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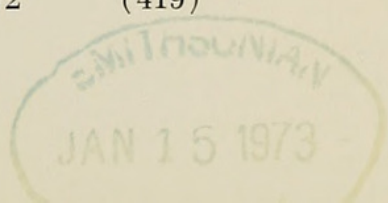
APOGON LEPTOCAULUS, A NEW CARDINALFISH
FROM FLORIDA AND THE WESTERN
CARIBBEAN SEA

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The shallow-water species of Atlantic Apogonidae have been the subject of several recent systematic papers (Böhlke, 1959; Böhlke and Randall, 1968; Fraser and Robins, 1970). Twenty-two valid species, belonging to three genera, have so far been described from the area; 16 belong to the genus *Apogon*, three to the genus *Phaeoptyx*, and three to the genus *Astrapogon*. Of these, *Apogon imberbis* (Linnaeus) occurs only in the eastern Atlantic, *Apogon americanus* Castelnau is confined to the southwestern Atlantic, and *Apogon axillaris* (Valenciennes) apparently is endemic to the islands of Ascension and St. Helena, in the mid-southern Atlantic (Bauchot and Blanc, 1961:68-69; Cadenat and Marchal, 1963:1272). *Apogon affinis* (Poey) and *Phaeoptyx pigmentaria* (Poey) occur on both sides of the ocean (Fraser and Robins, 1970). *Apogon powelli* Fowler, which was tentatively recognized by Böhlke and Randall (1968), has been shown (Fraser and Robins, 1970) to be a junior synonym of *A. imberbis*. Six additional species, all in the genus *Apogon*, occur in the eastern Pacific. Most of these species appear to be most common at shallow to moderate depths, although adults of *Apogon anisolepis* Böhlke and Randall¹ and *A. affinis* apparently have their center of abundance at greater depths (150-300 feet).

¹The status of *Apogon anisolepis* will be discussed in a subsequent paper by Böhlke and Randall.



In July 1970 I collected a specimen of a distinctive new *Apogon* off Boca Raton, Florida, and in August 1971 I obtained a second individual off Providencia Island, in the western Caribbean. Dr. David W. Greenfield subsequently sent me a third specimen he had taken on Glovers Reef, off the coast of British Honduras. Inasmuch as these are the only specimens known from hundreds of western Atlantic reef-fish collections, the new species evidently is rare in shallow water, and probably is also one that attains its greatest abundance in relatively deep water. The systematics of the shallow-water western Atlantic Apogonidae are well understood, and thus it seems desirable to describe this distinct new form (the 23rd from Atlantic waters) from the three specimens.

Type material has been deposited at the Academy of Natural Sciences of Philadelphia (ANSP), the Field Museum of Natural History (FMNH), and the Florida State Museum, University of Florida (UF). Measurements were made with dial calipers and recorded to the nearest 0.1 mm. Body proportions are expressed as thousandths of standard length (SL). Step measurements appearing in the second and third paragraphs of the description are based on the two largest specimens. The order and format in which the various morphological characters appear in the description is similar to that appearing in Böhlke and Randall's (1968) paper.

Appreciation is extended to Thomas H. Fraser, J. L. B. Smith Institute of Ichthyology, Rhodes University, Grahamstown, Republic of South Africa, and James E. Böhlke, Academy of Natural Sciences of Philadelphia, for comments regarding the new species; David W. Greenfield, Northern Illinois University, for loan of one of the paratypes; Carl L. Hubbs, Scripps Institution of Oceanography, for suggestions and help regarding the species name; Sid R. Anderson, New Milford, Connecticut, for the opportunity to conduct field work on Providencia Island; Kay Purington, Florida State Museum, who took the photograph; and John Larsen, John Dwyer, William Astras, Russell Parks, and Dianne Lieberman, who aided in the fieldwork.

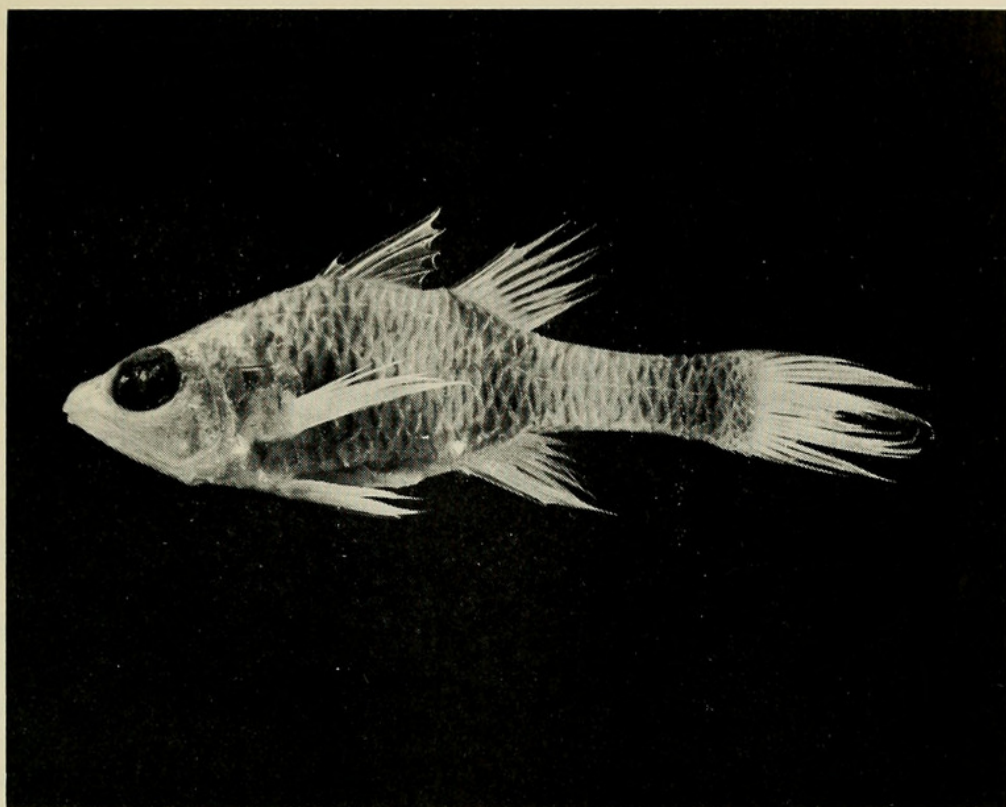


FIG. 1. *Apogon leptocaulus* new species; holotype UF 17287, 51.5 mm SL, off Boca Raton, Florida, 65–70 ft.

Funding for fieldwork resulting in collection of the first (Florida) specimen of the new *Apogon* was provided by research contract number DACW-72-71-C-0004 from the Coastal Engineering Department of the Army to Dr. Walter R. Courtenay, Jr. (Project Leader), Florida Atlantic University, Boca Raton, Florida.

Apogon leptocaulus new species

Slendertail cardinalfish

Figure 1

Holotype: UF 17287 (51.5 mm SL); Florida, Palm Beach Co., Atlantic Ocean, ca. 3700 yds. off Boca Raton, depth 65–70 ft.; in a low coral ridge; 19 July 1970; C. R. Gilbert and party (field no. G 70-4).

Paratypes: ANSP 117463 (41.8 mm SL); Colombia, Providencia Id., Caribbean Sea, WNW of Santa Catalina Id., south of "Channel Mouth," depth 95–100 ft.; in small cave along moderately sloping dropoff; 18 August 1971; C. R. Gilbert and party (field no. G 71-51). FMNH

71014 (23.5 mm SL); British Honduras, Glovers Reef, dropoff area just south of Long Cay, depth 70–100 ft.; 22 December 1970; D. W. Greenfield and G. Deckert (field no. G 70-127).

Diagnosis: A species of *Apogon* with six first-dorsal spines; a shallowly forked caudal fin; complete lateral line; a long, very slender caudal peduncle, with eight caudal-peduncle circumferential scales; dentigerous portion of premaxillary continued outside mouth laterally on bone, as in *Apogon robbinsi*; free preopercular margin with a well-developed, rounded flap of skin (not so well developed or evenly rounded as in genus *Phaeoptyx*) that extends posteriorly beyond an imaginary ventral continuation of the line formed by the free posterior preopercular margin and covers (but does not extend past) part of angle of opercle; posterior half of each scale with a narrow, vertical, broadly crescentic area of dark pigment, particularly evident in preserved specimens, varying somewhat in width but never extending back to border of scale; a broad band of pigment, nearly the width of second dorsal and anal-fin bases, extending from second dorsal fin to the anal fin, and an equally broad band of pigment encircling posterior part of caudal peduncle; neither band sharply defined; body deep red in life; head pointed; dark pigment on posterior parts of upper and lower caudal lobes.

Description: Dorsal rays VI-I,9 (last ray composite); anal rays II,8 (last ray composite); pectoral rays I,11; lateral-line scales to caudal-fin base 25; scales above lateral line 2; scales below lateral line 7 or 8; predorsal scales 8; scales around caudal peduncle 8; gill rakers on first arch 5 or 6 + 15 or 16 = 20 to 22; serrae along vertical limb of free preopercular margin 13 to 18.

Greatest depth of body contained 3.1 to 3.2 times in standard length (SL); caudal peduncle long, its length slightly less than greatest body depth (1.1 times in body depth, 3.3 to 3.4 in SL); caudal peduncle very slender, its least depth 2.6 times in its length; head length 2.5 in SL; eye diameter 3.2 to 3.4 in head length; snout length 4.5 to 4.8 in head length; end of snout bluntly pointed; dorsal profile of head a straight line from just above terminal curve of snout to origin of dorsal fin.

First dorsal spine 2.6 to 2.7 in length of second dorsal spine; second dorsal spine equal to, or slightly longer than, third; second dorsal spine thickest spine in fin; spine of second dorsal fin 1.4 to 1.5 in second spine of first dorsal fin; pelvic fins extending posteriorly almost to anal-fin origin; innermost pelvic rays connected to body by membrane at or just beyond halfway out on its mesial branch; pectoral fins narrow and rather long, extending posteriorly to midpoint of anal-fin base; first anal spine short, its length 3.9 to 4.0 in length of second spine; second anal spine 0.9 to 1.0 in length of spine in second dorsal fin; caudal fin moderately forked, the lobes blunt.

Upper angle of rear margin of maxillary extending posteriorly to a vertical about four-fifths of way below posterior part of eye; rear

margin of maxillary slightly concave; upper edge of maxillary slipping up beneath suborbital when mouth is closed; no orbital or anterior preopercular serrations; posterior margin of preopercle finely serrate; free tip of opercular spine short, sharp, and broad-based; anterior nostril tubular; posterior nostril a simple, broad, teardrop-shaped opening that is nearer eye than anterior nostril.

Large ctenoid scales present on cheek and opercle; scales on body all finely ctenoid, including those on thorax and nape, except for a few anteriorly on thorax and those before pectoral-fin base; scales on nape extending forward to occiput line; fins naked except for small scales basally on caudal fin; lateral line complete; lateral-line scales similar in size to adjacent body scales.

Tiny villiform teeth present on jaws, vomer, and palatine, none of them enlarged; teeth on jaws in broad patches; tooth patches on palatines in single series; gill rakers long and slender, particularly those on lower limb of first arch near angle; longest raker about three times length of opposing gill filament in outer series.

Body color deep red throughout; anterior half of anal fin red, the red extending posteriorly along base; pelvic and spinous dorsal fins reddish throughout; anterior part of soft dorsal fin with red pigment extending back along rays; caudal fin red, becoming lighter medially.

In the following paragraph morphometric and meristic data are listed (in order) for the holotype, the larger paratype, and the smaller paratype. Measurements are given in thousandths of SL. Greatest body depth 326, 316, 251; greatest body width 194, 203, 128; snout to first dorsal fin 394, 409, 404; snout to second dorsal fin 586, 598, 583; snout to anal fin 590, 593, 604; snout to pectoral fin 348, 373, 378; snout to pelvic fins 344, 364, 345; snout to anus 526, 543, 562; caudal-peduncle depth 118, 115, 98; caudal-peduncle length 303, 294, 340; head length 398, 395, 400; head depth at occiput 239, 234, 243; orbit diameter 118, 124, 128; snout length 83, 89, 77; post-orbital length 183, 177, 166; upper-jaw length 194, 194, 200; bony interorbital width 62, 62, 68; first dorsal spine 82, 74, 64; second dorsal spine 219, 196, 243; spine of second dorsal fin 146, 144, —; longest dorsal soft ray 243, 251, 217; first anal spine 39, 38, 43; second anal spine 155, 148, 187; longest anal soft ray 249, 220, 243; longest pectoral ray 322, 311, 277; pelvic spine 200, 196, 200; pelvic-fin length 252, 249, 234; caudal-fin length 363, 352, 438; caudal concavity 148, 127, —. Gill rakers (left side) $6 + 16 = 22$, $5 + 15 = 20$, $5 + 16 = 21$; preopercular serrae (left and right) 14/15, 16/18, 13/13; lateral-line scales 25, 25, —; caudal-peduncle circumferential scales $3/3 = 8$, $3/3 = 8$, $3/3 = 8$; predorsal scales 8, 8, —; pectoral rays 12-12, 12-12, 12-12; pelvic rays I,5-I,5, I,5-I,5, I,5-I,5; dorsal rays VI-I,9, VI-I,9, VI-I,9; anal rays II-8, II-8, II-8.

Relationships: *Apogon leptocaulus* is, in many respects, the most

distinctive species of Atlantic Apogonidae. The long, slender caudal peduncle and eight scales in the caudal-peduncle circumferential series are unique to the species; other Atlantic apogonids usually do not have fewer than 12 scales in this series. It is also unique, among Atlantic species of *Apogon*, in having an unusually well-developed free preopercular margin, which extends to the angle of the opercular bone; in this regard it closely approaches the genus *Phaeoptyx*, although the upper angle of the margin, where the flap of skin joins the preopercular bone, is not so acute, nor the flap so evenly rounded, as in the three members of that genus (see Fraser and Robins, 1970:309, fig. 1). This character was considered by Fraser and Robins (1970:303) to be of fundamental generic importance in their diagnosis of the genus *Phaeoptyx*. The possibility that *A. leptocaulus* should be included in *Phaeoptyx* is unlikely, since it has, in contrast to that genus, bright red color in life and the inner pelvic ray connected to the body only on the lower half of the ray. Finally, the pigmentation pattern shows no close similarity to any other known apogonid.

A. leptocaulus possesses teeth on the exposed part of the premaxillary bone, a character found, among other Atlantic apogonids, only in *Apogon robinsi* Böhlke and Randall. In view of the many other trenchant differences between the two species, however, this is considered most likely to be the result of convergence.

No conclusions regarding relationship of the species can presently be drawn on the basis of osteological characters.

Ecology: The holotype of *A. leptocaulus* was collected in a long, low coral formation (known locally as "The Ledge") in 65–70 feet of water, off Boca Raton, Florida. Despite many other collections in this, and adjacent areas, no other specimens have been found. It may be significant that on the day prior to the collection a mass of cold water moved into the area, resulting in a very sharp thermocline about halfway to the surface (John Larsen, pers. comm.). Although temperatures were not recorded, the bottom temperature was estimated to be about 70 to 75°F, and was probably 10 to 15 degrees colder than at the surface. Possibly the presence of the specimen was related to this, and it was brought in with the cold water mass. The Providencia specimen was collected in a small cave, on a moderately sloping dropoff, at 95 to 100 feet. In contrast to the previous situation, however, no unusual temperature phenomenon was noted. The individual from Glovers Reef was taken along a dropoff at 70 to 100 feet.

It seems likely that *A. leptocaulus* is a deepwater species that occasionally strays into shallow water, as appears to be the case with *A. anisolepis*. It is remarkable that the species was not discovered till 1970, particularly in view of the intensive surveys (involving a number of collections at depths over 100 feet) made by Dr. Walter A. Starck on Alligator Reef, in the upper Florida Keys, and by others in the Keys,

Bahamas, and Caribbean area. The reefs paralleling the east Florida coast north of Miami possess certain unique features, and several species of fishes that apparently occur in the Keys only as strays maintain permanent populations north of Miami. Among these may be mentioned the chaetodontids *Prognathodes aculeatus* and *Centropyge argi*, and the lutjanid *Lutjanus mahogoni*. The pomacentrid *Chromis scotti* and the serranid *Hypoplectrus gemma* are extremely common to the north, and reach a far greater abundance than in the Keys. The serranid *Lipogramma trilineata*, like *Apogon leptocaulus*, has been recorded from Florida only off Boca Raton.

It should be noted that the Gulf Stream is closer to shore north of Miami than in the Keys, and this, coupled with the turbid water that frequently makes its way into the Keys from Florida Bay, results in more consistently clear inshore water to the north. Starck (1968:11) concluded that turbidity is probably the primary factor involved in explaining these faunal differences.

Etymology: The species name *leptocaulus* is derived from the greek adjective λεπτο (= fine or slender) and the greek noun καυλος (= stem or stalk), in reference to the unusually slender caudal peduncle.

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