

## A REVIEW OF THE CARDINAL FISHES OF JAPAN.

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In the present paper the species of *Apogonidae* known from the waters of Japan are brought under consideration. It is based on collections obtained by the authors in 1900 for Leland Stanford Junior University, as well as upon a study of the Japanese fishes belonging to the United States National Museum. A series of duplicates of the fishes collected by the authors has been placed in the United States National Museum.

### Family APOGONIDÆ.

#### CARDINAL FISHES.

Body oblong or elongate, sometimes compressed and elevated, covered with rather large scales, which are striated and ctenoid, or sometimes cycloid; cheeks scaly; lateral line continuous; cleft of mouth wide, oblique; villiform teeth on jaws and vomer, and sometimes on palatines; canines sometimes present (teeth wanting in *Brephostoma*); preopercle with a single or double ridge, its edges entire or serrated; opercular spine little developed; lower pharyngeals separate, with sharp teeth; pseudo-branchiæ present; branchiostegals 6 or 7. Dorsal fins well separated, the first with 6 to 9 rather strong spines; no dorsal sheath or furrow; anal fin short, with 2 or 3 spines; ventral fins thoracic, I, 5, without axillary scale. Gill-rakers slender; gill membranes separate, free from the isthmus. Small fishes of the Tropics, especially abundant in the East Indies, some of them in fresh waters, most of them in rather deep waters. In Japan, notwithstanding their small size, they have great importance in the markets as food-fishes.

a. Vent posterior, not far from front of anal fin.

b. *Apogoninae*. Anal spines 2; body oblong; teeth present, in jaws at least; preopercle with a double ridge.

c. Canine teeth none, the teeth all villiform; lateral line normal; palatines with teeth.

d. Scales large, 20 to 30 in lateral line.

e. Preopercle with its margins entire; dorsal spines 7; anal with 8 to 12 soft rays.....*Apogonichthys*. 1.



- ee. Preopercle with its margins both serrate, at least in the young.
- f. Anal with 8 to 10 soft rays; first dorsal with 6 or 7 spines.....*Apogon*. 2.
- ff. Anal with 13 to 17 soft rays; first dorsal with 6 spines....*Archamia*. 3.
- cc. Canine teeth present; scales large; anal with 7 to 9 soft rays.
- g. Dorsal spines 6; preopercle serrate .....*Paramia*. 4.
- gg. Dorsal spines 8 or 9; preopercle with no bony serrations.
- h. Jaws with a few canines and a band of villiform teeth; scales large (about 36) .....*Melanostoma*. 5.
- hh. Jaws with many canines and no villiform teeth; scales small (about 62) .....*Telescopias*. 6.
- bb. *Scombropinae*. Anal spines 3 or 4; body elongate; mouth large; soft dorsal and anal long of 12 to 13 soft rays; dorsal spines 8; scales small; preopercle with a single ridge.....*Scombrops*. 7.
- aa. *Acropominae*. Vent anterior, nearer root of ventrals than origin of anal; operculum produced in a long, denticulated point; preopercle entire; jaws with small canines; palatines with teeth; scales moderate; lower jaw longest. D. VII-I, 10. A. III, 7.....*Acropoma*. 8.

### 1. APOGONICHTHYS Bleeker.

*Apogonichthys* BLEEKER, Floris, 1854, p. 321 (*perdix*).

This genus differs from *Apogon* only in having the preopercle entire at all ages; scales very large (20 to 26) and cycloid. Dorsal spines 7 in typical species, the soft dorsal and anal with 9 to 12 rays. Small species, similar in habit to those of *Apogon*, found in the tropical seas. (*Apogon*; *ιχθύς*, fish; *α*, without; *πώγων*, beard, being thus distinguished from the bearded mullet, *Mullus barbatus*.)

- a. Soft dorsal with a large black ocellus at the base of its last 4 rays; anal black edged.....*carinatus*. 1.
- aa. Soft dorsal edged with black, but without black ocellus at base; anal pale. *glaga*. 2.

### 1. APOGONICHTHYS CARINATUS (Cuvier and Valenciennes).

#### ICHIMOCHI.

*Apogon carinatus* CUVIER and VALENCIENNES, Hist. Nat., Poiss., II, 1828, p. 157, Japan, Coll. Langsdorff.—SCHLEGEL, Fauna Japonica, Poiss., 1846, p. 3, Nagasaki.—NYSTROM, Handl. Svensk. Vet. Akad., 1887, p. 8, Nagasaki.

*Apogonichthys carinatus* BLEEKER, Floris, 1854., p. 321; Verh. Bat. Genootsch., XXVI, p. 56, pl. 1, fig. 3.—GÜNTHER, Cat. Fish., I, 1870, p. 247, after Bleeker.

Head  $2\frac{4}{5}$  in length; depth  $2\frac{2}{3}$ ; depth of caudal peduncle 2 in head; eye  $3\frac{1}{2}$ ; interorbital space  $3\frac{1}{2}$ ; snout  $4\frac{1}{4}$ ; maxillary  $1\frac{4}{5}$ ; D. VII-I, 9; A. II, 8; scales in lateral series 25; in transverse series 9.

Body rather robust; the head large. Interorbital space somewhat convex. Snout about equal to diameter of eye. Mouth large; very oblique; lower jaw slightly projecting; maxillary extending beyond pupil, sometimes reaching beyond posterior border of eye. Spinous dorsal low. Soft dorsal and anal high, in some specimens almost reaching base of caudal when depressed. Caudal truncate posteriorly.

Dull reddish olive, the edges of the scales sometimes but not always



dusky; head dusky above on the naked rugose skin. First dorsal largely black; second dorsal with a large jet black spot at base of the last 4 rays; this in highly colored specimens surrounded by a yellowish ring. Anal with a black edge. Caudal dusky behind. Paired fins pale.

Coast of Japan and southward. Our specimens are from Misaki, Wakanoura, and Nagasaki. From Misaki we have a single large

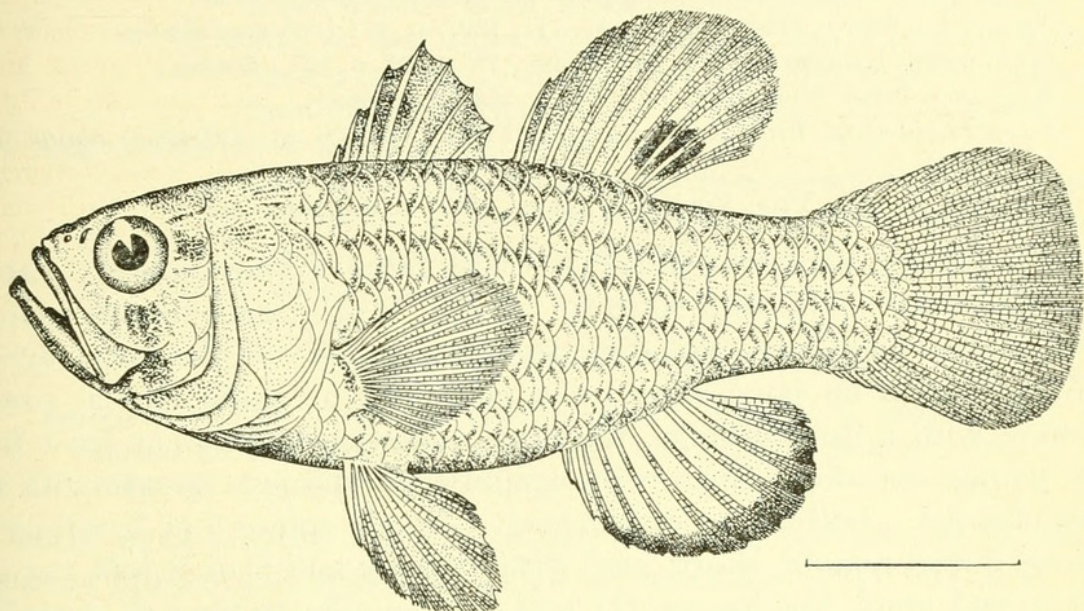


FIG. 1.—APOGONICHTHYS CARINATUS.

example, here figured, which is much darker in color than the others, each scale having a broad edging of black points. Except in color no other difference appears. Length 100 to 150 millimeters.

(*Carinatus*, keeled, from the prominent lateral line, a character of no importance.)

## 2. APOGONICHTHYS GLAGA (Bleeker).

*Apogon glaga* BLEEKER, Verh. Bat. Gen., XXII, Percoiden, p. 29.—DAY, Fishes India, p. 62, pl. XVI, fig. 10.

*Apogonichthys glaga* BLEEKER, Verh. Bat. Gen. XXVI, Ichth. Japan, p. 57.—GÜNTHER, Cat. Fish., I, p. 247.

*Amia glaga* BLEEKER, Atlas Ichth. Percoid., 1876, p. 100, pl. XXXIII, fig. 1, Singapore, Bangka, Java.

Head  $2\frac{1}{5}$  in length; depth  $2\frac{3}{4}$ ; eye 4 in head; D. VII–I, 9 or 10; A. II, 8 or 9. Scales 25. Body rather deep, the back elevated; maxillary extending a little beyond eye; dorsal spines short and slender; caudal truncate.

Color olivaceous, reddish below; sides with small blue spots arranged in lines along the rows of scales; no caudal spot; first dorsal dull orange; second, black at tip with small pale spots on the membranes; no black ocellus; caudal black at tip; pectorals, anal, and ventrals light yellow.



East Indies, said by Bleeker to range northward to Japan.<sup>1</sup> It is likely that faded specimens of *A. carinatus* have been mistaken for it. It may be easily recognized by the absence of dorsal ocellus and of serræ on the preopercle. (*Glaga*, the Malay name.)

## 2. APOGON Lacépède.

*Amia* GRONOW, Zoophyl., 1763, p. 80 (*moluccensis*; nonbinomial).—GILL, Proc.

Acad. Nat. Sci. Phila., 1862, p. 237 (*imberbis*; scales 20 to 28).

*Apogon* LACÉPÈDE, Hist. Nat. Poiss., III, 1802, p. 411 (*ruber*=*imberbis*).

*Ostorhinchus* LACÉPÈDE, Hist. Nat. Poiss., IV, 1802, p. 165 (*fleurieu*).

*Monoprion* POEY, Memorias, II, 1860, p. 123 (*maculatus*).

? *Lepidamia* GILL, Proc. Acad. Nat. Sci. Phila., 1863, p. 81 (*kalosoma*; scales 33 to 38).

*Mionurus* KREFFT, Proc. Zool. Soc. Lond., 1867, p. 942 (*lunatus*)

Body oblong, compressed, covered with large, ctenoid scales. Lateral line continuous, with 20 to 30 scales. Head large; mouth wide, oblique, the maxillary extending to below middle of the large eye; villiform teeth on jaws, vomer, and palatines; no canine teeth; preopercle with a double ridge, the edge somewhat serrate, at least in the young, becoming entire with age in some species; opercle with a spine behind. Gill rakers rather long. Dorsal spines 6 or 7, strong; second dorsal remote, short; anal with 2 spines and 8 or 9 soft rays, the second much the longer, the soft part similar to the soft dorsal; pectorals and ventrals moderate; caudal concave or convex; vertebrae 11+14=25. Warm seas; the species numerous. The species are much alike in form, but differ greatly in markings, the ground color being usually bright red or reddish silvery. The principal groups differ in number of dorsal spines and in the form of the caudal. Most of the Pacific species belong to the subgenus *Ostorhinchus*; all of the Atlantic to the typical subgenus *Apogon*.

### I. *Ostorhinchus*. First dorsal with seven spines.

- a. Caudal fin rounded or subtruncate, its base without distinct round black spot; sides without black lateral stripe.
- b. Side without narrow vertical brown bars.
- c. Fins blackish or with black markings.
  - d. Top of head dusky, without conspicuous black dots; preopercle without black line; body deep; scales firm; fins blackish; caudal and pectoral yellowish.....*niger*. 3.
  - dd. Top of head sprinkled with very distinct black dots; a black line along inner margin of preopercle; spinous dorsal black at tip; soft dorsal with two black bands.....*marginatus*. 4.
  - cc. Fins all pale; body without black markings.....*unicolor*. 5.
- bb. Side with 8 to 12 narrow brownish vertical crossbars, the ground color silvery; dorsals and caudal obscurely dark edged; scales thin...*lineatus*. 6.
- aa. Caudal fin lunate or forked; dark stripes, if present, horizontal; base of caudal with a very distinct round black spot; snout pointed.
  - e. Sides of body with 3 to 7 stripes extending from head to tail.

<sup>1</sup> L' *Amia glaga* dont je possède aussi des individus provenant du Japon (Bleeker).



f. Distinct stripes on side, at least 4 in number, the upper and lower of the four converging over and behind the caudal spot; top of head with 4 or more stripes.....*schlegeli*. 7.

ff. Distinct stripes on sides, 3 in number, the upper and lower not converging behind caudal spot; dark stripes plain on the cheeks.  
*döderleini*. 8.

ee. Sides of body without stripes except anteriorly or along back.

g. Stripe on head above eye extending backward to front of soft dorsal, widening a little at the nape; a median stripe above it to the dorsal; another below, across eye and opercle....*semilineatus*. 9.

gg. Stripe on head above eye, not reaching nape; a jet black nuchal spot; a stripe from snout across eye to opercle; body unmarked save for the caudal spot.....*notatus*. 10.

II. *Apogon*. First dorsal with 6 spines; caudal lunate.

h. Side with a broad jet black stripe from snout through eye to base of caudal; a narrower stripe above it; dorsal and anal each with a dark streak near base; body rather elongate; general color red.....*kiensis*. 11.

### 3. APOGON NIGER Döderlein.

*Apogon nigripinnis* SCHLEGEL, Fauna Japonica, 1846, p. 3, Nagasaki, not of Cuvier and Valenciennes.—STEINDACHNER, Fische Japans, II, 1883, p. 1, Shikoku, as *Apogon niger* Döderlein MS.

Head  $2\frac{1}{2}$  in length; depth  $2\frac{1}{3}$ ; depth of caudal peduncle  $2\frac{1}{2}$  in head; eye  $3\frac{1}{2}$ ; interorbital space  $3\frac{2}{5}$ ; snout  $3\frac{1}{2}$ ; maxillary 2; D. VII–I, 9; A. II, 8; scales in lateral series 25; in transverse series 9.

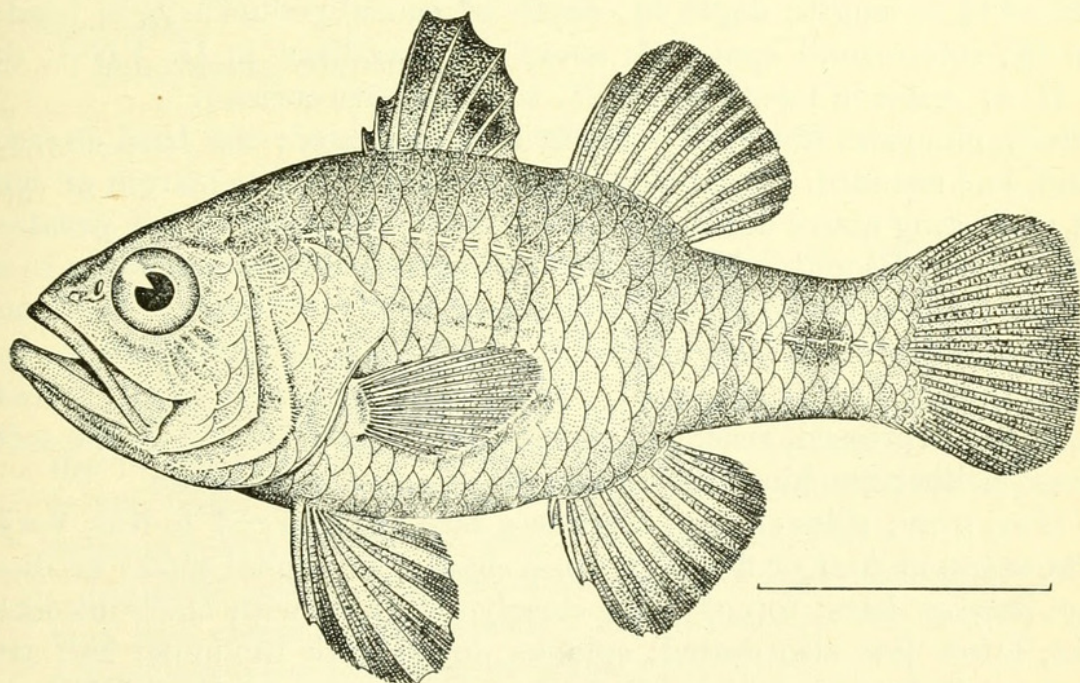


FIG. 2.—APOGON NIGER.

Body very deep; compressed; its outlines regular. Interorbital space convex; rim of orbit not projecting above contour of head; diameter of eye equal to length of snout. Mouth very oblique; maxillary extending to a vertical between pupil and posterior edge of



orbit; jaws subequal, the lower slightly projecting. Edge of preopercle finely serrated. Scales comparatively firm and rough. Dorsal spines rather strong, the third longest. Soft dorsal and anal reaching equally far posteriorly when depressed, falling considerably short of base of caudal. Caudal subtruncate or slightly rounded. Ventrals reaching anal opening.

Color in life soiled brown, the sides with a greenish luster; no red anywhere. Fins dull gray, washed toward the edges with inky black; pectoral and caudal dirty yellowish; ventrals and anal most nearly black. Length about 80 or 90 millimeters.

Shores of Kiusiu and Shikoku, in southern Japan; very common in sandy bays. Known to us from about 50 specimens taken from the harbor of Nagasaki and the neighboring bay of Mogi.

The species is identified by Schlegel and by Steindachner with *Apogon nigripinnis*, Cuvier and Valenciennes, from Pondicherry, but the accounts given by Day of Cuvier's type show that this is a different fish, with dark vertical bands and a black edge to the caudal.

(*Niger*, black.)

#### 4. APOGON MARGINATUS Döderlein.

*Apogon ellioti* STEINDACHNER, Fische Japans, II, 1883, p. 2, Kagoshima; Kochi in Shikoku (as *Apogon marginatus* Döderlein MS.).

*Apogon* sp. ISHIKAWA, Prel. Cat. 1897, p. 55, Tosa in Shikoku.

Head  $2\frac{5}{6}$  in length; depth  $3\frac{1}{5}$ ; depth of caudal peduncle  $2\frac{1}{4}$  in head; eye  $3\frac{3}{4}$ ; interorbital space  $3\frac{3}{4}$ ; snout  $4\frac{1}{4}$ ; maxillary 2; D. VII-I, 9; A. II, 8; scales in lateral series 25; in transverse series 7.

Body elongate, the back scarcely at all elevated; the head broad, blunt, and rounded. Interorbital space convex; upper margin of eye not projecting above dorsal contour of head; diameter of eye greater than length of snout. Mouth very oblique; maxillary extending to a vertical passing between pupil and posterior edge of orbit. Teeth on vomer, palatines and jaws villiform. Serrations of preopercle weak. Scales thin, and easily displaced. First dorsal spine very small. Anal fin, when depressed, reaching farther posteriorly than does the soft dorsal, neither reaching base of caudal. Caudal subtruncate.

Color, gray; sides silvery, doubtless flushed with red in life; very faint traces of four or five dark cross shades; no caudal spots; no distinct lines or bars; top of head closely sprinkled with black ink-like dots; lower jaw also dotted; spinous dorsal with the upper half jet black; soft dorsal with a marginal and a median black band; anal with a black median band; caudal dusky, with a median and a terminal shade made up of dark points; similar dots on pectorals and ventrals; inner margin of preopercle marked by a line of dark dots; similar dots on sides of head and on breast. Length, about 90 millimeters.



Coasts of southern Japan; said to be common in Kagoshima and Kochi, our single specimen from Wakanoura. This species is close to *Apogon ellioti* Day, from India, a species with which it is identified by Dr. Steindachner. But *A. ellioti*, in addition to the markings in *A. marginatus*, has a grayish lateral band ending in a dusky spot at

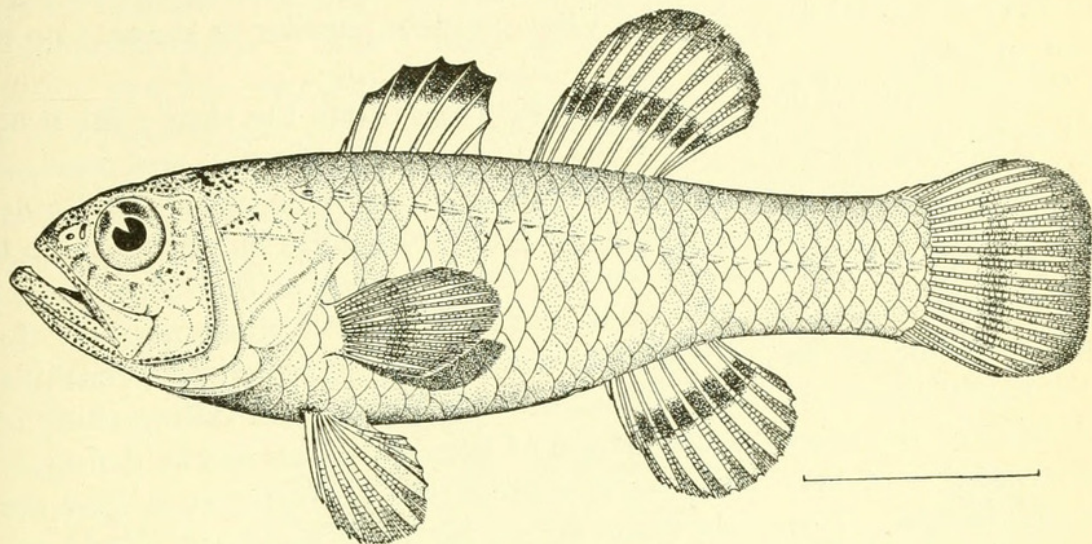


FIG. 3.—APOGON MARGINATUS.

base of caudal. *Apogon arafurae* Günther, from the Arafura Sea, near Borneo, is equally closely related, but lacks the black-dotted edge of the preopercle; the soft dorsal, anal, and caudal are not colored in the same way.

(*Marginatus*, edged.)

##### 5. APOGON UNICOLOR Döderlein.

(Plate XLIII.)

*Apogon bifasciatus* STEINDACHNER Fische Japans, II, 1883, p. 2, Shikoku, Kagoshima. (Coll. Döderlein as "*Apogon unicolor*, n. s.")

*Apogon unicolor* JORDAN and SNYDER, Proc. U. S. Nat. Mus., XXIII, 1901, p. 749, pl. XXXII, Yokohama.

Head  $2\frac{2}{3}$  in length; depth  $2\frac{5}{6}$ ; depth of caudal peduncle  $6\frac{1}{2}$ ; diameter of eye  $3\frac{1}{6}$  in head; snout  $3\frac{2}{3}$ ; maxillary  $1\frac{4}{5}$ ; D. VII—I+9; A. II+8; P. 13; scales in lateral line 25; between lateral line and insertion of spinous dorsal 2; between lateral line and anal 13.

Depth of body a little less than length of head; the caudal peduncle long and comparatively slender, narrowest near the middle. Interorbital space convex. Snout bluntly pointed.

Eye large, the diameter greater than length of snout. Mouth oblique; jaws equal; maxillary reaching almost to posterior edge of orbit; its upper edge covered for nearly the entire length by the suborbital. Teeth villiform, in bands on jaws, palatines, and vomer; the toothed area of the palatines very small. Gill-rakers on first arch



5+13; those near the center of the arch very slender; near the ends they are reduced to minute knobs.

Opercles and preopercles with large, finely ctenoid scales; other parts of head naked, the skin thin and transparent; opercle with a small sharp spine on its posterior edge. Body with large ctenoid scales; those on posterior end of caudal peduncle small, encroaching on base of caudal fin. Lateral line complete, similar in shape to contour of back.

Second spine of dorsal small; little longer than the sixth; the third strongest and highest; the others successively shorter and weaker; the fin when depressed reaching just past insertion of second dorsal. Spine of soft dorsal slender and straight; equal in height to vertical diameter of eye; the rays about  $1\frac{2}{3}$  times as long as the spine. Anal inserted below middle of second dorsal; the first spine minute; the second as long as the spine of soft dorsal; the depressed rays reaching posteriorly about as far as those of the dorsal, both falling short of the base of the caudal. The shape of the caudal can not be definitely determined. It may have been subtruncate posteriorly, at least not deeply forked. Pectorals reaching as far back as insertion of anal. Ventrals extending to a point midway between vent and insertion of anal.

Color in spirits, uniform light yellowish brown, except a subdued, dusky dash across the distal end of pectoral and an indistinct spot of same color on the opercle near the base of pectoral. Coasts of Japan, from Tokyo to Kiusiu.

Known to us from one specimen 75 millimeters long, found in the market of Yokohama by Pierre Louis Jouy. The species has been identified by Steindachner with *Apogon bifasciatus* Rüppell from the Red Sea, but it shows no trace of the dark cross-bands characteristic of that species.

(*Unicolor*, one color.)

#### 6. APOGON LINEATUS Schlegel.

##### TENJIKUDAI (INDIAN PERCH).

*Apogon lineatus* SCHLEGEL, Fauna Japonica, Poiss., 1846, p. 3, Nagasaki.—BLEEKER, Verhand. Bat. Gen., XXV, p. 54, pl. 1, fig. 1.—GÜNTHER, Cat. Fish., I, 1859, p. 239, copied.—STEINDACHNER and DÖDERLEIN, Fische Japans, II, 1883, p. 4, Tokyo, Maizuru in Tago, Kanagawa (near Yokohama), Chefu in China.—ISHIKAWA, Prel. Cat., 1897, p. 55, Tokyo, Kishin.—JORDAN and SNYDER, Proc. U. S. Nat. Mus., 1900, p. 353, Yokohama.

Head  $2\frac{3}{5}$  to  $2\frac{4}{5}$  in length; depth  $2\frac{3}{5}$ ; depth of caudal peduncle  $2\frac{1}{2}$  in head; eye 3; interorbital space  $3\frac{1}{2}$ ; snout 5; maxillary 2; D. VII-I, 9; A. II, 8; scales in lateral series 25; in transverse series 9.

Body rather stout; anteriorly blunt; the back elevated. Eyes large, their upper edges projecting slightly above the dorsal contour of head.



Interorbital space broad, flat, with a median elevation. Snout shorter than the diameter of eye. Lower jaw projecting; maxillary extending to a point about midway between pupil and edge of orbit. Teeth villiform on jaws, vomer, and palatines; no canines. Gill-rakers  $6+13$ ; those on middle of arch very long and slender. Posterior edge of opercle with large serrations near the angle. Fins moderate; caudal subtruncate. Scales rather thin and loose.

Color grayish; sometimes slightly bluish, with pink; sides silvery; top of head and jaws dusky, with dark dots; body with 8 to 12 narrow, faint, irregular dark brownish cross-streaks; much narrower than the interspaces, and sometimes alternately narrow and broad. Spinous dorsal dark-edged; second dorsal with a dark median band and a dark

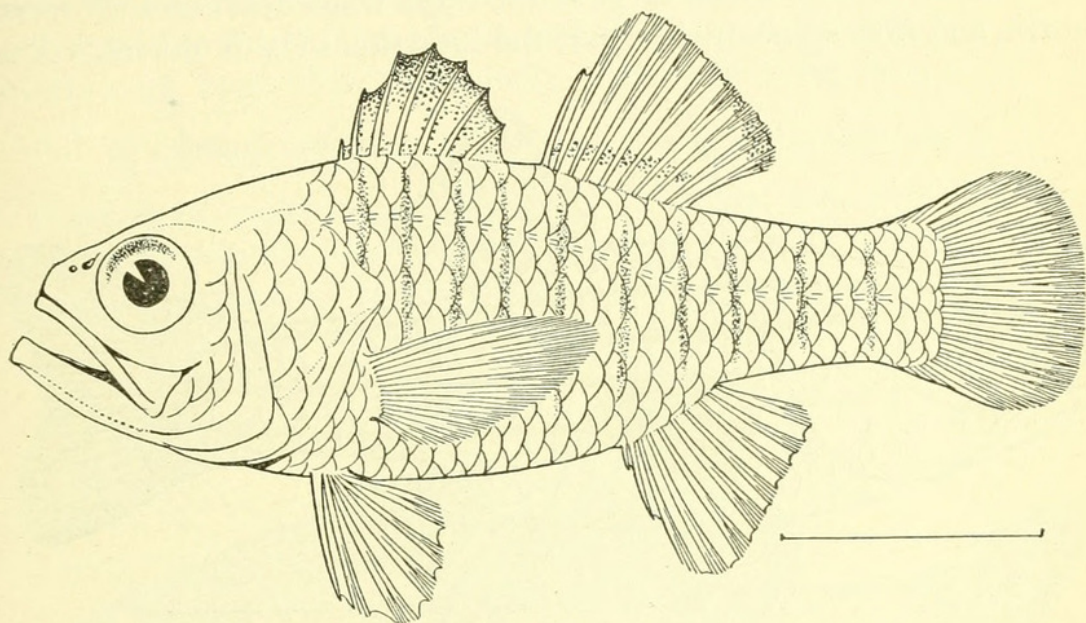


FIG. 4.—APOGON LINEATUS.

edge; caudal dusky at base, with a more or less distinct dark edge; ventrals and pectorals yellowish, more or less dotted with black; anal pale yellow; no spot on caudal. Length 60 to 90 millimeters.

Coasts of Japan, from Tokyo southward, everywhere common in sandy bays, and becoming from its abundance a food fish of importance. It is usually known as Tenjikudai. Our specimens are from Tokyo, Yokohama, Misaki, Owari, Enoshima, Wakanoura, Kobe, Onomichi, Miyajima, Hiroshima, Tsuruga, Kawatana, Hakata, and Nagasaki.

The only variations of importance are in degree of color, some having the paired fins pale and the lateral bands faint. The length of head, size of eye, depth of body, and caudal peduncle are subject to slight variation.

(*Lineatus*, lined.)



## 7. APOGON SCHLEGELI Bleeker.

*Apogon novemfasciatus* SCHLEGEL, Fauna Japonica, Poiss., 1846, p. 2, pl. II, fig. 2, Nagasaki (not of Cuvier and Valenciennes).

*Apogon schlegeli* BLEEKER, Verhand. Batav. Genoots., XXVI, p. 55, after Schlegel.

Head  $2\frac{5}{6}$  in length; depth  $2\frac{5}{6}$ ; depth of caudal peduncle  $2\frac{1}{5}$  in head; eye 3; interorbital space  $4\frac{2}{3}$ ; snout  $4\frac{1}{4}$ ; maxillary 2; D. VII-I, 9; A. II, 8; scales in lateral series 25; in transverse series 9.

Body rather elongate; the back little elevated; the head rather pointed. Eye large; the diameter much greater than length of snout; interorbital space convex; dorsal rim of orbit not projecting above contour of head. Jaws equal; maxillary extending to a vertical through posterior edge of pupil. Serrations of preopercle rather weak. Fins high; third spine of dorsal large and strong; when depressed the third, fourth, and fifth spines reach past the insertion of soft dorsal. Anal

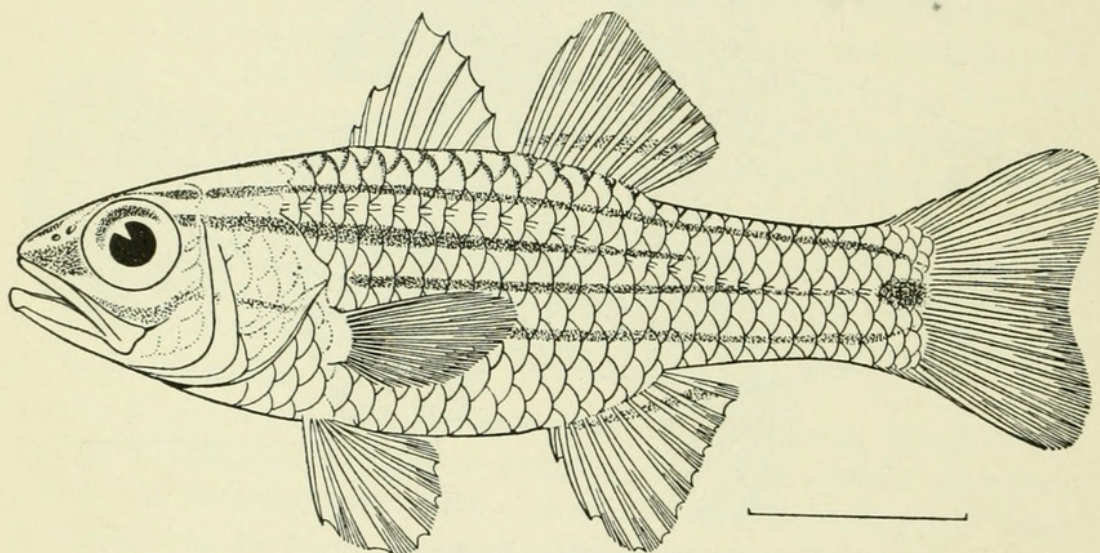


FIG. 5.—APOGON SCHLEGELI.

fin when depressed reaching farther posteriorly than does the soft dorsal, both falling far short of base of caudal. Caudal well forked. Ventrals reaching a little beyond anal opening. Scales large and thin.

Color in life dirty gray, washed with pink; top of head reddish; about six longitudinal stripes, the upper olive, the lower brassy yellow; anteriorly more or less red; stripes on top of head brick red; a large black caudal spot; fins all carmine. About eight dark stripes on top of head between eyes; a distinct stripe from eye to caudal spot; another above this from snout, across upper part of eye, fading out before reaching caudal spot; another above this, just above lateral line from nape to caudal, bent downward on reaching base of caudal fin; another below the first one from anal to base of caudal, this one bent upward as the other is downward, so as to form backward converging lines above and below caudal spot; traces of another band on eye across cheek and side of belly to anal; still another more or less distinct on



side of back, and often still another at base of dorsal, making seven on each side, four distinct, three faint; fins all pale, a few dark dots on caudal and dorsals; traces of a faint dusky cross-line on base of second dorsal. Length about 100 millimeters.

Coast of southern Japan, here described from four examples from Nagasaki. It is doubtless Schlegel's *Apogon novemfasciatus* (not of Cuvier and Valenciennes), based on a drawing by Bürger, though the drawing is not very correct. This is the basis of Bleeker's *Apogon schlegeli*. Later Bleeker has identified this species with his *Apogon endekataenia* from the East Indies. But *A. endekataenia* lacks the converging lines around the caudal spot; the eye is much smaller and the body more slender. We think *A. schlegeli* a valid species. It is probably not very abundant.

(Named for Prof. H. Schlegel, of Leyden, the distinguished author, jointly with Prof. C. J. Temminck, of the Fauna Japonica.)

8. APOGON DEDERLEINI Jordan and Snyder, new species.

Head  $2\frac{4}{5}$  in length; depth  $2\frac{3}{5}$ ; depth of caudal peduncle  $2\frac{1}{4}$  in head; eye 3; interorbital space 3; snout 4; maxillary 2; D. VII-I, 9; A. II, 8; scales in lateral series 25; in transverse series 9.

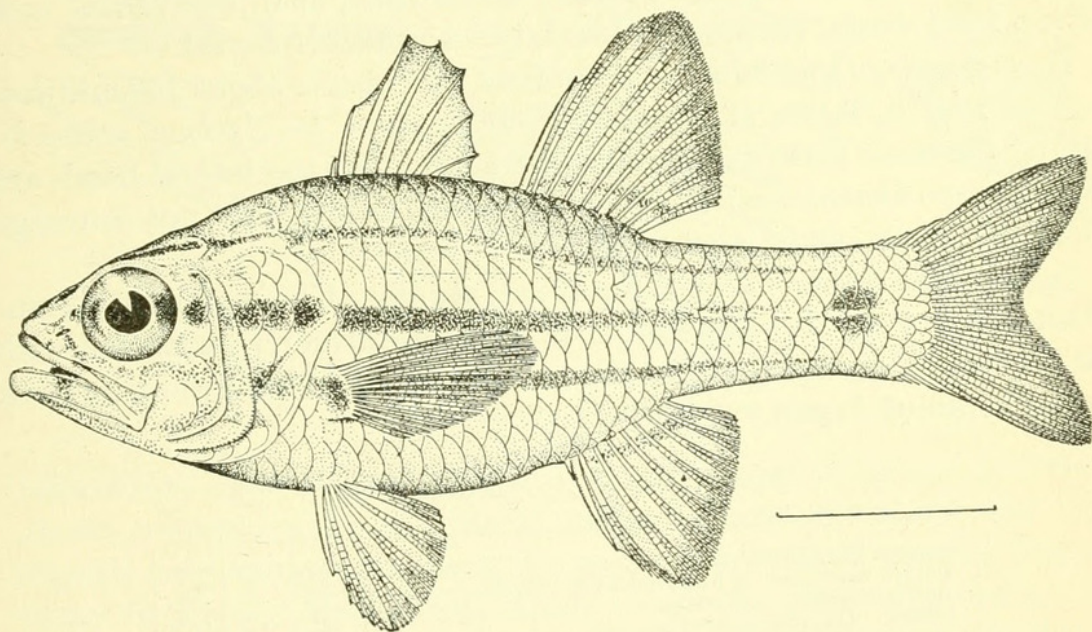


FIG. 6.—APOGON DEDERLEINI.

Body robust; somewhat elongate; the caudal peduncle very long, slender; the back little elevated and evenly curved. Head rather pointed. Eye very large, its diameter much greater than the length of snout. Interorbital space flat, with a slight median elevation; upper rim of orbit not projecting above contour of head. Mouth large, moderately oblique; jaws equal, maxillary extending to a vertical passing a little before posterior edge of pupil. Teeth villiform on jaws, vomer, and palatines. Gill-rakers on first arch 5+13, slender.



the length of the longest much less than diameter of pupil. Posterior edge of opercle finely serrated for the greater part of its length. Scales large and thin.

Fins high. First dorsal spine minute, the third high and strong; the fourth of about equal height, though more slender; when depressed just reaching insertion of soft dorsal; other spines gradually shorter. Soft dorsal and anal when depressed reaching an equal distance posteriorly, both falling far short of reaching base of caudal. Caudal deeply notched. Pectorals almost reaching a vertical through insertion of anal. Ventrals reaching anal opening.

Color in life yellowish gray, with three distinct blackish lateral stripes; a jet-black spot on caudal peduncle; top of head with two distinct stripes only; bands distinct on sides of head; a dark spot on base of pectoral. Median lateral stripe extending from snout through eye across opercle to caudal spot; an upper one running from snout above eye to tail, not extending on caudal fin and not bent downward above caudal spot; lower stripe extending from snout across suborbital, opercle, base of pectoral, to base of caudal; not bent upward on tail and not extending on caudal fin; traces of a fourth stripe along lower part of cheek and behind pectoral; these stripes made of dark dots. Fins all pale, probably red in life; the dorsals, anal, and caudal each with a faint dusky margin; no dark bar across soft dorsal.

This species is known to us from four specimens, about 100 millimeters in length, taken at Nagasaki. It is close to *Apogon schlegeli*, having the same form and general characters, but the lateral bands are fewer, more distinct, especially on the head, and they do not converge about the black caudal spot.

*Type*.—No. 6513, Leland Stanford Junior University Museum. (Named for Prof. L. Döderlein, of Vienna, formerly connected with the Imperial University at Tokyo, in recognition of his assiduous work on the fishes of Japan.)

*Measurements of Apogon döderleini.*

Length in millimeters.....	91	83	67
Depth, expressed in hundredths of length.....	.38	.36	.35
Depth of caudal peduncle.....	.16	.16	.15
Length of caudal peduncle.....	.28	.26	.30
Length of head.....	.39	.41	.37
Diameter of eye.....	.125	.13	.13
Length of snout.....	.09	.09	.08
Length of maxillary.....	.17	.18	.18



## 9. APOGON SEMILINEATUS Schlegel.

NEBUTUDAI (BOTTOM TAI OR PERCH); TENGIKUJIAKO; TENSIBU-SHAKO (INDIAN LITTLE FISH).

*Apogon semilineatus* SCHLEGEL, Fauna Japonica, Poiss., 1846, p. 4, pl. II, fig. 3, Nagasaki.—BLEEKER, Verh. Bat. Genootsch., XXVI, p. 55, pl. I, fig. 2.—GÜNTHER, Cat. Fish., I, 1870, p. 240, copied.—STEINDACHNER and DÖDERLEIN, Fische Japans, II, 1883, p. 2, Tokyo.—NYSTROM, Handl. Svensk. Vet. Ak., 1887, p. 8, Nagasaki.—ISHIKAWA, Prel. Cat., 1897, p. 55, Enoura in Izu.

*Apogon quadrifasciatus* (error for *semilineatus*) JORDAN and SNYDER, Proc. U. S. Nat. Mus., XXIII, 1900, p. 353, Yokohama.

Head  $2\frac{1}{2}$  in length; depth  $2\frac{5}{6}$ ; depth of caudal peduncle 3 in head; eye  $3\frac{2}{5}$ ; interorbital space  $4\frac{1}{2}$ ; snout  $3\frac{2}{5}$ ; maxillary  $2\frac{1}{4}$ ; D. VII-I, 9; A. II, 8; scales in lateral series 25; in transverse series 9.

Body rather elongate; compressed; caudal peduncle narrow; head pointed. Eye large, the diameter a little greater than length of snout;

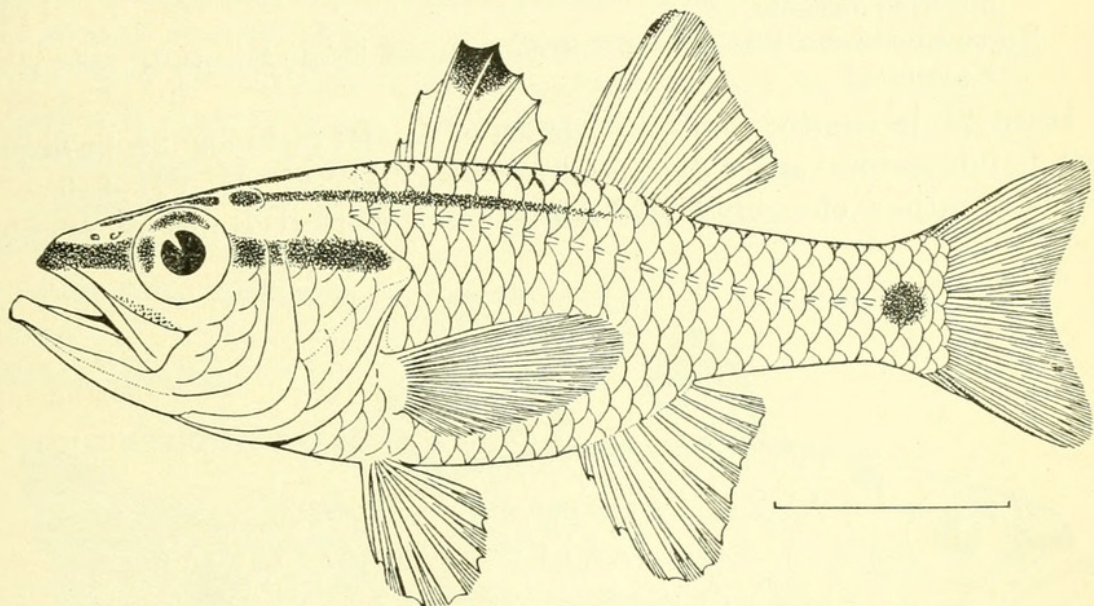


FIG. 7.—APOGON SEMILINEATUS.

interorbital space slightly convex; upper rim of orbit not projecting above contour of head. Snout pointed; jaws subequal, the lower slightly projecting; maxillary extending to a vertical passing just posterior to pupil. Scales thin, rather roughish. Dorsal spines slender and rather weak; the first minute; placed very close to base of the second; the tip of the fourth when depressed just reaching insertion of soft dorsal. Soft dorsal and anal reaching an equal distance posteriorly when depressed, both falling far short of base of caudal. Pectorals reaching slightly beyond insertion of anal. Ventrals reaching vent. Caudal forked.

Color in life light gray, flushed with bright red; sides silvery; an inky black spot as large as pupil at base of caudal; a jet-black stripe from tip of snout through eye to gill opening; another above eye from tip of snout to opposite front of soft dorsal, this usually, but not



always, interrupted a little over the eye, leaving a jet-black spot on temporal region; interspaces between these lines golden yellow in life; a black median stripe from above eye to front of spinous dorsal; tip of chin black; fins all carmine; a jet-black spot at tip of spinous dorsal; a little black usually on upper edge of soft dorsal and on upper and lower margin of caudal; throat whitish. In alcoholic specimens the black markings only remain. Length about 100 millimeters.

Coasts of Japan from Tokyo southward very common. Our specimens from Tokyo, Yokohama, Yodomi, Enoshima, Misaki, and Wakanoura. It must be rare at Nagasaki, where it is mostly replaced by *Apogon notatus*.

(*Semi*, half; *lineatus*, lined.)

10. APOGON NOTATUS (Houttuyn).

*Sparus notatus* HOUTTUYN, Beschryving van eenige Japanse Visschen, Hollandsche, Maatschappye van Weetenschappen te Harlem, XX, 1782, pp. 311-346 (Nagasaki).

*Apogon kiushiuanus* Döderlein MS. STEINDACHNER, Fische Japans, II, 1883, p. 2, Kagoshima.

Head  $2\frac{3}{4}$  in length; depth  $2\frac{3}{4}$ ; depth of caudal peduncle  $2\frac{3}{4}$  in head; eye 3; interorbital space  $3\frac{1}{2}$ ; snout  $3\frac{4}{5}$ ; maxillary  $2\frac{1}{4}$ ; D. VII-I, 9.

Body rather elongate; the dorsal and ventral contours evenly

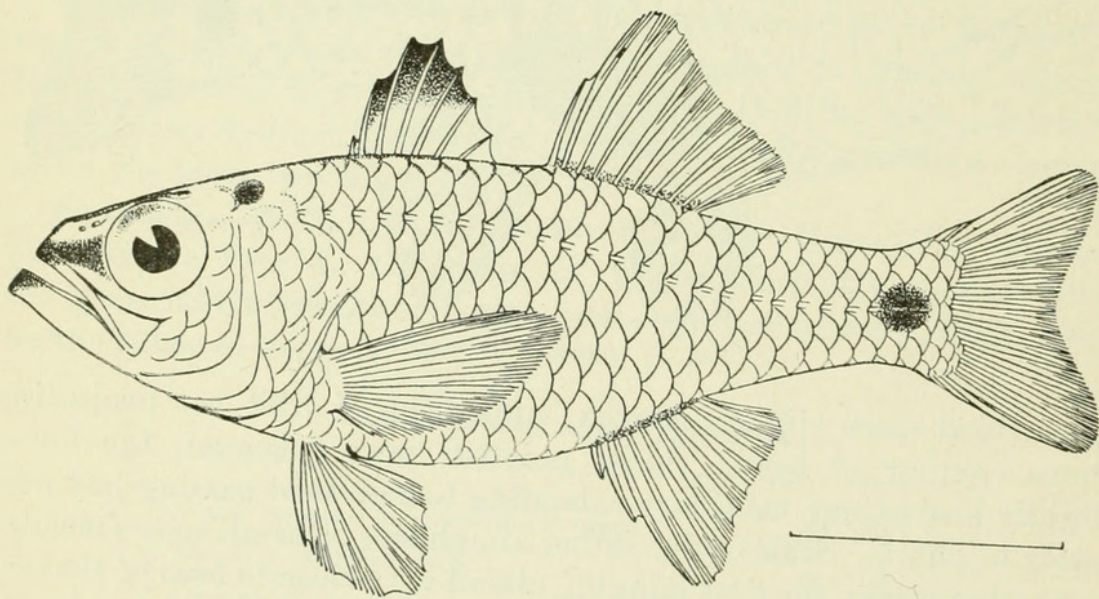


FIG. 8.—APOGON NOTATUS.

rounded; caudal peduncle much narrower at base of caudal fin than anteriorly. Head pointed; snout sharp; lower jaw projecting considerably. Eye large, its diameter greater than length of snout; interorbital space somewhat convex; upper edge of orbit not projecting above contour of head. Maxillary extending to a vertical passing through posterior edge of orbit. Edge of preopercle rather strongly serrated throughout the entire length (this character varying consid-



erably). Fins low. Dorsal spines weak and slender; the first minute; the third strongest, but not so high as the fourth; the fifth, when depressed, just reaching insertion of soft dorsal. Anal reaching slightly farther posteriorly than does the dorsal, both failing to reach base of caudal by a considerable distance. Caudal notched. Ventrals reaching vent.

Color in life, grayish, flushed with red, and much dotted; a round jet-black spot at base of caudal; a very black band across chin, and snout to eye, where it fades, though traces of it are seen behind eye; a jet-black stripe on top of head on each side from snout, ceasing above pupil; a median stripe from top of head to first dorsal; snout otherwise mostly golden yellow; a round jet-black spot on each side of nape; fins carmine; first dorsal with a broad black edge; other fins pale or slightly dotted; a golden streak across lower half of eye. In spirits the black coloring only is retained. Length about 100 millimeters.

This species is very close to *Apogon semilineatus*, with which all observers save Dr. Döderlein have confounded it. It is deeper in body, and with blunter snout. The most obvious difference lies in the fact that the uppermost of the paired black stripes does not reach the black nuchal spot and is not continued behind it. The range of *A. notatus* is more southern.

Our numerous specimens are from Nagasaki; a single one from Wakanoura.

(*Notatus*, spotted.)

## 11. APOGON KIENSIS Jordan and Snyder, new species.

Head  $2\frac{5}{6}$  in length; depth  $3\frac{1}{6}$ ; depth of caudal peduncle 3 in head; eye 3; interorbital space  $4\frac{1}{2}$ ; snout  $4\frac{2}{3}$ ; maxillary 2; D. VI-I, 9; A. II, 8; scales in lateral series 25; in transverse series 8.

Body rather elongate; compressed; dorsal contour somewhat arched; caudal peduncle slender. Head large; snout pointed; lower jaw projecting. Interorbital space flat or slightly convex; a low median ridge present; eye large; its diameter considerably greater than length of snout. Maxillary passing through a point midway between pupil and posterior border of eye. Teeth villiform; on jaws, vomer, and palatines. Gill-rakers on first arch 5+14; long and very slender. Serrations of opercle rather coarse. Scales thin; easily detached.

Fins of moderate height and length. The small first dorsal spine, present in other Japanese species of the genus, is absent in this form. Second spine of fin highest and strongest; the spines when depressed not touching insertion of soft dorsal. Anal when depressed reaching a little farther posteriorly than does the soft dorsal, both falling far short of base of caudal. Ventral fins reaching anal opening. Pectorals extending a little farther posteriorly. Caudal notched.

Color grayish, probably red in life; a jet-black stripe from tip of



snout across eye and sides of body to tip of caudal; this stripe widened and most distinct on the opercle; no distinct caudal spot, the stripe unbroken; this stripe half width of eye and bordered above and below by a pale streak; a second dark stripe above it, barely a fourth as wide from snout above eye to opposite middle of soft dorsal; no spots or streaks below the broad stripe; sides of head silvery; fins pale, except for a black cross stripe on soft dorsal and anal near the base, and the black lateral stripe continued on the caudal. The relative

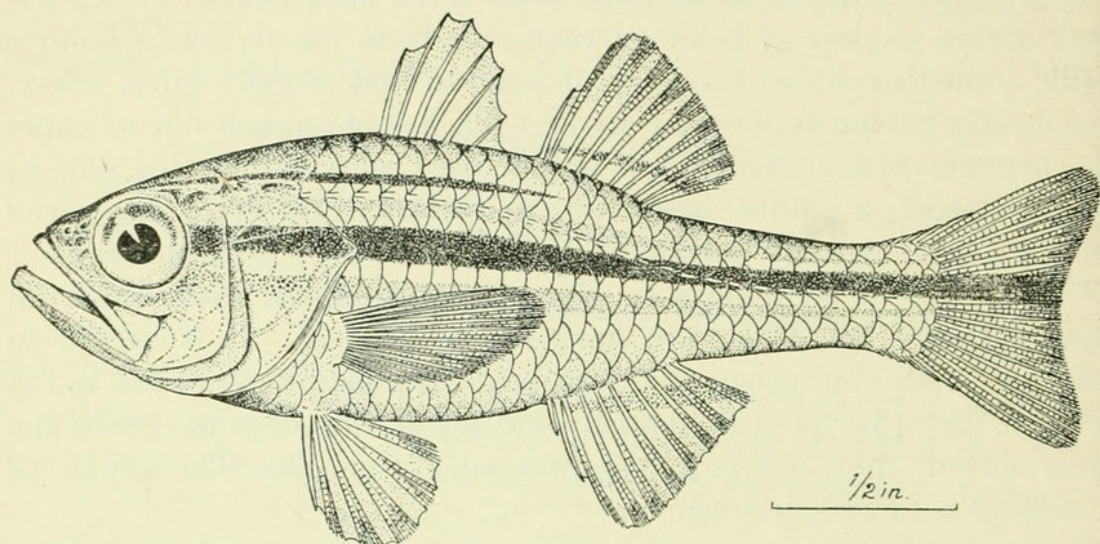


FIG. 9.—APOGON KIENSIS.

width of the two black stripes and the distinctness of the opercular spot is subject to some variation. The extension of the lateral band to the tip of the caudal will serve to distinguish the species from any other in Japan.

*Type*.—No. 6514, Leland Stanford Junior University Museum.

Smallest of the Japanese Apogonidae, not exceeding 650 millimeters in length. We have 38 specimens taken at Wakanoura, in the province of Kii, one of the richest collecting grounds for fishes yet known in any part of the world.

*Measurements of Apogon kiensis.*

Length in millimeters .....	59	57	56	56	58	57	55
Depth, expressed in hundredths of length .....	.32	.30	.33	.34	.335	.32	.32
Depth of caudal peduncle .....	.12	.125	.14	.14	.125	.125	.125
Length of caudal peduncle .....	.28	.27	.28	.27	.28	.28	.30
Length of head .....	.37	.35	.40	.39	.36	.35	.39
Diameter of eye .....	.12	.12	.12	.12	.12	.12	.125
Length of snout .....	.8	.75	.8	.85	.9	.8	.8
Length of maxillary .....	.18	.18	.19	.18	.18	.19	.18

### 3. ARCHAMIA Gill.

*Archamia* GILL, Proc. Ac. Nat. Sci. Phila., 1863, p. 81 (*macropterus*).

This genus is distinguished from *Apogon* by the long anal, its rays being II, 13 to 17. Dorsal spines, 6. East Indies.

(ἄρχος, anus; *Amia*, an old name of *Apogon*.)



## 12. ARCHAMIA KAGOSHIMANA Döderlein.

*Apogon (Archamia) macroptera* STEINDACHNER, Fische Japans, II, 1883, p. 3, Kagoshima (not of Bleeker).

*Apogon kagoshimanus* DÖDERLEIN MS. in Steindachner, Fische Japans, II, 1883, p. 3.

Head  $2\frac{1}{2}$ ; depth a little greater; D. VI-I, 9; A. II, 16; scales 26. Eye 3 in head.

Preopercle very finely serrate; maxillary to posterior part of eye. Dorsal spines very slender, the second not quite half head. Pectoral as long as caudal, reaching sixth soft ray of anal; ventral reaching front of anal.

Body reddish, strewn with violet points. No spot at base of caudal nor on scapula; fins pale. (Steindachner.)

Kagoshima, island of Kiusiu, a single specimen, sent to Dr. Steindachner by Dr. Döderlein, not seen by us. Notwithstanding its lack of the conspicuous caudal spot characteristic of *Archamia macroptera* (Bleeker), of the East Indies, Dr. Steindachner does not feel warranted in separating it as a distinct species. In view of the permanence of this mark, and of the essential difference of the Japanese shore fauna, from that of the East Indies, we adopt the name suggested by Dr. Döderlein. (Name from *Kagoshima*, "basket island.")

## 4. PARAMIA Bleeker.

*Cheilodipterus* LACÉPÈDE, Hist. Nat. Poiss., III, 1802, p. 539 (*saltatrix*, *macrodon*, etc., restricted by Cuvier and Valenciennes, in 1828, to *macrodon*; but the first species mentioned (*saltatrix*), more properly the type, is a species of another group.)

*Paramia* BLEEKER, Revision Apogonini, 1874, p. 74 (*macrodon*), the name *Cheilodipterus* being transferred to *Pomatomus saltatrix*.)

Body oblong, covered with rather large, deciduous scales; teeth on jaws, vomer, and palatines, some of them in both jaws strong, canine-like; operculum without spine; preopercle with a double margin, the posterior edge serrated; eye large. Dorsal fins separated, the rays VI-I, 10. Anal II, 9; caudal forked. Tropical seas. Small fishes differing from *Apogon* chiefly in the presence of canines in the jaws. (*παρά*, near; *Amia*, a nonbinomial name applied by Gronow to *Apogon*.)

## 13. PARAMIA QUINQUELINEATA (Cuvier and Valenciennes).

*Cheilodipterus quinquelineatus* CUVIER and VALENCIENNES, Hist. Nat. Poiss, II, 1828, p. 167, Society Islands.—? RÜPPELL, Neue Wirbelthiere, Fische, p. 89, Red Sea.—LESSON, Zool. Voy. Duperr., II, p. 237.—BLEEKER, Amboyna and Ceram, p. 252, Amboyna.—GÜNTHER, Cat. Fish., I, 1859, p. 248, Amboyna; Fishes of Zanzibar, p. 22.—DAY, Fishes of India, p. 66.—STEINDACHNER, Fische Japans, II, 1883, p. 4, Kagoshima.

*Paramia quinquelineata* BLEEKER, Atlas, Percoid., I, 1876, p. 105, pl. XLVIII, fig. 2, Sumatra, Nias, Batu, Singapore, Bangka, Cocos, Java, Celebes, Sangir, Solor, Halmahera, Ternata, Batjan, Amboyna, Goram.



? *Apogon novemstriatus* RÜPPELL, Neue Wirbelthiere, p. 85, pl. XXII, fig. 1, Red Sea.

? *Sparus meaco* LACÉPÈDE, Hist. Nat. Poiss, IV, 1803, pp. 54, 160, Japan, on a manuscript of Thunberg.—CUVIER and VALENCIENNES, Hist. Nat. Poiss, II, 1828, p. 161. "Brown, with 6 white bands and a brown spot on the tail; scales large; jaws each with two canines; caudal rounded. D. IX-10. A. III, 8." The canine teeth seem to locate this very doubtful description near *Paramia quinquelineata* rather than with *Apogon schlegeli*.

Head  $2\frac{3}{5}$ ; depth  $3\frac{3}{5}$ ; D. VI-I, 9; A. II, 9. Scales 25. Eye 3 in head. Maxillary reaching to beyond middle of eye. Body with five longitudinal stripes of violet along the sides, the third one forming a spot at base of caudal; an unpaired sixth stripe along the belly from throat to vent; caudal with numerous diffuse cross-bands (Steindachner). Bleeker describes the black spot on the tail as ocellated with yellow, its center brown.

East Indies, a single specimen 130 millimeters long taken at Kago-shima by Dr. Döderlein and referred by Steindachner to this species; not seen by us. The identification is perhaps doubtful.

(*Quinque*, five; *lineata*, lined.)

### 3. MELANOSTOMA Döderlein.

*Melanostoma* DÖDERLEIN, Beitrage zur Kenntniss Fische Japans, II, 1883, p. 5 (*japonicum*).

Body rather elongate, covered with rather large, cycloid, deciduous scales, about 35 in lateral line; scales of head covered with very small scales; eyes large; jaws with a band of villiform teeth and with strong canines in front; small or villiform teeth on vomer and palatines; preopercle with its angle produced and with soft serrations; dorsal rays IX-I, 10; anal II, 7. Vent normal. Coloration black. Deep waters of Japan, distinguished from *Paramia* chiefly by the increased number of dorsal spines.

(μέλας, black; στόμα, mouth.)

### 14. MELANOSTOMA JAPONICUM Döderlein.

*Melanostoma japonicum* STEINDACHER and DÖDERLEIN, Fische Japans, II, 1883, p. 6, off Tokyo.

Head 3; depth 4; D. IX-I, 10; A. II, 8; scales 36; eye  $3\frac{2}{3}$  in head; snout  $4\frac{2}{5}$ . Body oblong, the back not much elevated; small scales on head covering the larger ones; base of soft fins more or less scaly; jaws equal; maxillary extending a little beyond middle of eye; supplemental maxillary evident; both jaws with a narrow band of villiform teeth, broader above; upper jaw with a strong canine in front on each side; lower jaw with about 5 canines; the fourth longest; fourth dorsal spine about half head; soft dorsal and anal concave on the margin; caudal forked; anal spines short, the second half eye; pectoral as long as head, without snout; swim bladder present; pyloric cœca 6 or 7.



Color everywhere black, including the mouth cavity. (Steindachner and Döderlein.)

Deep water outside of Tokyo Bay (near Misaki); one specimen 22 mm. long in the museum of Vienna; not seen by us.

6. *TELESCOPIAS* Jordan and Snyder, new genus.

*Telescopias* JORDAN and SNYDER, new genus (*gilberti*).

Body oblong, covered with small, thin, cycloid scales; jaws with small scales; soft fins mostly covered with small scales; eyes very large; mouth very large, with strong teeth; teeth in jaws principally in one series, canine-like, those in front of upper jaw and in sides of lower jaw largest; vomerine teeth villiform; palatine teeth small canines; preopercle with a produced membranous angle; first dorsal with eight spines; soft dorsal and anal long; concave on the margin; caudal lunate. Japan, in the Black Stream or Kuro Shiwo.

Size larger than in other genera of *Apogonidae*. It differs from *Melanostoma* mainly in the stronger dentition, the uniserial teeth of the jaws, and in the smaller scales.

(τελεσκοπός, far-seeing, from the large eyes.)

15. *TELESCOPIAS GILBERTI* Jordan and Snyder, new species.

KUROMUTSU: BLACK SCOMBROPS.

(Plate XLIV.)

Head  $3\frac{1}{5}$  in length; depth  $4\frac{1}{3}$ ; depth of caudal peduncle  $3\frac{1}{2}$  in head; eye  $3\frac{1}{2}$ ; interorbital space  $5\frac{1}{4}$ ; snout  $3\frac{1}{2}$ ; maxillary  $2\frac{1}{4}$ ; D. VIII–I, 13; A. II, 13. Scales in lateral series about 63; in transverse series 21.

Body elongate, the back not elevated; caudal peduncle somewhat cylindrical at its narrowest part. Head almost as deep as body. Interorbital space flat; its width about equal to three-quarters of the diameter of eye. Eye large; its diameter equal to length of snout; preorbital very narrow. Snout pointed. Lower jaw projecting; maxillary extending to a perpendicular, passing a little behind center of pupil; its posterior edge rounded. Upper jaw with an outer row of sharp canines; widely spaced; larger and stronger at anterior end of jaw, where there is a group of several on each side; posterior part of jaw with an inner, short row of minute teeth; lower jaw with a single row of sharp teeth similar to those above; largest on sides of jaw; vomer with a small patch of villiform teeth; palatines with a series of small, sharp teeth. Tongue notched anteriorly; with small patches of blunt teeth. First gill-arch with 10 long, slender gill-rakers, 1 on the upper part, 9 on the lower. Pseudobranchiæ large. A shallow pocket or fold between the preopercle and suspensorium of jaw opening into gill-chamber. Edge of preopercle without serrations; a large striated flap at its angle. Branchiostegals 7.



Head, except lips and branchiostegal region, covered with smooth, thin scales, these overlaid with smaller ones; those on upper part of head, on snout, and lower jaw small and minute. Body with large, smooth, thin scales. Fins all completely covered with small scales.

First dorsal spine somewhat more than half as long as the second; inserted close to it; third spine longest; fin when depressed fitting into a narrow groove; the tips of the spines not reaching insertion of soft dorsal. Spine of soft dorsal closely adnate to the first ray; membrane of fin thick and fleshy. Anal inserted below the middle of soft dorsal; the first spine very short; both spines closely adnate to the first ray; edges of both dorsal and anal fins concave. Caudal deeply notched. Pectorals pointed, about  $1\frac{2}{3}$  in head. Ventrals short, about  $2\frac{1}{6}$  in head.

Color everywhere blackish gray; lining of mouth and gill chambers bluish black.

Length about 500 millimeters.

*Type*.—No. 12657, Leland Stanford Junior University Museum. The type and a similar specimen were taken on long hand lines (dabonawa) by Kumakichi Aoki in the deep water between Misaki and the island of Oshima.

(Named for Professor Charles Henry Gilbert.)

#### 7. SCOMBROPS Schlegel.

*Scombrops* TEMMINCK and SCHLEGEL, Fauna Japonica, 1846, p. 118 (*cheilodipteroïdes* = *boops*).

*Latebrus* POEY, Memorias, II, 1860, p. 168 (*oculatus*).

Body elongate, covered with small, thin, smooth scales; mouth very large; lower jaw longest; 2 to 4 long canines in upper jaw, besides strong lateral teeth; a series of canines in lower; teeth in bands on vomer and on palatines; preopercle not serrated; its angle produced; opercle with 2 feeble points; tongue notched; eye large. Branchiostegals 7. Dorsals separated, the first of 8 very feeble spines; anal spines 3; soft dorsal and anal rather long, of 12 to 14 rays, the membranes scaly. Pyloric cæca 6 to 15. Gill-rakers long. Soft-bodied fishes, living in rather deep water.

(*Scomber*, mackerel; *鯧*, appearance.)

#### 16. SCOMBROPS BOOPS (Houttuyn).

MUTSU; OKIMUTSU (OFF SHORE MUTSU).

*Sparus boops* HOUTTUYN, Beschryving Jap. Visschen, 1782, pp. 311–346, Nagasaki.

*Scombrops boops* JORDAN and SNYDER, Proc. U. S. Nat. Mus., XXIII, 1901, p. 750.

*Scombrops* SCHLEGEL, Fauna Japonica, Poiss. 1847, p. 118, pl. LXII, fig. 2, Nagasaki.

*Scombrops cheilodipteroïdes* BLEEKER, Verhand. Bat. Gen. XXV, Japan, p. 9;

XXVI, Japan, p. 58, Nagasaki.—GÜNTHER, Cat. Fish., I, 1859, p. 249, Japan.—

STEINDACHNER and DÖDERLEIN, Fische Japans, II, 1883, p. 5, "in ganz Japan."—NYSTROM, Handl. Svensk. Vet. Ak., 1887, p. 9, Nagasaki.—JORDAN

and SNYDER, Proc. U. S. Nat. Mus., XXIII, 1900, p. 353, Tokyo.



Head  $3\frac{1}{6}$  in length; depth  $3\frac{2}{3}$ ; depth of caudal peduncle  $3\frac{1}{4}$  in head; eye  $3\frac{1}{5}$ ; interorbital space  $4\frac{2}{5}$ ; snout  $3\frac{1}{4}$ ; maxillary 2; D. VIII–I, 13; A. III, 13; scales in lateral series 53; in transverse series 17.

Body rather elongate, the dorsal and ventral contours evenly rounded. Head elongate, pointed. Eye large, the margin not projecting above dorsal contour of head; interorbital space flat or slightly convex. Snout sharp, its length about equal to diameter of eye. Mouth not very oblique; lower jaw slightly projecting; maxillary extending to a point about midway between pupil and posterior edge of orbit; its posterior edge rounded. Teeth in single rows on jaws, canine-like, very sharp; those of lower jaw largest on the sides; the corresponding ones of the upper jaw much smaller; a group of 3 or 4 large teeth on anterior part of upper jaw; very small, sharp teeth on vomer and palatines. Tongue notched. Gill-rakers on first arch 6+15, long and slender, those farthest from angle of arch very small. Pseudobranchiæ large. A shallow pocket or fold between suspensorium of lower jaw and preopercle, opening into the branchial cavity. Edge of preopercle entire; its lower part with a large flap. Branchiostegals 7.

Head completely scaled except on lips and branchiostegal region; scales of interorbital area, snout, maxillary, and lower jaw minute. Body with rather small, smooth scales, which are easily displaced. Soft dorsal, anal, and basal parts of pectorals, ventrals, and caudal with minute scales.

Spinous dorsal rather low; the fin when depressed not nearly reaching insertion of soft dorsal. Second dorsal and anal with thick, fleshy membranes; posterior edges of fins concave; first spine of anal very small. Caudal deeply notched. Pectorals pointed; their length about  $1\frac{1}{2}$  in head. Ventrals 2 in head.

Color steel blue or grayish; belly more or less yellowish; a faint dusky spot on upper part of opercle; inside of mouth pale.

Coast of Japan, generally common, in water of considerable depth, 20 to 400 fathoms. It is an excellent food-fish of soft flesh and is common in the markets as *Mutsu*. Our many specimens are from Same, Minato, Matsushima, Awa, Tokyo, Misaki, Enoshima, Tateyama, Wakanoura, Kobe, and Nagasaki.

( $\beta\sigma\tilde{\upsilon}\varsigma$ , bull;  $\omega\psi$  eye; from the large eye.)

#### 8. ACROPOMA Schlegel.

*Acropoma* SCHLEGEL, Fauna Japonica, Poiss., 1846, p. 31 (*japonicum*).

Body oblong, covered with moderate-sized deciduous, ciliated scales. Mouth large, the lower jaw longest; villiform teeth in both jaws and on the vomer and palatines, besides very small teeth in each jaw; preopercle entire; opercle produced in a very long thin membraneous flap, with a denticulate edge. Vent inserted far forward, nearer the



base of the ventrals than the anal. Dorsal rays VII-I, 10; anal III, 7. Caudal forked.

The single species resembling *Apogon*, but with the vent very differently placed. It is arranged, perhaps justly, in a separate family by Dr. Theodore Gill.

(ἄκρος, sharp; πῶμα, opercle.)

17. *ACROPOMA JAPONICUM* Günther.

*Acropoma* SCHLEGEL, Fauna Japonica, Poiss., 1847, p. 31, pl. XII, figs. 2, 3, Nagasaki.

*Acropoma japonicum* GÜNTHER, Cat. Fish., I, 1859, p. 250, after Bleeker.

Head  $2\frac{3}{5}$  in length; depth  $3\frac{2}{5}$ ; depth of caudal peduncle  $3\frac{1}{3}$  in head; eye  $3\frac{1}{4}$ ; interorbital space  $4\frac{1}{2}$ ; snout  $3\frac{1}{2}$ ; maxillary  $2\frac{2}{5}$ ; D. VII-I, 10; A. III, 7; scales in lateral series about 49; in transverse series 10 or 11.

Body rather elongate; the back a little elevated. Margin of eye not projecting above dorsal outline of head. Interorbital space somewhat convex; a low ridge in the middle. Snout shorter than diameter of eye; pointed. Lower jaw projecting beyond the upper; maxillary reaching a perpendicular through center of pupil; its posterior edge concave. Teeth in bands on jaws, vomer, and palatines; some of those

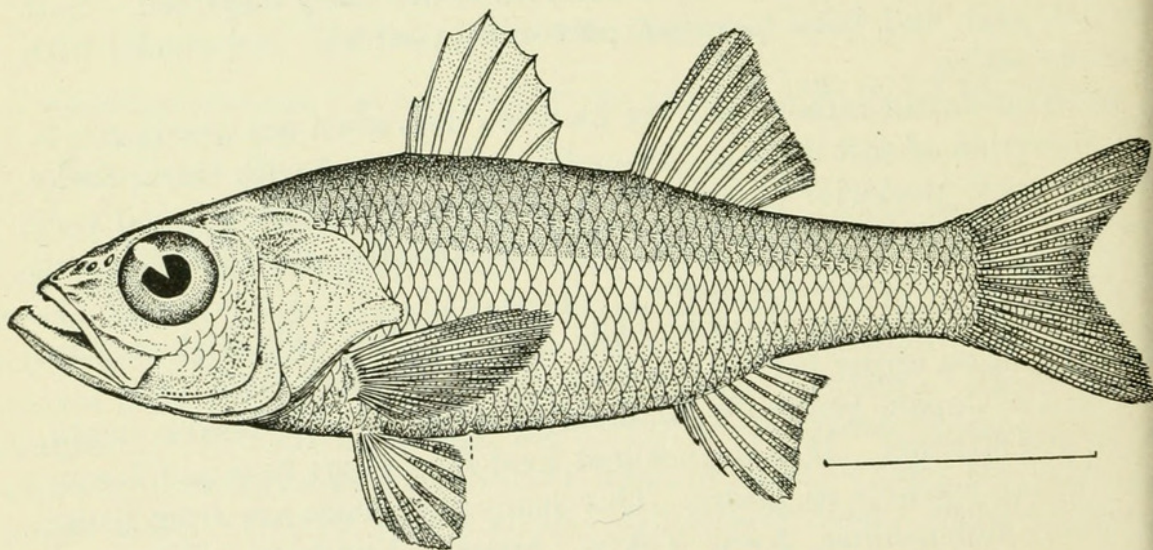


FIG. 10.—*ACROPOMA JAPONICUM*.

in front of upper jaw and on tip and sides of lower jaw enlarged in slender canines; tip of lower jaw elevated; the canines on the raised part. Gill-rakers on first arch 5+14; long and slender. Pseudo-branchiæ large. Tongue pointed. Preopercle with a double edge, entire; the posterior part very thin. Opercular flap long; with 2 or 3 small denticulations posteriorly.

Scales thin, weakly ctenoid, easily displaced.

Dorsal spines slender, not reaching insertion of soft dorsal when depressed. Membranes of soft dorsal and anal fins very thin, not fleshy; anal inserted below a point a little posterior to middle of dorsal;



edges of both fins concave. Caudal deeply forked. Pectorals pointed, contained about  $1\frac{1}{2}$  in head. Ventrals about 2 in head; extending beyond anal opening, which is located far forward.

Color in life, light red; lower half abruptly silvery; fins all light reddish; inside of gill chamber blackish. Alcoholic specimens retain much of the silver on the lower parts, have the upper edge of the orbit dusky, and have a somewhat indefinite dusky longitudinal band on lower half of body.

Length 80 to 125 millimeters. An interesting species allied to *Scombrops* and *Apogon*, but with the vent advanced forward. Southern Japan; rather rare. Our specimens are from Wakanoura and Misaki.

#### RECAPITULATION, WITH LOCALITIES.

##### Family APOGONIDÆ.

1. *Apogonichthys* Bleeker.
  1. *carinatus* (Cuvier and Valenciennes); Misaki, Wakanoura, Nagasaki.
  2. *glaga* (Bleeker; not seen).
2. *Apogon* Lacépède.
 

§ *Ostorhinchus* Lacépède.

  3. *niger* Döderlein; Nagasaki, Mogi.
  4. *marginatus* Döderlein; Wakanoura.
  5. *unicolor* Döderlein; near Yokohama.
  6. *lineatus* Schlegel; Tokyo, Yokohama, Owari, Enoshima, Wakanoura, Kobe, Onomichi, Miyajima, Hiroshima, Tsuruga, Kawatana, Hakata, and Nagasaki.
  7. *schlegeli* Bleeker; Nagasaki.
  8. *döderleini* Jordan and Snyder; Nagasaki.
  9. *semilineatus* Schlegel; Tokyo, Yokohama, Yodomi, Enoshima, Misaki, Wakanoura.
  10. *notatus* (Houttuyn); Wakanoura, Nagasaki.

§ *Apogon*.

  11. *kiensis* Jordan and Snyder; Wakanoura.
3. *Archamia* Gill.
  12. *kagoshimana* Döderlein; not seen.
4. *Paramia* Bleeker.
  13. *quinquelineata* (Cuvier and Valenciennes); not seen.
5. *Melanostoma* Döderlein.
  14. *japonicum* Döderlein; not seen.
6. *Telescopias* Jordan and Snyder.
  15. *gilberti* Jordan and Snyder; Misaki.
7. *Scombrops* Schlegel.
  16. *boops* (Houttuyn); Same, Minato, Tateyama, Matsushima, Awa, Misaki, Enoshima, Wakanoura, Kobe, Nagasaki.
8. *Acropoma* Schlegel.
  17. *japonicum* Günther; Wakanoura, Misaki.





Jordan, David Starr and Snyder, John Otterbein. 1901. "A review of the cardinal fishes of Japan." *Proceedings of the United States National Museum* 23(1240), 891–913. <https://doi.org/10.5479/si.00963801.23-1240.891>.

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