 9; body deep, strongly compressed; sixth stripe faded; three reddish brown stripes extend from snout tip across eye to middle of caudal base, second stripe very short; second light colored interspaces forked behind eye; third dark stripe breaks into two short bars or small spot (4–5) at caudal base.....
.....*compressus*
- 2a. Body and head deep, compressed; dark stripes narrower than light colored interspaces; a dark stripe with second dorsal and anal fin

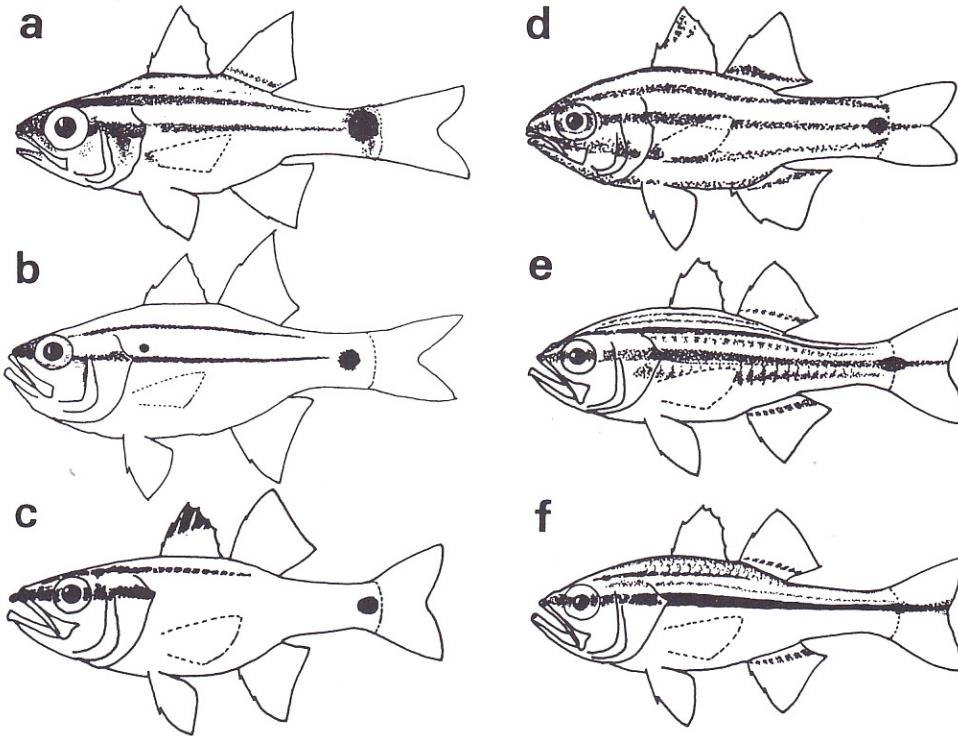


Fig. 4 Six dark-striped *Apogon* species in coast of southern Japan*.

a: *A. fukuii*, n. sp. b: *A. cheni* n. sp. c: *A. semilineatus* d: *A. angustatus*
e: *A. quadrifasciatus* f: *A. kiensis*

* other six dark-striped *Apogon* species were showed in HAYASHI and KISHIMOTO (1983)

- base; black caudal spot centered on lateral-line or absent3
- 2b. Body and head thick, snout sharp; dark stripes wider than light colored interspaces; black caudal spot absent on midbody stripe ...11
- 3a. Three to five, mostly four predorsal scales; dark longitudinal stripes with two to six on body; a clear dark stripe with second dorsal and anal fin base4
- 3b. Five to six predorsal scales; two dark longitudinal stripes on body; no clear dark stripe with second dorsal and anal fin base9
- 4a. Four to five predorsal scales; two dark longitudinal stripes on body; caudal spot absent5
- 4b. Three to four predorsal scales; four to six dark longitudinal stripes on body; caudal spot present.....6

- 5a. Four predorsal scales; two light brownish longitudinal stripes on body, converging to snout tip; first stripe reaches near caudal fin base, last faded; midbody stripe passes from last constriction to fork of caudal fin; two faded dark linear stripe run on fast light interspace, and one runs on lateral-line; some vertical dark bands often laterally; caudal spot absent..... *quadrifasciatus*
- 5b. Five predorsal scales; two blackish longitudinal stripes on body, converging to snout tip; first stripe reaches in front of second dorsal fin base, last faded; midbody stripe clearly black, and passes from last constriction to fork of caudal fin; a faded dark linear stripe runs on lateral-line; no vertical dark bands on laterally; caudal spot absent..... *kiensis*
- 6a. Four longitudinal stripes on body7

- 6b. Five or six longitudinal stripes on body.....8
- 7a. All longitudinal stripes clearly black, forth faded; first and third stripes not extend caudal fin; midbody stripe across eye and not confluent with caudal spot; black caudal spot small, likewise pupil; head rounded*doederleini*
- 7b. All longitudinal stripes brownish and faded; first and third stripes extend caudal fin; midbody stripe across eye and passes from caudal spot and last converging to meet midbody stripe at base of caudal; blackish brown caudal spot small, likewise pupil; head barely pointed*angustatus**
- 8a. Five dark longitudinal stripes, fifth faded; first and forth stripes extend on caudal fin, last faded; midbody stripe across eye and passes from spot to fork of caudal fin; second stripe extend about half of midbody stripe; head robust and broadened *cookii*
- 8b. Six dark flame-colored longitudinal stripes; second and fifth stripes slightly extend on caudal fin; sixth faded; width of all stripes not uniform; midbody stripe across eye and confluent with caudal spot; caudal spot black and large, likewise eye diameter; caudal spot positioned off posterior of hypural edge; body slightly compressed, head rounded.....*endekataenia*
- 9a. Five predorsal scales; two blackish longitudinal stripes converging to snout tip; first stripe reaches to front of second dorsal fin base, last faded; short midbody stripe across eye and reaches to end of operculum; black caudal spot small, likewise pupil; head smooth; upper part of first dorsal blackish*semilineatus*
- 9b. Five or six predorsal scales; two blackish longitudinal stripes converging to snout tip; first stripe not extend anterior of caudal spot; midbody stripe confluent with caudal spot or not reaches.....10
- 10a. Body and head thick, head slightly warped; midbody stripe reaches to caudal spot; black caudal spot large, likewise orbit diameter or more over; caudal spot positioned just anterior of hypural edge and upward of lateral-line; blackish spot on first dorsal absent*fukuii* n. sp.
- 10b. Body slightly compressed, head smooth; midbody stripe not confluent with caudal spot; black caudal spot large, likewise pupil; caudal spot positioned off anterior of hypural edge and centered on lateral-line; a small black spot on just posterior portion of opercular spine; blackish spot on first dorsal present*cheni* n. sp.
- 11a. Four black and redish longitudinal stripe on body; three upper very dark colored; first and third stripes extend on caudal fin base and converging to meet midbody stripe at base of caudal; midbody stripe across eye; two dark linear stripes runs upper and lower interspaces of midbody; stripes of second dorsal and anal fin base clearly*nigrofasciatus***
- 11b. Four black longitudinal stripe on body, forth faded; first and third stripes converging to meet near tip of median caudal; midbody stripe constricted on three points and not uniform width; midbody stripe passes from last constriction to fork of caudal fin; one dark linear stripe runs on fast light interspace; stripes of second dorsal and anal base clearly*novemfasciatus*

* *angustatus* is the first record of Japan in this paper.

** *aroubiensis* is synonymised with *nigrofasciatus* by RANDALL and LACHNER, 1986.

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