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## FIRST RECORD OF *RIVULUS MARMORATUS* POEY, 1880 FROM THE SOUTH AMERICAN CONTINENT (PISCES: CYPRINODONTIDAE)

by

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*Rivulus marmoratus* Poey, 1880 has previously been found only in south Florida, Cuba, the Bahamas, Barbuda, St. Martin and several islands off the Venezuelan coast (Curaçao, Bonaire and Gran Roque) (Hoedeman, 1958; Böhlke & Chaplin, 1968). In September of 1978, one of my students, Mr. Edgard W. Cabezas, brought me a specimen of this species that he had caught in the northern section of Maracaibo City, state of Zulia, Venezuela. We revisited the site, a poorly drained section of town near the western shore of the Straits of Lake Maracaibo, on 21.ix.1978 and 14.x.1978, and collected an additional 19 specimens (15 of which are in my personal collection). Most of the fish were caught in shallow, brackish water (salinity 25<sup>0</sup>/00, temperature 31°C) among algae growing on the flooded porch of an abandoned house, and among the debris, mangrove trees, and garbage dumped nearby. The water flowing through the dump originates from a series of open ditches that carry rainwater and sewage into the lake from the city. Thousands of *Poecilia vandepolli* Van Lidth de Jeude, 1887 occupy the same habitat.

These specimens represent the first record for this species on the South American continent and the only record of *Rivulus* from the Maracaibo Basin. Their preference for habitats which are less than attractive to the average collector may in part explain why they have been overlooked until now.

Description. — To facilitate future taxonomic comparisons of this population with the others, a summary of meristic data is presented below, and morphometric data are summarized in table 1.

TABLE I

Summary of morphometric data for *Rivulus marmoratus bonairensis* from the Maracaibo Basin, Venezuela. N = number of specimens, max = maximum, min = minimum,  $\bar{x}$  = mean, SD = standard deviation. All values except standard length (mm) are expressed as thousandths of standard length

	N	max	min	$\bar{x}$	SD
Standard length (mm)	15	36.0	10.6	—	—
Predorsal length	12	.811	.740	.775	.018
Preanal length	12	.645	.592	.620	.015
Eye diameter	10	.080	.072	.077	.004
Interorbital width	10	.113	.092	.100	.006
Snout length	10	.054	.033	.041	.006
Greatest body depth	10	.234	.190	.210	.015
Head length	14	.315	.269	.288	.012
Least depth caudal peduncle	12	.144	.111	.129	.008
Dorsal fin base length	10	.101	.083	.093	.006
Anal fin base length	10	.159	.140	.147	.004
Dorsal fin length	10	.206	.176	.192	.009
Anal fin length	10	.261	.231	.244	.008

Dorsal rays nine (the first ray barely visible in some); anal rays 11-12; pectoral rays 13; pelvic rays four (this fin is tiny, one fish had no pelvics, and five were missing one fin); frontal scale pattern "e", in all but one specimen which had "d" (see Hoedeman, 1958 for explanation of scale pattern scheme); lateral scales 44-52; predorsal scales (from "b" scale to dorsal fin origin) 35-40; caudal peduncle scales 21-23 (18 in one specimen); transverse scales 13-17; branched caudal fin rays 14-16. Comparison of these data with that given by Hoedeman (1958) shows that this population pertains to *R. m. bonairensis* Hoedeman, 1958.

Zoogeographical implications. — Hoedeman (1975) stated that the morphological similarity and disjunct distribution of the members of his *R. marmoratus* complex (i.e. *R. m. marmoratus* in the Bahamas, Cuba, and S. Florida; *R. m. bonairensis* in the islands off Venezuela; *R. myersi* Hubbs, 1936 on the Yucatan Peninsula of Mexico; *R. waimacui* Eigenmann, 1909 in Guyana and Surinam; and *R. ocellatus* Hensel, 1868 in SE. Brazil), is evidence that these are relict populations that infer a former connection between the South American continent and the Caribbean islands. This new record of *R. m. bonairensis* from the Maracaibo Basin would seem to further support this hypothesis.

Freshwater *Rivulus* species occur in the mountains near Caracas and in the llanos of the Orinoco Basin of Venezuela, as well as in the Magdalena Basin of N. Colombia. Even though the Maracaibo Basin is thus surrounded by *Rivulus* species, only *R. marmoratus*, which lives in brackish coastal

waters, has been found there. This might be explained in part by the presence of four species of annual killifish, *Austrofundulus limnaeus* Schultz, 1949, *Rachovia brevis* (Regan, 1912), *R. hummelincki* De Beaufort, 1940, and *R. pyropunctata* Taphorn & Thomerson, 1978 (Taphorn & Thomerson, 1978), which would compete with the non-montane *Rivulus* for habitat in the lowlands. The absence of *Rivulus* from the mountain streams remains a mystery.

Biological notes. — The seven largest specimens (over 15 mm SL) contained eggs. All specimens examined are alike in colouration, drab brown with black spots along the sides, and a typical ocellus on the caudal peduncle's dorsal margin. Thus, they appear to be females. However, the possibility that they may be hermaphroditic cannot be dismissed. Gross examination of the gonads revealed no obvious testicular tissue. Facilities for histological analysis are not available. Harrington (1961) discussed hermaphroditism in the Florida population. Though we have maintained eight individuals in aquaria for several months, no eggs have been found. If in fact they are hermaphrodites, this might account for the reduction and loss of the pelvic fins as a result of extreme inbreeding. The population is apparently quite small, though few collections have been made in the coastal mangrove swamps of this region. On the other hand, though the sample is too small to be certain, variation among the other characters seems greater than one might expect if all individuals were members of a "clone".

We hope to continue the observations of this species both in aquaria and in the wild to obtain the data necessary to answer some of the questions that remain about this new population.

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