

Rivulus corpulentus, a new killifish from Cordillera de La Macarena, Colombia (Cyprinodontiformes: Rivulidae)

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Rivulus corpulentus, new species, a robust species with 8-9 sharply defined narrow lateral stripes in both sexes, is described from specimens collected in 1960 on the Cordillera de La Macarena, Departamento de Meta, Colombia, by the late General Thomas D. White. Juveniles of two other *Rivulus* species were also collected on or near the Cordillera Macarena by members of the same party.

Sedescribe una especie nueva, *Rivulus corpulentus*, un pez caracterizado en tener un cuerpo corto y robusto, marcado por 8-9 bien definidas líneas oscuras y delgadas en los costados de ambos sexos. Los ejemplares fueron colectados por el General Thomas D. White en 1960 de caño en la parte sur de la Cordillera de La Macarena, en el Departamento de Meta, Colombia. Juveniles de lo que aparentemente representan dos especies más de *Rivulus* fueron colectados por el mismo grupo en la misma región.

Introduction

This paper describes a distinctive new species of *Rivulus* collected from the southern portion of the Cordillera de La Macarena, Departamento de Meta, in the upper Orinoco Basin, during the 1960 Myers and White expedition to Colombia. The papers of the late George Sprague Myers are now available for study in the Archives and Special Collections of the Smithsonian Institution (Cox, 1988). Notes on three *Rivulus* collections from Cordillera de La Macarena and vicinity are in Box 59, Folder 1, 'Field notes kept on collecting trips to Colombia, with General Thomas D. White, 1958 and 1960'. One *Rivulus* collection forms the type material of the new

species described below. The other two collections each include an additional *Rivulus* species, but we cannot identify either of them with certainty at this time.

Methods

Measurements made with Helios dial calipers, counts, and head scale nomenclature follow Hoedeman (1959), with the exception that head depth was measured at the posterior margin of the preopercle. Measurements not taken by Hoedeman include prepelvic fin insertion length and orbit diameter. Greatest body depth is as measured by Hoedeman, but body depth is measured at the anal-fin origin. Ratios are expressed in

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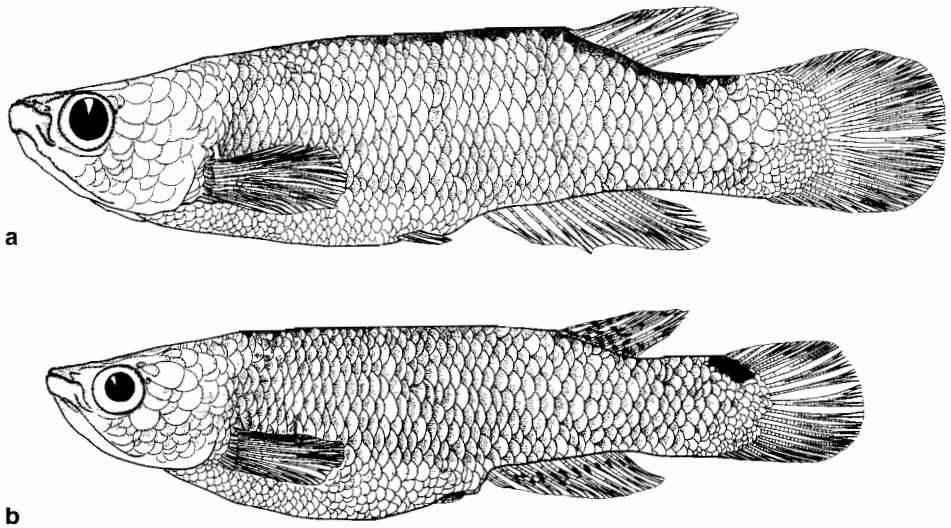


Fig. 1. *Rivulus corpulentus*. a, holotype, CAS-SU 69692, male, 43.5 mm SL; b, paratype, CAS-SU 53693, female, 39.0 mm SL.

thousandths so that the reader can reconstruct measurements to the precision with which we recorded them. Fin-ray counts were made on preserved specimens using a dissecting microscope with light transmitted through the fins, and include all discernable fin-rays. Specimens are deposited at the California Academy of Sciences (CAS) but retain their original Stanford University (SU) catalog numbers.

Rivulus corpulentus, new species
(Fig. 1)

Holotype. CAS-SU 69692, male 43.5 mm SL; Colombia: Departamento de Meta: from a small stream on Cordillera de La Macarena flowing west (02°25'N 73°52'W), Guaviare-Orinoco drainage; General Thomas D. White, 22 February 1960.

Paratypes. CAS-SU 53693, 14, 12.4–38.1 mm SL, same data as holotype.

Diagnosis. Differs from all known species of *Rivulus* Poey, 1860, by the combination of: (1) unusually deep body (average greatest body depth .250, Table 1), (2) color pattern of 8–9 well-defined narrow lateral stripes running the length of the body, and (3) females only with a small,

intensely pigmented, ocellated, egg-shaped rivulus spot.

Description. The body form of preserved specimens of the new species is shown in Figure 1, and proportions are given in Table 1. Meristic values for the holotype are indicated with a *; number of individuals with each value is given in parentheses after the value: lateral scales 40(1), 41(3), 43(2), 44*(4); transverse series 11(2), 12*(7), 13(1); dorsal-fin rays 10'(10); anal-fin rays 14(2), 15*(7), 16(1); left pectoral-fin rays 13(4), 14(4), 15*(2); left pelvic-fin rays 6*(8), 7(1), 8(1).

The holotype has a d-e' head scale pattern; among para-topotypes there were f-f'(2), e-d'(2), e-f'(2), and e-e'(3) patterns.

Color in alcohol. In larger specimens three wide dark lines (rows of scale-sized dark diffuse dots) extend from the head to behind the dorsal-fin base. One runs along the dorsal midline; the other two along either side of the dorsum. These lines are more diffuse than the 8–9 dark narrow lines (rows of confluent or nearly confluent dark dots) present on the middle and lower sides.

Sexual dimorphism. Females have an ocellated rivulus-spot; males do not. Anal length and length of anal base values run slightly higher in males than in females; other morphometric char-

Table 1. Proportional measurements for holotype and nine paratypes of *Rivulus corpulentus*.

character	holotype	minimum	average	maximum
Sex	male		(five of each sex)	
SL (mm)	43.5	26.5	33.28	43.5
Ratio of standard length				
Total length	1.200	1.167	1.211	1.244
Predorsal length	.740	.725	.748	.775
Preanal length	.584	.584	.616	.650
Prepectoral length	.517	.486	.518	.544
Greatest body depth	.257	.238	.250	.281
Body depth	.202	.190	.205	.221
Depth of caudal peduncle	.151	.128	.137	.151
Length of pectoral	.180	.151	.172	.197
Length of pelvic	.085	.051	.069	.085
Length of dorsal	.216	.190	.206	.235
Length of dorsal base	.109	.109	.120	.131
Length of anal (n = 4M+5F)	.315	.245	.284	.315
Length of anal base	.213	.172	.204	.218
Head length	.257	.237	.252	.267
Ratio of head length				
Head width	.682	.669	.742	.874
Head depth	.638	.609	.634	.652
Orbit diameter	.305	.305	.348	.386

acters do not show sexual dimorphism in the small sample examined.

Distribution. Known only from the type locality in Cordillera de La Macarena.

Etymology. The specific epithet *corpulentus* is from Latin for stout, and refers to the short stocky body of this species.

Habitat. According to Gen. White's field notes (Sta. 5, El Refugio trip), he took the specimens of *R. corpulentus* with a handnet from a swift, clear-water stream with a sand and rock bottom. The stream was from 6 in (0.15 m) to 4 ft (1.4 m) deep and no other fishes were taken. We plot this locality as being on a tributary to the Rio Guayabero above the upper Salto Angostura.

Discussion

The rotund compact body of *R. corpulentus* is unusual for a *Rivulus* species, but it fits very well the redescription of *Rivulus* given by Costa (1991). We do not think it is closely related to the even deeper-bodied (average greatest body

depth; 8 males .260, 10 females .270, vs. .250 for 10 *R. corpulentus*, Table 1) Mexican species *R. robustus* Miller & Hubbs, 1974, from which it differs in head scalation (*R. robustus* does not have the circular pattern of head scales typical of *Rivulus* species), color pattern (*R. robustus* has uniformly colored body sides), and lateral scale counts (31-33 for 19 *R. robustus*, 40-44 for 10 *R. corpulentus*).

Among Orinoco River basin *Rivulus* species, *R. corpulentus* seems, at least superficially, most similar to *R. deltaphilus* Seegers, 1983; a species we have collected at many localities in the lower Orinoco and Cuyuni (Essequibo) basins in Venezuela. Compared to *R. corpulentus*, *R. deltaphilus* (Seegers, 1983) has fewer dorsal fin-rays (5-7 rays vs. 10), slimmer body (average greatest body depth = .227 vs .250), and a dissimilar sort of sexual dimorphism; *R. deltaphilus* males may retain a large faded rivulus-spot, and the adult female body pattern is much more uniform than seen in *R. corpulentus*.

Reported greatest body depth values (Seegers, 1983) for *R. deltaphilus*, and those for another Orinoco Basin species, *Rivulus lyriceauda* Thomerson, Berkenkamp, & Taphorn, 1991 (average greatest body depth: 8 males .219, 6 females .216), overlap the lower range of *R. corpulentus*

greatest body depth values. This is, however, comparison of well-fed robust aquarium-kept specimens of these two species with wild-collected and preserved *R. corpulentus* of unknown nutritional status, and thus may be misleading.

Other Cordillera de La Macarena *Rivulus* collections

CAS 53664 (15 fish) seem to be juveniles of a different species (slender body, no sharp lateral stripes), but we cannot identify them at this time. They were collected by G. S. Myers and William Mitchell, 20 Feb 1960, Sta. 1, El Refugio trip, 2°15'N 73°50'W, from a small clear-water stream in an open area on the south shoulder of the Cordillera de La Macarena at an altitude of about 3000 ft (900 m). The stream was 5-10 ft (2.3-4.6 m) wide; 2 in - 3 ft (0.05-0.9 m) deep. There were small submersed aquatic plants and algae here and there, and the bottom was sand and rock with riffles. About 200-300 yds were collected with rotenone; only the rivulus, a small characid, and two *Hoplias* individuals are mentioned in the field notes. Myers wrote, 'Although this is the dry season, there is much water on the flat top and step-like flat areas and slopes of the southern end of the Cordillera Macarena. Most of the little brooks & rills are small. Almost all flatten out wide as they run over the flatter areas of conglomerate rock. A few run in deeper channels and are shaded by trees. I would have liked to fish one of those but the helicopter had to stop in an open place. This was one of the larger open streams'.

CAS 53806 (6 specimens) represents yet a third species. J. H. Huber has informed us (letter of 29 Nov 1991) that it is undescribed. This collection was made by White and Myers, 24 Feb 1960, Sta 10, El Refugio trip, 2°16'N 73°46'W, altitude 925 ft (282 m), from a small swift clear-water brook about 3 miles (4.8 km) below El Refugio on the Rio Guayabero. The brook was from 4-20 ft (1.2-6.0 m) wide and from 0-5 ft (0-1.5 m) deep, in forest, with no aquatic vegetation, and gravel, stones, and a little mud for substrate. Myers wrote 'We came out of the tributary (see Sta. 9) and went further upstream on the Rio Guayabero, stopping where we saw the present brook coming in via a little waterfall. ... Seine stretched at mouth, rotenone introduced about 200 yds (180 m) above. This stream had a remarkably rich fauna, perhaps because it did not come down ...

from the Sierra Macarena, but was on the opposite side (right bank) of the Rio Guayabero ... in flatter country ... Perhaps 40 or more species'.

Myers and White's collection of a different species of *Rivulus* at each of three nearby localities suggests a rich and diverse rivulus fauna on and around the Cordillera de La Macarena.

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