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THE GOBIID FISH *Palatogobius paradoxus* IN THE NORTHERN GULF OF MEXICO

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ABSTRACT: Fourteen specimens of the little known gobiid fish *Palatogobius paradoxus*, recently collected from the northern Gulf of Mexico, have added significantly to our knowledge of the species. Morphometric and meristic characters of these specimens agree closely with two of the other three known specimens, taken from the Virgin Islands and Venezuela, and are thus considered conspecific. The third previously collected specimen, taken from Panama, shows variation in vomerine teeth and fin ray characters, and thus its specific status is unresolved. Data from these additional specimens indicate less intraspecific variation in some characters than was apparent from the original three specimens.

Recently I (Gilbert 1971) described *Palatogobius paradoxus* as a new genus and species, based on three specimens collected at three widely separated localities in the Caribbean Sea. Birdsong's (1975) discussion of the osteology and relationships of the genus, based on a detailed examination of one of the above individuals, is the only other reference to this fish that has so far appeared in the literature.

Several problems relating to the taxonomy and morphology of this fish were discussed in the original description, but these could not be resolved until more material became available. Questions remained unanswered concerning (a) the vomerine teeth, which were present in the two female individuals but absent in the lone male; (b) the unexpectedly wide variation in pectoral fin-ray count, which ranged from 18 to 22 in the three specimens; and (c) shape of the caudal fin, which was either lanceolate or deeply forked. These unresolved problems raised the possibility that more than one species of *Palatogobius* might be included among the original three specimens, and for this reason no paratypes were designated in the original description.

Recent dredge and trawl collections

made from sand and coral-rubble areas in the northern Gulf of Mexico, off the Florida coast, yielded 14 additional specimens of *Palatogobius*. All collections are from a limited geographic area (between 28°29'58.6" - 30°01'30"N and 84°20'59" - 86°06'30"W) and depth range (27-39.5 meters). They represent a significant range extension for the genus, are the first records from United States waters, and they permit reevaluation of the taxonomic questions raised in the original description. These collections were made during work done under contracts with the Bureau of Land Management, Drs. Stephen A. Bortone (University of West Florida), Robert L. Shipp (University of South Alabama), and Thomas S. Hopkins (University of Alabama), principal investigators. I would like to thank them for informing me of these collections and making the specimens of *Palatogobius* available for study. I would like to thank Mr. Philip A. Hastings, Harbor Branch Foundation, Fort Pierce, Florida, for supplying me with a kodachrome he had taken of one of the specimens. I wish also to express my gratitude to Dr. Walter R. Courtenay, Jr., Florida Atlantic University, Boca Raton, who is responsible for the radiographs taken of the specimens.

MATERIALS AND METHODS

All counts and measurements were taken in the same manner as those described in my 1971 paper. Body lengths are recorded in millimeters standard length (SL). Proportional measurements were taken on selected individuals using dial calipers, and were compared with data in the original description. Dorsal and pectoral fin-ray counts were taken for 13 of 14 specimens, and anal-ray counts were taken on all individuals. Vertebral counts were made for all specimens. Gill-raker counts were taken on only three individuals, this resulting from the difficulty in counting these structures without mutilating the specimen. In addition, each individual was examined and the various morphological features compared to those recorded in the original description. Particular attention was given the development of teeth, especially those in the vomerine series; degree of body squamation; body pigment pattern; and cephalic lateralis system morphology. Some of these data and observations appear in Table 1, and others are discussed below. Should a character not be specifically mentioned, one may assume that no information was found that differed from that appearing in the original description. Table 1 is abbreviated to include only those characters considered pertinent to the taxonomic considerations at hand.

The following abbreviations are used for the various museum collections in which specimens of *Palatogobius* are present; UWF (University of West Florida), USA (University of South Alabama), UMML (University of Miami, Rosenstiel School of Marine and Atmospheric Sciences), ANSP (Academy of Natural Sciences of Philadelphia).

Data for the 14 Gulf of Mexico specimens of *Palatogobius* are as follows: UWF 2154 (7,23.6-32.3 mm SL);

29°56'00N, 86°06'30"W, depth 40 M, 3 June 1974; UWF 2155 (2, 28.2 - 31.5), same locality as above, 27 June 1974; UWF 2156 (1, 32.3), 29°48'00"N, 86°03'30"W, depth 31 M, 4 July 1974; UWF 2157 (1,17.8), 30°01'30"N, 85°54'54"W, depth 30 M, 27 June 1974; UWF 2158 (1, 25.7), 28°29'58.6"N, 84°20'59.0"W, 39 M, 13 July 1976 (BLM sta. 44-3a); USA 02139 (2, 28.0 - 30.3), 29°50'N, 86°06.5'W, depth 30 M, 20 July 1975.

DISCUSSION

Most morphometric, morphological, or pigmentary characters observed in the 14 specimens from the northern Gulf of Mexico do not appear to differ from those found in the three Caribbean specimens. Thus, the characters appearing in the original description (including proportional measurements) apply equally well to the Gulf specimens, unless specifically indicated.

Degree of body squamation appears to vary slightly, the scales extending forward to beneath the 10th to 14th second dorsal ray. In two individuals (both males, 25.7 and 31.5 mm SL) the scales are difficult to discern, and may be so weakly developed that they are essentially absent. The cephalic lateralis system appears to be the same as described earlier, except that the interorbital and coronal pores may be slightly closer together than shown in Fig. 4a of the 1971 paper. The gill-rakers are long and slender in the three Gulf specimens examined, and all number 4 + 12 or 13. Vertebral counts are uniformly 11 + 16 = 27.

Vomerine teeth are present in all of the recently collected individuals, of which ten are males, three are females, and one (the smallest) could not be sexed. Vomerine-teeth development seems to vary independently of sex and

Table 1

Selected counts and observations on the genus *Palatogobius*

	ANSP 109182 (holotype)	UMML 26700	UMML 23118	UWF 2154	UWF 2154	UWF 2154	UWF 2154	UWF 2154	UWF 2154	UWF 2154	UWF 2154	UWF 2155	UWF 2155	UWF 2156	UWF 2157	UWF 2158	USA 02139	USA 02139
Sex	♀	♀	♂	♂	♂	♂	♂	♂	♀	♂	♂	♂	♂	?	♂	♀	♀	
Standard length (mm)	25.5	31.0	26.3	30.9	31.3	29.0	29.5	24.8	27.8	23.6	28.2	31.5	32.3	17.8	25.7	30.3	28.0	
Dorsal-fin rays	VII-20	VII-19	VII-19	VII-19	VII-20	VII-19	VII-20	VII-21	VII-20	VII-21	VII-18	VII-20	VII-21	--	VII-19	VII-19	VII-19	
Anal-fin rays	20	20	20	20	21	20	21	21	21	21	20	21	22	21	20	21	21	
Pectoral-fin rays (both sides)	20-20	18-18	22-21	19-19	19-19	19-19	19-19	19-19	19-19	19-19	18-	19-19	19-19	--	20-20	19-	19-19	
Vomerine-teeth development*	3	3	0	3	3	1	1	1	2	3	1	1	1	1	2	1	1	

*Degree of development of vomerine teeth: 0 - absent; 1 - weakly developed; 2 - moderately developed; 3 - well developed

(for mature individuals at least) body length. This is substantiated by the fact that the best developed vomerine teeth seen in any Gulf specimen were found in a 23.6 mm SL male, which was the second smallest of the 14 fish examined. The presence of vomerine teeth in all Gulf specimens raises further question regarding the specific identity of the specimen from off Panama (UMML 23118), which lacks any evidence of these structures. On the other hand, the variation observed in vomerine-teeth development in the 14 Gulf specimens suggests that the Panama individual may simply represent a morphological extreme. No obvious sexual differences were noted in the development of the prominent canine teeth.

Accurate pectoral fin-ray counts could be made on both sides in 11 or the 14 specimens and on one side only in two others. Counts for these specimens are surprisingly uniform considering the wide variation noted in the original description, ten individuals having 19 rays on each side and one having this count for the left fin (other fin too mutilated to count). One specimen has 20 rays in each fin, and the other has the left fin with 18 rays (other fin damaged). The counts recorded here encompass those found in the holotype (ANSP 109182) from the Virgin Islands and the non-type from off Venezuela (UMML 26700), but not the one from off Panama (UMML 23118), which has a count of 22-21. The high pectoral count for the last specimen again raises the question of

its specific identity. It would appear that this character can less readily be attributed to normal variation than can the absence of vomerine teeth.

Second dorsal-ray counts in the Gulf specimens range from 18 to 21. This increases the range of variation for this character beyond that in the original description (19 to 20). Anal-ray counts show less variation, most either being 20 or 21, and one 22.

Examination of the caudal fin in the 14 new specimens indicates that this fin is normally lanceolate in shape, is undivided at the tip, and that any separation of the rays that may occur presumably results from separation of the fin membranes.

In summary, the specimens of *Palatogobius* here reported for the first time from the Gulf of Mexico appear to be conspecific with the holotype from the Virgin Islands and the original non-type specimen off Venezuela. Specific status of the third Caribbean specimen (from Panama) still is in question, however, based on the absence of vomerine teeth (which are present in all other known individuals) and the increased number of pectoral rays.

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