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**Semblanzas Ictiológicas Iberoamericanas**  
**Marcelo Loureiro Barrella**



**Hugo L. López**  
**y**  
**Justina Ponte Gómez**

**Indizada en la base de datos ASFA C.S.A.**  
**2014**

*“El tiempo es invención o no es nada en absoluto”*. Henri Bergson

*“El tiempo es olvido y es memoria”*. Jorge. L. Borges

A través de esta nueva serie tratamos de conocer diferentes aspectos personales de los integrantes de la comunidad ictiológica iberoamericana.

Esta iniciativa, comparte el espíritu y objetivo de las semblanzas nacionales buscando informalmente, otro punto de unión en la “comunidad de ictiólogos iberoamericanos”.

Quizás esté equivocado en mi apreciación, pero creo que vale la pena este intento, ya que, con la colaboración generosa e insoslayable de los integrantes de este “universo”, señalaremos un registro en el tiempo de la *Ictiología Neotropical*.

*Hugo L. López*

*“O tempo é uma invenção ou não é nada em absoluto”*. Henri Bergson

*“O tempo é olvido e é memória”*. Jorge. L. Borges

A través desta nova série, tentamos conhecer os diferentes aspectos pessoais dos integrantes da comunidade ictiológica ibero-americana.

Esta iniciativa compartilha o espírito e o objetivo das biografias de pesquisadores brasileiros, procurando, informalmente, outro ponto de conexão na “comunidade de ictiólogos ibero-americanos”.

Talvez esteja equivocado na minha apreciação, mas creio que esta tentativa compensa, já que, com a colaboração generosa e voluntária dos integrantes deste “universo”, marcaremos um registro no tempo da *Ictiologia Neotropical*.

*Hugo L. López*

# Semblanas Ictiológicas Iberoamericanas

**Marcelo Loureiro Barrella**



**Hugo L. López y Justina Ponte Gómez**

**ProBiota**  
División Zoología Vertebrados  
Museo de La Plata  
FCNyM, UNLP

**Julio, 2014**

Imagen de Tapa

Sueño luego de extenuante muestreo de peces anuales, Barra Grande, Departamento de Rocha, República Oriental del Uruguay, octubre de 2004

Imagen de fondo de la Introducción

*Porque en realidad nuestro norte es el sur*, dibujo de Joaquín Torres García

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- **Una película:** *Dead Man* de Jim Jarmusch
- **Un tema musical:** *New Grass* de Talk Talk
- **Un artista:** David Lynch
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- **Un color:** violeta
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- **Una palabra:** perfecto
- **Un número:** 7
- **Una imagen:** el campo justo antes del amanecer
- **Un lugar:** laguna de Salamanca, Río Cuareim
- **Una estación del año:** primavera
- **Un nombre:** Helena
- **Un hombre:** Chico Mendes
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- **Un personaje de ficción:** Nobody de la película *Dead Man*
- **Un superhéroe:** Jean Luc Picard
- **Un ictiólogo/a del pasado:** Garibaldi Devincenzi
- **Un ictiólogo/a del presente:** J. Lundberg



José Ignacio, Departamento de Maldonado, República Oriental del Uruguay, enero de 1991  
De izquierda a derecha: Diego Lercari, Guillermo D'Elía y Marcelo Loureiro



Salida de campo, río Negro, Paso Aguiar, Departamento de Tacuarembó, República Oriental del Uruguay, noviembre de 2012  
De izquierda a derecha: F. Teixeira de Mello, M. Zarucki, I. González, M. Loureiro



Salida de campo del curso de Biología Animal, laguna Negra, Departamento de Rocha, República Oriental del Uruguay, noviembre de 2012

Neotropical Ichthyology, 9(2):335-342, 2011  
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## A new species of *Austrolebias* Costa (Cyprinodontiformes: Rivulidae) from northeastern Uruguay, with comments on distribution patterns

Marcelo Loureiro<sup>1,2</sup>, Alejandro Duarte<sup>1</sup> and Matías Zarucki<sup>1</sup>

A new species of *Austrolebias* is described based on individuals from the middle and upper rio Negro (rio Uruguay basin) and rio Yaguarón (Patos-Merín system). The new species can be differentiated from all other species of the genus by the unique presence in males of uniform bluish gray pigmentation on flanks (without vertical bands) and unpaired fins. The new species is also distinguished by the combination of characters associated with a reduction of the squamation of the abdominal, preopercular, and opercular regions. The new species presents some morphological characteristics similar to *A. gymnoventris* and *A. luteoflammulatus*. The distribution of the new species is concordant with three other species of *Austrolebias* and may represent a case of drainage rearrangement of the rio Negro upstream tributaries (rio Uruguay basin) and tributaries of laguna Merín system.

Uma espécie nova de *Austrolebias* é descrita, com base em indivíduos do alto e médio rio Negro (bacia do rio Uruguai) e rio Jaguarão (sistema Patos-Mirim). A espécie nova pode ser distinguida de todas as demais do gênero pela presença única em machos de pigmentação uniforme cinza azulado nos flancos sem listras verticais, e a pigmentação uniforme das nadadeiras ímpares. Também pode ser reconhecida pela combinação de caracteres associados à redução do padrão de escamas na região abdominal, pré-opérculo e opérculo. A espécie nova apresenta várias características semelhantes a *A. gymnoventris* e a *A. luteoflammulatus*. A distribuição da espécie nova é concordante com outras três espécies de *Austrolebias*, representando um caso potencial de captura da bacia dos afluentes superiores do rio Negro (bacia do rio Uruguai) aos afluentes da lagoa Mirim.

**Key words:** Annual fishes, Biogeography, Systematics.

### Introduction

Species of the genus *Austrolebias* Costa are the most numerous annual fishes of temporary ponds and wetlands in the lower Plata-Paraná basin and the Patos-Merín system. There are 39 currently recognized species (Costa, 2006; Ferrer *et al.*, 2008; Loureiro & García, 2008), most (65%) described in the last 25 years.

Monophyly of the genus is supported by molecular (García *et al.*, 2000; García, 2006) and morphological analysis (Costa, 2006). According to Costa (2006), synapomorphies that support *Austrolebias* monophyly comprise head scale patterns, pigmentation around the eyes, bony structures of the lower jaw and the gill arches, morphology of the unpaired fins, and genital morphology. Phylogenetic relationships within the genus are considered controversial because morphological and molecular analyses are contradictory

(Costa, 1998, 2002, 2006; García *et al.*, 2000; García, 2006; Loureiro, 2004). According to the most recent revision (Costa, 2006), the genus includes three basal species and five species groups. Despite the fact that these groups were roughly supported by molecular analyses (García *et al.*, 2000; García, 2006), phylogenetic relationships among and within clades are still the subject of debate.

Due to their peculiar life cycle and habitat, which favors high local differentiation and low vagility, annual fishes are an excellent model group to test speciation mechanisms and historical biogeographic hypotheses. Yet, absence of a robust phylogenetic hypothesis for the group, make interpretations weak. However, some general patterns are still evident. At a large geographical scale Costa (2010) suggested that the ancestor of *Austrolebias* probably originated in the lower La Plata basin (including the rio Negro) and the Patos-Merín system, and later different dispersal and vicariant events

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ORIGINAL  
ARTICLE

## Patterns of population differentiation in annual killifishes from the Paraná–Uruguay–La Plata Basin: the role of vicariance and dispersal

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### ABSTRACT

**Aim** To elucidate the role of vicariance versus dispersal at the microevolutionary scale in annual killifish populations belonging to the *Austrolebias bellottii* species complex (Rivulidae). Within this complex, *A. bellottii* and *A. apaii* have low vagility and occur widely within the study area, making them excellent models for testing biogeographic hypotheses of differentiation.

**Location** South America, in the Paraná–Uruguay–La Plata river basin.

**Methods** Molecular data and morphometric analyses were used to reconstruct the phylogeographic history and morphological variation of 24 populations of two taxa of the *A. bellottii* species complex. Phylogenetic analyses using maximum likelihood (ML) and Bayesian inference (BI) model-based methods, estimates of clade divergence times implemented in BEAST, non-metric multidimensional scaling, analysis of molecular variance results, and morphological analyses elucidated the role of vicariance versus dispersal hypotheses in population differentiation in the aforementioned river basin.

**Results** In the *A. bellottii* species complex from the Paraná–Uruguay–La Plata river basin, past allopatric fragmentation from vicariance events seems to be the most plausible scenario for diversification since the Late Miocene and more recently since the Plio-Pleistocene. The Plio-Pleistocene vicariance produced the differentiation of three major clades in *A. bellottii* populations. One clade from the eastern Uruguay River drainage was separated from another in western Uruguay and the Paraná–La Plata River drainages. A later vicariance event split populations to the south (lower Paraná–La Plata Basin) and north (middle Paraná) of the western Paraná River drainage. However, our results do not exclude the possibility of dispersal events among *A. bellottii* populations from both the Uruguay and Paraná river drainages, which could occur in these river basins during hypothesized connectivity cycles of the Late Pliocene and Pleistocene.

**Main conclusions** Past allopatric fragmentation caused by different vicariance events seems to be the main driver of diversification in the *A. bellottii* species complex since the Plio-Pleistocene. However, the current molecular data suggest that populations from both drainages of the Paraná–Uruguay rivers may have experienced cycles of connectivity during the Pleistocene, perhaps including multiple vicariance or dispersal events from populations located in the western lower Uruguay River drainage, which encompassed climatic and geological changes in the Paraná–Uruguay–La Plata Basin.

### Keywords

Annual killifishes, *Austrolebias*, dispersal, past fragmentation, phylogeography, Rivulidae, South America, vicariance.

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## Functional Diversification within a Predatory Species Flock

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### Abstract

Ecological speciation is well-known from adaptive radiations in cichlid fishes inhabiting lentic ecosystems throughout the African rift valley and Central America. Here, we investigate the ecological and morphological diversification of a recently discovered lotic predatory Neotropical cichlid species flock in subtropical South America. We document morphological and functional diversification using geometric morphometrics, stable C and N isotopes, stomach contents and character evolution. This species flock displays species-specific diets and skull and pharyngeal jaw morphology. Moreover, this lineage appears to have independently evolved away from piscivory multiple times and derived forms are highly specialized morphologically and functionally relative to ancestral states. Ecological speciation played a fundamental role in this radiation and our data reveal novel conditions of ecological speciation including a species flock that evolved: 1) in a piscivorous lineage, 2) under lotic conditions and 3) with pronounced morphological novelties, including hypertrophied lips that appear to have evolved rapidly.

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### Introduction

Species flocks are monophyletic assemblages of closely related species that occur in sympatry and display high degrees of endemism [1] that are often in the process of radiating along an ecological gradient. Although examples of spatially driven (i.e., allopatric) radiations are abundant, recent evidence suggests that ecological selection may play an important role in sympatric speciation events [2–5]. For example, resource segregation is often associated with cases of adaptive divergence among sister species [6,7] and among species flocks [8,9].

To date, examples of ecological differentiation among species flocks have been documented primarily in lentic fishes [9–11] and divergence is generally associated with habitat (i.e., pelagic-littoral zonation) heterogeneity. Indeed, ecological speciation in sympatric or parapatric conditions is often tied to habitat use. For example, among fishes, deep- or robust-bodied forms are often found in littoral zones while shallow- or slender-bodied forms are associated with pelagic zones [6,13,14]. Pronounced habitat zonation (i.e., depth, temperature,

dissolved oxygen) characterizes lentic ecosystems. Such habitat zonation may be limited in lotic environments, where water current seems to be the primary selective agent [15]. No prior studies have documented adaptive radiations of lotic species flocks.

Sympatric adaptive radiation (i.e., species flocks) is also limited to ecological differentiation among groups with low trophic levels such as algivory, planktivory, zooplanktivory and invertivory [6,8,13]. There are several possible explanations for the rarity of piscivorous lineages producing species flocks. Piscivory tends to limit diversification of feeding structures [16] and thus reduces the likelihood of disruptive ecological selection and niche plasticity. Additionally, fishes tend to be motile, such that habitat zonation (i.e., littoral vs. pelagic) among prey fishes may be an ineffective means of resource partitioning (e.g., source of disruptive selection; [17]) compared to prey types that are associated with a discrete habitat such as plankton (i.e., pelagic zone) or algae (i.e., photosynthetic zone). Furthermore, individual fitness benefits (e.g., increased growth and survivorship; [18]) associated with piscivory may inhibit niche divergence away from piscivory. Such limitations



A orillas del río Uruguay en Bella Unión, Departamento Artigas, República Oriental del Uruguay, enero de 2009

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