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Menephorus Poey, A Serranid Genus Based on Two Hybrids of *Cephalopholis fulva* and *Paranthias furcifer*, with Comments on the Systematic Placement of *Paranthias*

By C. Lavett Smith[1]

In 1860, Felipe Poey described *Serranus dubius* from a single specimen that probably had been collected near Havana. Poey commented that the new form seemed to be intermediate between *Serranus creolus* [= *Paranthias furcifer* (Valenciennes)] and the guativere [*Cephalopholis fulva* (Linnaeus)]. The fishermen who brought the specimen to Poey had also noticed this intermediacy: ". . . ce qui fit dire à l'un d'eux que c'était un hybride du *creolus* et du *Guativere.*" Poey went on to say that this was not the first time that he had seen fishermen, embarrassed at being unable to name a rare species, call some fish a hybrid to cover their ignorance. In this case, however, the fishermen were probably correct.

In 1868 Poey transferred *Serranus dubius* to *Enneacentrus* Gill, a genus originally proposed to contain *Serranus ouatabili* Valenciennes (= *Cephalopholis fulva*) (Gill, 1865). In 1874 Poey created the genus *Menephorus* for the enigmatic *Serranus dubius,* and a year later (1875) he described a second, similarly intermediate fish as another member, *Menephorus punctiferus,* of this new genus.

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THE TYPE SPECIMENS

There has been considerable confusion about the types of *Serranus dubius* and *Menephorus punctiferus.* Each description was based on a single example that Poey stated had been deposited in the Museum of Comparative Zoölogy at Cambridge. There are still two specimens in that museum. One (M.C.Z. No. 10019; fig. 1B) has a standard length of 184 mm. It is a perfect specimen, faded but otherwise in excellent condition. The other (M.C.Z. No. 33983) is 154 mm. long. Its dorsal fin is abnormal, with only 11, somewhat deformed, soft rays, and it has well-defined dark spots and circles on the sides of the head and anterior part of the body.

Poey's original descriptions gave the length of *Serranus dubius* as 155 mm. and that of *Menephorus punctiferus* as 250 mm. Jordan and Eigenmann (1890, p. 380) concluded that the larger specimen was the type of *M. punctiferus.* They also suggested that the type of *dubius* had been lost and that the smaller specimen was a third individual that had not previously been reported in the literature. Howell y Rivero (1938, p. 190) also listed M.C.Z. No. 10019 as the type of *M. punctiferus.* Nevertheless, the smaller specimen cannot be the type of *dubius,* because Poey described *dubius* as having 17 dorsal soft rays, and there are only 11 in its dorsal fin. I believe, however, that in spite of the discrepancy in the lengths, M.C.Z. No. 10019 is probably the type of *Serranus dubius,* and M.C.Z. No. 33983 is the type of *M. punctiferus.* The lower catalogue number would indicate that the perfect specimen had been received before the other, and the distinct spots would have suggested the name *punctiferus* for the smaller specimen. Moreover, Poey did not give the meristic characters of *M. punctiferus,* possibly because he realized that the dorsal fin was abnormal. I have encountered similar disagreement between

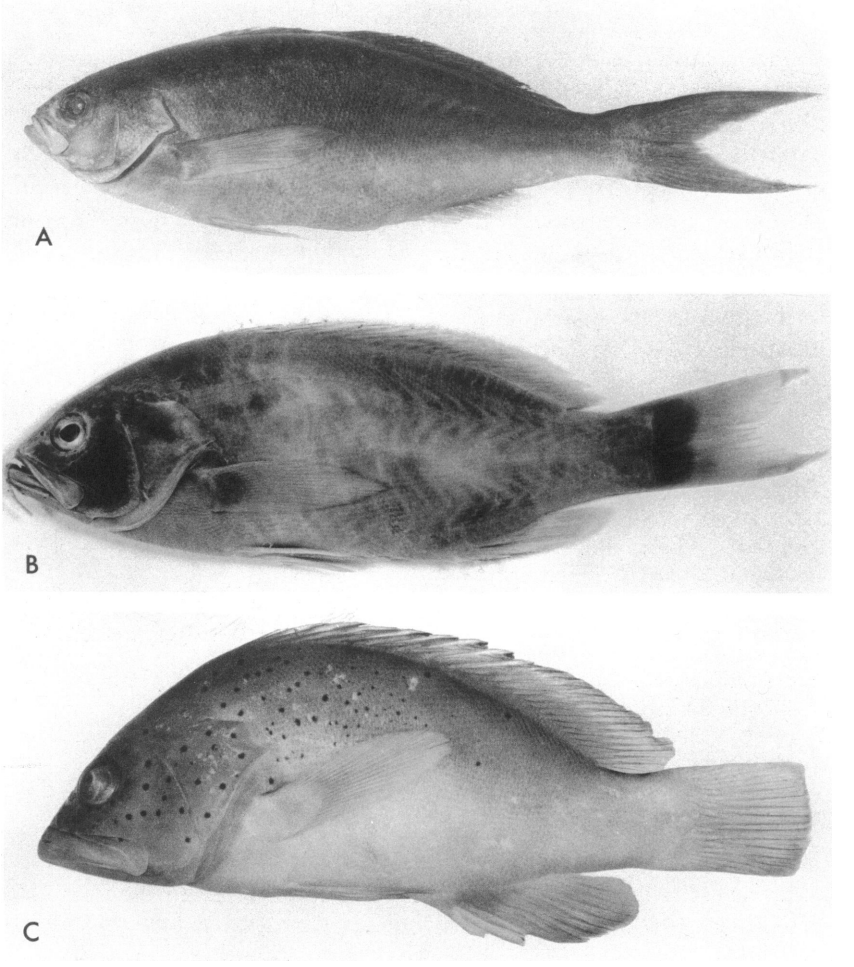

FIG. 1. Photographs of preserved specimens. A. *Paranthias furcifer* from Bermuda; U.M.M.Z. No. 176172; standard length, 264 mm. B. Holotype of *Menephorus dubius;* M.C.Z. No. 10019; standard length, 184 mm. C. *Cephalopholis fulva,* yellow form from Bermuda; U.M.M.Z. No. 176604; standard length, 111 mm.

the lengths given by Poey and the specimens in the Museum of Comparative Zoölogy of other serranid species. It appears that either Poey did not measure his specimens precisely or that the typesetter was unable to interpret the author's numerals. I see no reason to assume that Poey ever sent a third specimen of this form to Cambridge.

NOMENCLATURE

Since the time of Poey, there has been intensive collecting in the West Indian region, yet no additional specimens of either of these forms have been reported. All our information about the genus *Menephorus* is ultimately based on only these two specimens. Jordan and Eigenmann (1890, p. 380) were the first to state that there are no grounds for recognizing more than a single species. Except for the malformed dorsal fin, the specimens show no differences that cannot be attributed to normal individual variation, and Poey's original description of *punctiferus* offers no justification for its separation from *dubius*. The nomenclatural history of this species is reviewed in the following synonymy:

Hybrid *Cephalopholis fulva* × *Paranthias furcifer*

Serranus dubius Poey, 1860 (1858–1861), pp. 142–143 (original description, Cuba).

Enneacentrus dubius: Poey, 1868 (1866–1868), p. 289 (very rare). Jordan, 1887, p. 581 (West Indies list only).

Menephorus dubius: Poey, 1874, pp. 50–51. Poey, 1875, p. 95. Jordan, Evermann, and Clark, 1930, p. 309.

Menephorus punctiferus Poey, 1875, pp. 95–96 (original description). Jordan, Evermann, and Clark, 1930, p. 309. Howell y Rivero, 1938, p. 190 (types of Poey in Museum of Comparative Zoölogy).

Epinephelus dubius: Jordan and Swain, 1884, p. 406. Boulenger, 1895, pp. 185–186 (*punctiferus* a synonym).

Bodianus dubius: Jordan and Eigenmann, 1890, p. 380. Jordan and Evermann, 1896a, p. 371; 1896b, pp. 1146–1147.

Bodianus punctiferus: Jordan and Evermann, 1896a, p. 371; 1896b, p. 1147 (probably a color variation of *dubius*).

Although *Serranus dubius* has been assigned to five different genera, all of its classifiers have agreed that it is somehow related to the form that we now call *Cephalopholis fulva*. The generic changes have all been due to a lack of agreement as to the proper relationships of the groupers with nine dorsal spines and do not reflect any considered opinions about the status of *S. dubius*.

HYBRIDIZATION

A careful study of these two specimens has revealed that they are morphologically intermediate between *Paranthias furcifer* and *Cephalopholis fulva*. Table 1 lists 45 meristic and morphometric characters that have been compared in *Paranthias*, the two specimens of *dubius*, and *Cephalopholis fulva*. In all but five of these characters the specimens of *dubius* are intermediate between the presumed parental forms, and the five exceptions fall within the limits of one or the other of these species. Hubbs (1955)

has reviewed the general phenomenon of hybridization between fish species in nature and has commented, "It has proved to be an almost universally valid rule that natural interspecific hybrids are intermediate between their parental species in all characters in which those species differ." The intermediate structure of natural interspecific fish hybrids has been so well documented that we are fully justified in regarding the specimens of *Menephorus dubius* as hybrids between *Paranthias furcifer* and *Cephalopholis fulva*. Only this combination could produce a hybrid with a moderately forked tail and a color pattern of small blue spots with black edges, because such spots are present only in *Cephalopholis fulva* among local species, and *Paranthias* is the only grouper in the West Indian fauna with a deeply forked caudal. *Paranthias*, *Cephalopholis*, and *Petrometopon* are the only West Indian grouper genera with nine dorsal spines; *Petrometopon* can be ruled out, however, because it has neither blue spots nor a forked tail.

HABITS

Cephalopholis fulva and *Paranthias furcifer* have comparable geographic ranges and live in similar habitats. On August 13, 1956, I saw these two species caught in the same fish pot off the northeast breakers at Bermuda. They spawn at the same time (May) in Bermuda and presumably in Cuba as well.

There is no indication of when the specimens were collected. Although the descriptions of them appeared in print 15 years apart, they could have been collected at about the same time, and it is possible that they are siblings.

Paranthias appears to be less restricted to the bottom than *Cephalopholis*. Its streamlined body and forked caudal suggest a mid-water mode of life, and some eastern Pacific populations of *Paranthias* are said to form schools. *Paranthias* seems to occupy the same position among the grouper-like serranids that *Ocyurus chrysurus* (Bloch) occupies among the bottom-dwelling lutjanids, and in general form *Paranthias* and *Ocyurus* exhibit many similarities.

REPRODUCTION

In a previous paper (Smith, 1959, p. 114), I suggested that *Paranthias furcifer* might be gonochoristic. I have re-examined the histological sections and found the testis to be hollow—similar to the testes of the protogynous serranids in which the ovarian lumen remains after sex reversal from female to male has taken place. Unfortunately, sections of

TABLE 1

COMPARISON OF *Paranthias furcifer, Menephorus dubius,* AND *Cephalopholis fulva*

(For meristic characters, the numbers in parentheses are the numbers of specimens with that count. For measurement characters, the numbers in parentheses are the arithmetic means of nine specimens of *Paranthias furcifer,* two specimens of *M. dubius,* and 10 specimens of *C. fulva.*)

Character	*P. furcifer*	Hybrid	*C. fulva*
Dorsal rays	IX–18 (6), 19 (3)	IX–17 (1)	IX–14 (8), 15 (118), 16 (2)
Anal soft rays	9 (8), 10 (1)	9 (2)	8 (2), 9 (127)
Pectoral rays	39 (1), 40 (8)	38 (2)	34 (3), 35 (5), 36 (107), 35 (5), 38 (3)
Gill rakers	35 (1), 36 (1), 37 (2), 38 (2), 39 (2), 40 (1)	30 (1), 33 (1)	23 (2), 24 (16), 25 (44), 26 (58), 27 (7)
Scales above lateral line	10–14 (7)	10 (1)	6–8 (20)
Transverse scale rows	115–119 (3), 120–124 (2)	97 (1)	80–84 (6), 85–89 (9), 90–94 (5)
Scales below lateral line	25–29 (2), 30–34 (5), 35–39 (1)	28 (1)	20–24 (4), 25–29 (16)
Caudal peduncle scales	41–43 (1), 44–46 (2), 47–49 (3)	47 (1)	38–40 (10), 41–43 (10)
Head length	260–302 (281)	331–332 (332)	378–432 (399)
Head width	126–149 (140)	144–156 (150)	170–193 (184)
Head depth	192–250 (216)	240–240 (240)	244–280 (266)
Snout length	62–75 (69)	84 (84)	96–111 (104)
Suborbital width	17–25 (20)	30–32 (31)	41–52 (47)
Interorbital width	77–89 (84)	71–74 (73)	67–76 (71)
Orbit length	53–78 (63)	68–71 (70)	62–86 (69)
Postorbital head length	150–176 (158)	188–199 (194)	223–257 (236)
Maxillary length	98–125 (110)	144–153 (149)	184–207 (194)
Lower jaw length	96–125 (110)	150–156 (153)	176–216 (199)
Snout to angle of preopercle	181–212 (196)	232–234 (233)	256–306 (276)
Supramaxillary length	26	41–45 (43)	49–64 (57)
Maxillary width	33–42 (40)	42–44 (43)	41–54 (46)
Tip of lower jaw to gular notch	73–101 (88)	93–97 (95)	124–165 (145)
Body width	140–161 (152)	144–169 (157)	159–198 (183)
Body depth	289–338 (326)	335–367 (353)	348–387 (364)
Caudal peduncle depth	102–154 (117)	125–136 (131)	134–153 (139)
Tip of snout to dorsal origin	324–342 (331)	302–360 (331)	356–441 (389)
Tip of snout to pectoral base	254–288 (274)	305–311 (308)	366–410 (381)

TABLE 1—(*Continued*)

Character	*P. furcifer*	Hybrid	*C. fulva*
Tip of lower jaw to pelvic base	326–352 (344)	364–376 (370)	404–485 (433)
Dorsal base length	566–611 (588)	539–556 (548)	521–595 (543)
Depressed dorsal length	608–683 (644)	616	612–712 (642)
Anal base length	167–205 (186)	179–180 (180)	166–194 (182)
Depressed anal length	223–308 (259)	267–279 (273)	280–314 (299)
End of dorsal to caudal base	149–170 (160)	155–169 (162)	130–148 (141)
Length of caudal peduncle	212–254 (228)	207–211 (209)	181–216 (190)
Pectoral length	244–288 (263)	263–270 (267)	240–297 (263)
Pelvic length	153–199 (172)	182–183 (183)	193–243 (205)
Dorsal spine I, length	44–64 (52)	52–57 (55)	55–72 (63)
Dorsal spine III, length	90–114 (101)	104–104 (104)	109–149 (124)
Dorsal spine IX, length	75–109 (91)	91–106 (99)	105–135 (120)
Anal spine I, length	36–58 (45)	45–54 (50)	62–90 (67)
Anal spine II, length	72–122 (97)	101–106 (104)	112–167 (127)
Anal spine III, length	79–92 (97)	104–120 (112)	110–167 (127)
Caudal base to tip of upper rays	300–414 (354)	272–282 (277)	220–257 (237)
Caudal base to tip of middle rays	115–147 (128)	166–188 (177)	211–261 (230)
Caudal base to tip of lower rays	310–377 (342)	263–286 (275)	218–252 (231)

the gonad of only two males are available, but neither of these shows any oocyte remnants to suggest that it was once an ovary. Moreover, the smaller of the two males is smaller than the three females that we have studied. It is therefore possible that *Paranthias*, like *Paralabrax clathratus* of the eastern Pacific (Smith and Young, in press), is a secondary gonochorist that retains the gonad structure of the protogynous forms from which it was derived. Smith and Young (in press) discussed the steps by which secondary gonochorism could arise. *Paranthias* may be protogy-

nous or secondarily gonochoristic, but in either case its gonad structure indicates a close affinity with the protogynous serranids, such as *Cephalopholis* (Smith, 1965).

SYSTEMATIC RELATIONSHIPS OF *PARANTHIAS* GUICHENOT

Paranthias is one of the most distinctive serranid genera of the New World, and its relationships have puzzled classifiers. It differs from most members of the family Serranidae in having a short head, a deeply forked caudal fin, and a streamlined body form with the dorsal and ventral profiles about equally curved. Its superficial resemblance to *Anthias,* a group of small, reddish, deep-water serranids is reflected in its name. Jordan and Eigenmann (1890) included *Paranthias* in their subfamily Epinephelinae because it has a supramaxillary bone. Jordan and Evermann (1896b) transferred *Paranthias* to their subfamily Anthiinae, and Jordan (1923) retained it in the family Serranidae, from which he excluded the Epinephelinae. Recently, Gosline (1966) has redefined the family Serranidae by restricting it to the subfamilies Serraninae, Epinephelinae, and Anthiinae (except *Callanthias)* of Jordan and Eigenmann. This restriction, in my opinion, makes the family much more meaningful.

The identification of the types of *Menephorus* as hybrids between *Cephalopholis* and *Paranthias* indicates that *Paranthias* belongs with the *Epinephelus*-like serranids and not with the Anthiinae. This is supported by external morphological features and by the structure of their reproductive systems. The *Anthias*-like serranids are still poorly known, largely because they live in deeper water and are collected relatively infrequently. They are distinguished by having large scales, a highly arched lateral line that runs close to the base of the dorsal fin, poorly developed frontoparietal skull crests, and enlarged, hooked canine teeth at the middle of each side of the lower jaw. They tend to be small fishes, usually less than 200 mm. long, and often have elongated individual rays or spines in the dorsal fins. Some species have deeply forked caudal fins. Reinboth (1963) found that the two species of anthiines he examined were synchronous hermaphrodites.

Although *Paranthias* exhibits some specializations for a mid-water mode of life, its basic anatomy indicates a closer relationship to *Epinephelus.* It has small scales which McCully (1961) found to resemble those of *Epinephelus.* Its lateral line is arched, but no more so than that in *Epinephelus,* and it does not run close to the dorsal base. The parietal skull crests are, if anything, better developed than in *Epinephelus,* since

they extend forward to almost the middle of the orbits as in *Mycteroperca.* There are no hooked canines on the sides of the lower jaw and no prolonged rays or spines in the dorsal fin. The caudal is deeply forked, but its lobes are not excessively attenuated. Its gonad structure is like that of the protogynous serranids.

Present indications are that there are three distinct phyletic lines within the Serranidae that are represented by *Serranus, Epinephelus,* and *Anthias.* Until more data are available on the various species of *Anthias*-like Serranidae, however, I do not believe that subfamilies should be used within this family. The forms allied to *Serranus* are bottom-living, synchronous hermaphrodites. Members of the *Epinephelus* line are bottom-dwelling, protogynous hermaphrodites, and *Anthias* and its relatives are mid-water, synchronous hermaphrodites. The protogynous *Centropristes* and the secondarily gonochoristic *Paralabrax* probably have been derived independently from *Serranus* lines (Smith and Young, in press). The Grammistidae have a type of hermaphroditism intermediate between the territorial synchronous condition of *Serranus* and the protogyny of *Epinephelus* (Smith, 1965). Grammistids seem to be specialized in the same way as *Epinephelus,* but they have carried the specialization much further (Gosline, 1966, p. 96).

The fact that *Paranthias,* although specialized in the same direction as *Anthias,* still retains the basic features of the *Epinephelus* line and can occasionally produce viable hybrids with a member of that line is further evidence that the structural similarities of the *Epinephelus*-like serranids have a valid phylogenetic basis.

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