

***Apogon seminigracaudus*, a New Cardinalfish Species Previously Misidentified as *Apogon fuscus* (Teleostei: Apogonidae)**

David W. Greenfield<sup>1</sup>

California Academy of Sciences, 875 Howard Street, San Francisco, California 94103 USA

*Apogon seminigracaudus* is a small, red, semitransparent cardinalfish with blackish coloration on the caudal peduncle and lower caudal-fin lobe. This species was first illustrated by Jordan and Seale (1906) and misidentified as *Apogon fuscus* (Quoy and Gaimard). Subsequent workers followed this misidentification, and the species has remained undescribed for over 100 years. *Apogon seminigracaudus* is in the subgenus *Apogon*, and shares a distinctive structure around the anterior nostril with *A. doryssa*, *A. lativittatus*, and *A. semiornatus*. It has 13 pectoral-fin rays, usually 4 + 14 gill rakers, and one and a half scales between the lateral line and center of the first dorsal fin. It is known from Japan, Ryukyu Islands, Ogasawara Islands, Fiji, Tonga, and Samoa.

In 1906, Jordan and Seale, in their *Fishes of Samoa*, illustrated a cardinalfish they identified as *Amia fusca* (Quoy and Gaimard) (Jordan and Seale 1906:244, fig. 38) (Fig. 1). They had a single specimen from Apia. This illustration shows a fish with black markings on the caudal peduncle and lower half of the caudal fin, and they commented on its distinct coloration. Subsequent to their identification of their specimen as *Amia fusca*, later workers followed suit and used the name *Apogon fuscus* for this species (Kuitert and Kozawa 1999; Hayashi 2002).

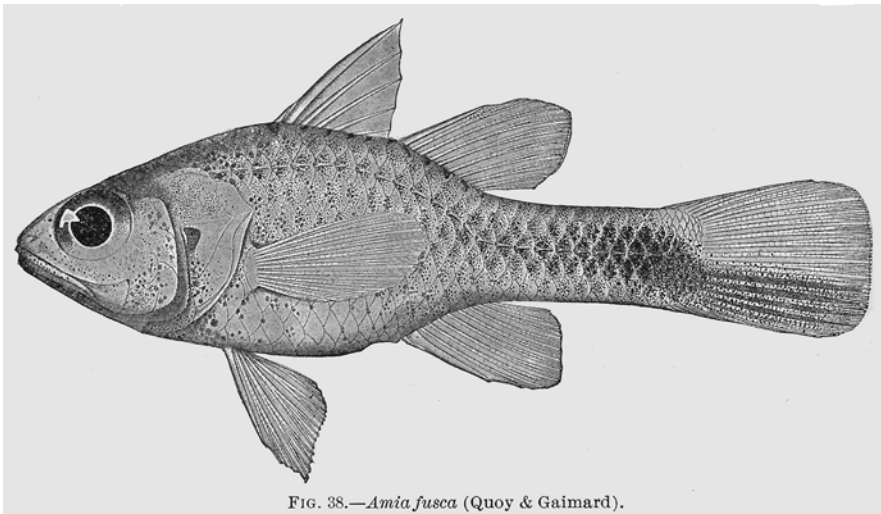


FIG. 38.—*Amia fusca* (Quoy & Gaimard).

FIGURE 1. Figure 38 of *Amia fusca* (Quoy and Gaimard) from Jordan and Seale (1906).

<sup>1</sup> Research Associate, Department of Ichthyology, California Academy of Sciences and Emeritus Professor, University of Hawaii. Email: greenfie@hawaii.edu. Mailing address: 944 Egan Ave., Pacific Grove, CA 93950.

While conducting a survey of the marine fishes of Fiji, I collected over twenty lots of this small, red cardinalfish with a blackish caudal peduncle and black pigment on the lower half of the caudal fin. In attempting to identify these specimens, I investigated the name *A. fuscus* that had previously been applied to this species. Because the name *fuscus* has also been associated with the *Apogon bandanensis* group (Myers 1989), I contacted T.H. Fraser who is revising that group, and he informed me (pers. commun., 31 Jan. 2007) that in a future publication he will be treating *A. fuscus* as a valid species within the *bandanensis* group. Earlier, I had concluded that the use of *A. fusca* by Jordan and Seale (1906) was a misidentification (Greenfield 2001).

In a revision of the *Apogon erythrinus* complex (Greenfield 2001), I discussed all of the semi-transparent red cardinalfish species that have been described. The only name that is not accounted for is *Apogon arenatus* Bleeker (1859–60). Bleeker based his description on a drawing by Castelnau (location unknown), and there is no holotype. The color description Bleeker gives does not match that of the species in question, which was first illustrated by Jordan and Seale (1906). Three additional recently described species, *Apogon lativittatus* (Randall, 2001) and *Apogon kauteame* and *Apogon rubrifuscus* (Greenfield and Randall, 2004), also are not this species. Thus, although this species has been illustrated several times, it remained undescribed for over 100 years. The purpose of this paper is to describe the species as *Apogon seminigracaudus*.

## MATERIALS AND METHODS

All counts and measurements follow Hubbs and Lagler (1964) except that the last two fin rays of the dorsal and anal fins are not counted as one unless it is clear that they are joined at the base. Also, caudal-peduncle length is measured horizontally not obliquely. Measurements were made to the nearest 0.1 mm using dial calipers and are expressed as percentage of standard length (SL). Length of dorsal-fin spines was measured by placing one end of the caliper tip at the base of the spine pushed against the posterior base of the spine anterior to it and the other caliper tip at the spine tip. Gill-raker counts include rudiments. Data for the holotype are presented first, followed by values for all specimens in parentheses if different. Institutional abbreviations are as listed in Leviton et al. (1985).

## SPECIES DESCRIPTION

### *Apogon seminigracaudus* Greenfield, sp. nov.

Figures 1–4.

**MATERIAL EXAMINED.**— HOLOTYPE: CAS 224639 (Fig. 2), 29.7 mm SL. Fiji, N. shore of Vanua Levu, reef N.E. of Yaqaga Id. and N.W. of Ovatoa Reef, 16°30.717'S, 178°38.730'E, 14 m, isolated patch reef on sand flat, 25 March 2002, field number G02-105, rotenone, collected by D.W. Greenfield, R.C. Langston, K.R. Longenecker. PARATYPES: CAS 224640, 32.6 mm, Fiji, Viti Levu, Nasava Bay, 17°29.442'S, 178°21.171'E, 5.6–8.0 m, fringing reef, 4 November 2002, field number G02-143, rotenone, D.W. Greenfield, K.S. Cole, R.C. Langston, K.R. Longenecker; CAS 224641, 30.3 mm. Fiji, N. shore of Viti Levu, Nananu-i-Ra, 17°16.704'S, 178°12.932'E, 3.1–5.8 m, fringing reef, 15 November 2002, field number G02-186, rotenone, D.W. Greenfield, K.S. Cole, R.C. Langston, K.R. Longenecker; AMS I.44090-001, 27.7 mm, taken with CAS 224641; BM(NH) 2007.4.4.1, 29.9 mm, taken with CAS 224641; BPBM 40508, 32.6 mm, Fiji, E. coast of Vanua Levu, Nasau Bay, 16°43.650'S, 179°53.970'E, 0.31–3.1 m, patch reef, 25 May 2003, field number G03-61, rotenone, D.W. Greenfield, T.A. Greenfield; FMNH 117287, 31.9 mm. Same location as holotype, 25 March 2002, field number G02-104, rotenone, D.W. Greenfield, R.C. Langston, K.R. Longenecker, B.K. Mataitini; NSMT-P 76275, 30.3 mm, taken with FMNH 117287; SAIAB (RUSI) 79500, 30.4 mm, taken with CAS 224641; USNM 389555, 31.4 mm, taken with BPBM 40508.

*Apogon seminigracaudus* (NON-TYPE MATERIAL): Fiji: CAS 224642(1), CAS 224643(2), CAS 224644(1),



FIGURE 2. Holotype of *Apogon semigracaudus* Greenfield, CAS 224639, 29.7 mm SL.

CAS 224645(1), CAS 224646(2), CAS 224647(1), CAS 224648(5), CAS 224649(5), CAS 224650(1), CAS 224651(1), CAS 224652(3), CAS 224653(2), CAS 224654(2), CAS 224655(3), CAS 224657(2), CAS224658(1), USNM 245650(1). Tonga: USNM 341780(2), USNM 341781(3).

*Apogon lativittatus* (PARATYPES): BPBM 11032 (5), Marquesas Islands.

*Apogon semiornatus*: BPBM 23453(2), Philippine Islands; BPBM 32375(2), Indonesia.

*Apogon doryssa*: CAS 224659(3), Fiji.

**DIAGNOSIS.**— A small, usually less than 33 mm SL, semitransparent, red species with a blackish stripe on the center of the caudal peduncle, extending posteriorly onto the lower half of the caudal fin; with six spines in the first and one spine and nine rays in the second dorsal fin; two spines and eight rays in the anal fin; 13 pectoral-fin rays; 4–5 + 13–15 (usually 4 + 14) gill rakers (rudiments included) on the first gill arch; one scale (plus  $\frac{1}{2}$  sometimes) between the lateral line and the base of the third spine of the first dorsal fin; anterior nasal opening lacking a posterior flap and with an indentation in the skin below it (Fig. 3); two predorsal (supraneural) bones.

**DESCRIPTION.**— Dorsal-fin elements VI-I,9; anal-fin elements II,8; all dorsal and anal soft rays branched, the last to base; pectoral-fin rays 13, upper two and lower one unbranched; pelvic rays I,5; lateral line complete, the pored scales 24; predorsal scales 6; scales above lateral line to center of first dorsal fin one (plus  $\frac{1}{2}$  sometimes); transverse scales 10; circumpeduncular scales 12; gill rakers 4+14 [4+13(5), 4+14(11), 5+14(2), 5+15(2)], in the holotype two developed and two rudimentary on the upper arch and four rudimentary and 10 developed on the lower arch. Gill raker counts based on 10 types plus 10 non-type specimens.

**MEASUREMENTS** (based on holotype and nine paratypes): Measurement for holotype presented first, followed by range for all types and the mean in parentheses, all in percentage of SL. Standard length 27.7–32.7 mm. Greatest body depth 35.5 (32.0–35.5, 33.8). Body width 16.8 (15.6–18.1, 17.0). Head length 38.9 (38.0–40.8, 39.2). Snout length 7.4 (5.8–7.8, 6.9). Orbit diameter 14.8 (12.1–15.1, 13.9). Bony interorbital width 7.1 (7.1–10.0, 8.1). Upper-jaw length 20.9 (18.3–24.4, 21.1). Caudal-peduncle depth 12.6 (10.8–12.6, 11.8). Caudal-peduncle length 30.6 (26.4–30.6,



FIGURE 3. Fresh color of *Apogon semigracaudus* Greenfield, CAS 224642, 35.0 mm SL.

28.8). Predorsal length 40.7 (40.3–44.9, 42.1). Preanal length 58.2 (55.1–60.9, 58.7). Prepelvic length 35.0 (31.4–39.0, 34.3). First dorsal-fin spine length 5.2 (5.2–7.7, 6.6). Second dorsal-fin spine length 27.9 (25.4–27.9, 26.5). Third dorsal-fin spine length 24.6 (17.8–24.6, 21.2). Length of spine of second dorsal fin 16.2 (13.8–16.2, 15.1). Longest dorsal ray 25.9 (1<sup>st</sup>) (22.3–28.3, 24.6 (1<sup>st</sup> or 2<sup>nd</sup>)). First anal-fin spine 5.7 (4.3–5.9, 5.0). Second anal-fin spine 15.8 (14.1–18.5, 15.8). Longest anal ray 23.6 (1<sup>st</sup>) (20.7–25.0, 22.6 [1<sup>st</sup> or 2<sup>nd</sup>]). Last anal ray 12.1 (9.9–14.5, 11.5). Caudal-fin length 35.2 (29.4–35.2, 32.2). Caudal-fin concavity 14.0 (10.3–14.1, 12.1). Pectoral-fin length 30.3 (24.0–30.3, 27.2). Pelvic-spine length 22.0 (18.4–22.0, 20.2). Pelvic-fin length 29.3 (24.8–29.3, 26.3). Caudal fin is forked; the illustration in Jordan and Seale (1906) is in error showing a rounded caudal fin.

**COLOR** (of fresh specimen; from 35mm transparency of CAS 224649): Head and body semi-transparent, overlaid with a wash of pink anteriorly and red posteriorly. Abdomen silvery in sharp contrast to the rest of the body. Red color of gill filaments showing through opercular area. Scales along back and sides with dark pigment in the central portion, resulting in a pattern of crescents. Blackish pigment increasing posteriorly along the caudal peduncle becoming black at caudal-fin base and onto the lower caudal-fin lobe. The upper caudal-fin lobe and all other fins red. Outer rim of orbit with a dark edge, pupil black and iris bright silver. Kuiter and Kozawa (1999) have an underwater photograph of this species from Kerma, Japan, on page 80 of their CD. Their photograph shows a bluish tinge to the dark scales on the nape and also on the iris of the eye.

**COLOR** (in alcohol): Head and body straw colored. Area over brain brown. Predorsal scales and scales along base of first two spines of first dorsal fin with heavier brown pigment. Sides of the head and body above level of pectoral fin with a lighter peppering of brown pigment. Caudal peduncle with heavier brown pigment, intensifying towards caudal-fin base, and extending onto lower lobe of caudal fin. Upper caudal-fin lobe and all other fins clear. Iris of eye black, pupil dark straw.

**ETYMOLOGY**.— The specific epithet is a compound adjective from the Latin, *semis* (half), *niger* (black), and *cauda* (tail) in reference to the black pigment on the lower half of the caudal fin.

**HABITAT**.— *Apogon seminigracaudus* was collected in Fiji between 0.3 and 15 meters. A single specimen was collected at 30.1 m in Fiji by V.G. Springer. In examining field data for 20 different collections, all were either from patch reefs on sand or at fringing reefs close to shore. Almost all stations had comments about one or more of the following conditions: silty or fine sand, heavy silt, heavy algae, dead coral, and bleaching. It thus appears that this species does not usually occur in more pristine coral-reef habitats.

**RANGE**.— Hayashi (2002) reports this species from Japan, Ryukyu Islands, and the Ogasawara Islands. It is recorded from Fiji in this paper, and specimens from the Tonga Islands (USNM 341780 and 341781 misidentified as *A. semiornatus*) have been examined. Jordan and Seale (1906) illustrated this species from Samoa.

**COMPARISONS**.— *Apogon seminigracaudus* belongs to a group of small, red, semitransparent species in the subgenus *Apogon*. Greenfield (2001) recognized two phenetic groups among these fishes, both defined by the structure of the snout around the anterior nostril and the number of scales between the lateral line and the first dorsal fin. In the *erythrinus* complex, containing *A. erythrinus*, *A. indicus*, *A. marquesensis*, and *A. susanae*, the skin at the end of the snout covers the nasal bones and extends over the ascending process of the premaxilla smoothly with no free edge near the anterior nasal opening, and two large, full, scales between the lateral line and first dorsal fin (Greenfield 2001: Figs. 1A, C, G). In the *coccineus* complex, containing *A. crassiceps* and *A. campbelli*, there is a free edge of skin near the anterior nasal opening (a flap), and only a single large, full scale between the lateral line and the first dorsal fin (Greenfield 2001: Figs. 1B, D, F). A smaller half scale may be present in addition to the full scales in both complexes. Greenfield and Randall (2004)

described another species from Easter Island, *A. kauteamea*, that has the nasal flap of the *coccineus* complex, but has two scales between the lateral line and the first dorsal fin. They then redefined the two complexes only on the basis of nasal structure.

*Apogon seminigraudus* has a nasal structure that differs from both the *erythrinus* and *coccineus* complexes (Fig. 4), and shares this pattern with *A. lativittatus*, *A. semiornatus*, and *A. doryssa*. The ventral edge of the preorbital that overlaps the premaxilla extends anteriorly to under the anterior nostril where there is an indentation. There is no flap posterior to the nostril as in the *coccineus* complex, nor is the lower edge smooth and continuous as in the *erythrinus* complex. Just anterior to the nostril is a free flap that extends ventrally with an opening in it where a probe may be inserted. Again, this is only a phenetic grouping and there is no evidence that this is a shared derived character.

In terms of coloration, only *A. doryssa* lacks some blackish pigmentation on the body. The other three species have different patterns of blackish areas on the body. *Apogon lativittatus* has a blackish area along the lateral line on the caudal peduncle that runs onto the center of the caudal fin. *Apogon semiornatus* also has blackish pigmentation along the lateral line of the caudal peduncle extending onto the center of the caudal fin, but also has a blackish band extending from the eye posteriorly onto the opercle, and another band from the pectoral-fin base to the anal fin. *Apogon seminigraudus* has blackish pigmentation on the caudal peduncle running along the lateral line, but it extends posteriorly only onto the lower half of the caudal fin.

*Apogon seminigraudus* further differs from *A. doryssa* by having 13 pectoral-fin rays instead of 11–12. It differs from *A. semiornatus* by having 13 pectoral-fin rays (all 20 specimens), whereas Randall (2001) states that of 21 specimens of *A. semiornatus*, 19 had 12 rays and only two had 13. *Apogon semiornatus* also has 12–13 gill rakers on the lower arch, whereas *A. seminigraudus* usually has 14. *Apogon lativittatus* differs from *A. seminigraudus* by being a larger species (to 58.4 versus 32.6 mm SL for the largest *A. seminigraudus*) and by having two and a half scales between the lateral line and the center of the first dorsal fin versus one and a half. It also has 12–13 gill rakers on the lower arch rather than 14, and has a deeper body (33.0–38.8, mean = 35.7% SL versus 32.0–35.5, mean = 33.8% SL). Most obviously it differs from all apogonid species by its distinctive coloration.

Randall (2005) reported that *Apogon semiornatus* occurs in the Indian Ocean and southern Japan to the Great Barrier Reef and New Caledonia, and no other localities in Oceania, and *A. lativittatus* is known only from the Marquesas Islands. *Apogon doryssa* is more widespread, ranging from the Indian Ocean across to the Tuamotu Archipelago. It is likely that specimens from Oceania identified as *A. semiornatus*, like those from Tonga at the USNM (Randall et al. 2003), might in fact be *A. seminigraudus*.

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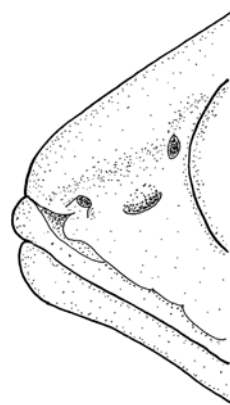


FIGURE 4. Snout morphology of *Apogon seminigraudus*, CAS 22460, paratype, 32.6 mm SL.

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