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Rivulus berovidesi, a new killifish species (Teleostei: Rivulidae) from western Cuba

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Abstract

Rivulus berovidesi, a new killifish species, is described from a small stream in Sierra de Cajalbana, northwestern Cuba. It is readily distinguished from *Rivulus cylindraceus* Poey by the combination of an exclusive color pattern and meristic characters such as a *d*-type frontal scalation pattern (versus *e*-type pattern in *Rivulus cylindraceus*). The current diagnosis of *Rivulus berovidesi* based on chromatic, morphological and meristic characters is consistent with a recent molecular analysis of this genus in Cuba.

Key words: *Rivulus berovidesi*, frontal scalation pattern, killifish, meristic characters

Introduction

The killifish genus *Rivulus* Poey, is the most speciose genus of the family Rivulidae including more than 125 valid species occurring in a great diversity of wetlands (Bussing 2002; Costa 2004, 2005; Valdesalici & Schindler 2011). However, based on recent molecular phylogenies, other authors consider that the genus *Rivulus* (*sensu stricto*) comprises less than five valid species (Hrbek *et al*. 2004; Costa 2011; Eschmeyer 2014). This group is represented by small oviparous fish (about 20-120 mm standard length) with sexual dimorphism characterized, in most cases, by the presence of an ocellated spot on the caudal fin of females (Ghedotti & Wiley 2002).

The geographic distribution of these fishes covers Middle and South America, where it ranges from Mexico to Argentina, although there are some species inhabiting many Caribbean islands (Lasso-Alcala *et al.* 2006). Particularly, a recent survey concerning the phylogeography of Cuban *Rivulus* (Ponce de Leon *et al.* 2014) concluded that only one of the two species previously described in this genus (*Rivulus cylindraceus* Poey (1860), the type species) inhabited the whole archipelago. However this same work provided solid evidence on the existence of a different lineage of *Rivulus* in northwestern Cuba, which constitutes the new species herein described.

During recent field trips to the mountain system Sierra de Cajalbana, located in northwestern Cuba, several specimens of this putative new species were observed and collected. In this paper chromatic, meristic and morphological characters are analyzed to describe this new killifish species.

Material and methods

A total of 23 specimens (11 males and 12 females) of *Rivulus berovidesi* **sp. n.** were collected at Sierra de Cajalbana, Pinar del Rio province, Cuba (Fig. 1). Measurements and counts were made according to Hoedeman (1959) using a digital caliper (nearest 0.1 mm), under a dissecting microscope. Seven meristic and eight morphometric variables commonly used in descriptions and revisions of killifish species (Hoedeman 1959; Costa 2004; Rodriguez 2009; Valdesalici *et al*. 2011; Valdesalici & Schindler 2011) were measured. The frontal scalation pattern is described following Hoedeman (1958). All measurements are presented as percentages

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Discussion

Diagnosis based on morphological and meristic characters of *Rivulus berovidesi* **sp. n.** is consistent with the results derived from a recent molecular analysis on the phylogeography of Cuban *Rivulus* (Ponce de Leon *et al.* 2014). These authors found that the new species showed 15% cytb and 2.5% CAM-4 sequence divergence with the species *R. cylindraceus*, which is more than three times the minimum divergence observed between cytb sequences of rivulid sister species (April *et al*. 2011). Additionally, the apparent non-overlapping geographic distribution of *Rivulus cylindraceus* and *Rivulus berovidesi* **sp. n.** corresponds with the separate phylogeographic history of both species.

Hoedeman (1958), described a *d*-type pattern for the frontal scalation in *Rivulus cylindraceus*. However, the current work describes a same pattern in *Rivulus berovidesi* **sp. n.** versus a frontal scalation e-type pattern in *Rivulus cylindraceus*. In our study, frontal scalation pattern of *Rivulus berovidesi* is compared with the holotype of *R. cylindraceus* (MCZ 6423) and other specimens collected from well determined populations of this species living in Cuba. Following the examination of frontal scalation carried out in this study and analyzing Hoedeman's work, where collection locality given is imprecise, it is probable that the specimens examined by this author were collected within the distribution range of *Rivulus berovidesi* **sp. n.** and thus belonged to this latter species.

Rivulus berovidesi **sp. n.** is the first species of *Rivulus* described from the Cuban archipelago after *Rivulus insulaepinorum* (now a synonym of *Rivulus cylindraceus;* Ponce de Leon *et al.* 2014). As occurs in some other Cuban freshwater fish groups, the diversity of rivulids from Cuba is currently underestimated. This constitutes a potential research subject for its importance in the overall biogeographical landscape and may have significant impact on the knowledge of freshwater fish from the Caribbean. In addition, ecological studies need to be carried out to know life-history details of this new species as well as to assess the conservation status of their populations.

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