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Semblanzas Ictiológicas Iberoamericanas
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Hugo L. López
y
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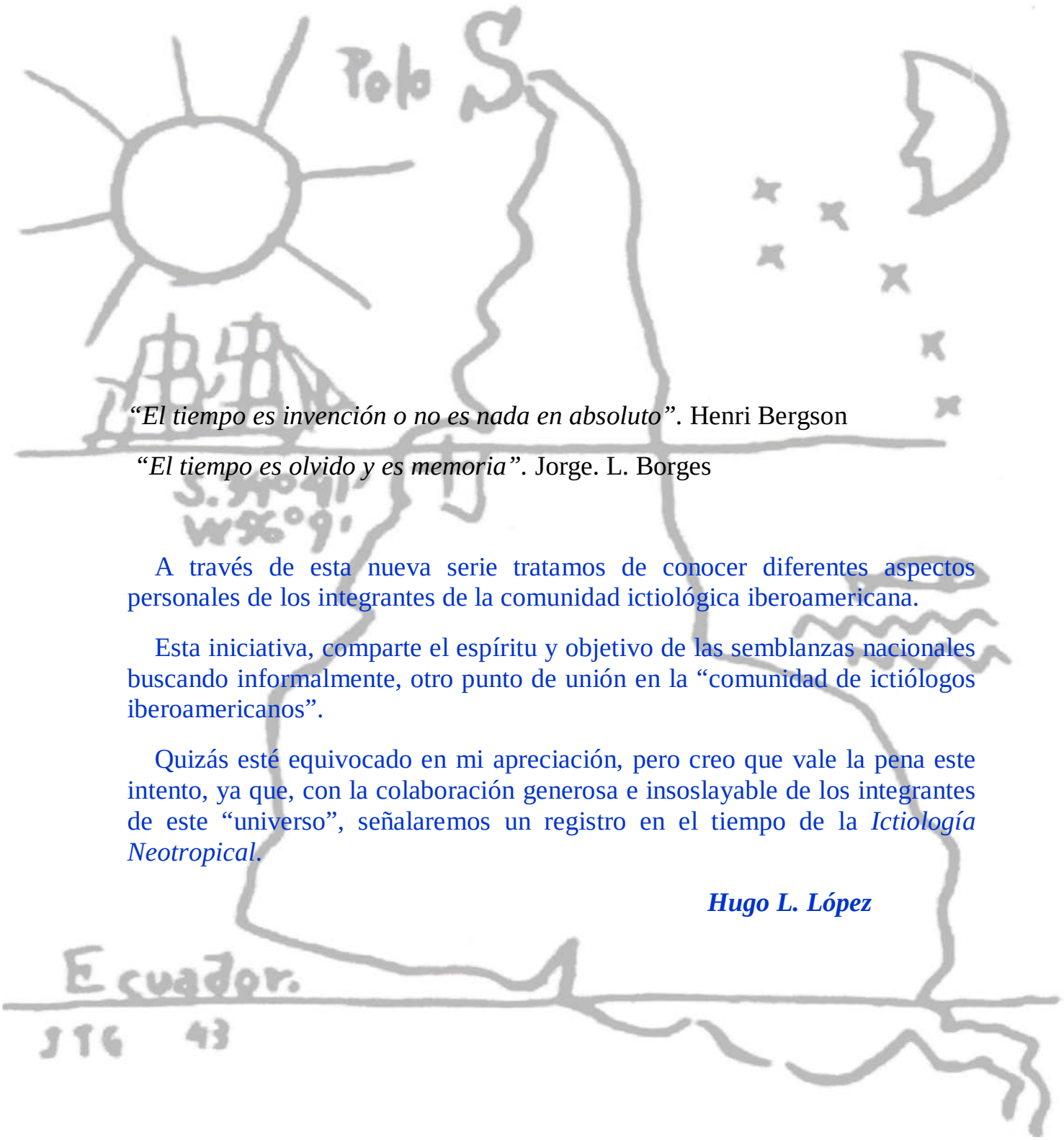

“El tiempo es invención o no es nada en absoluto”. Henri Bergson

“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

Semblanas Ictiológicas Iberoamericanas

Ignacio Doadrio Villarejo

Hugo L. López y Justina Ponte Gómez

ProBiota
División Zoología Vertebrados
Museo de La Plata
FCNyM, UNLP

Agosto, 2014

Imagen de Tapa
Ignacio Doadrio con el pescador Musa "Mango", río Dejendjou, Dogoumet, abril de 1993
Expedición conjunta a la República de Guinea: ORSTOM, Francia, y Museo Nacional de Ciencias Naturales, España

Imagen de fondo de la Introducción
Porque en realidad nuestro norte es el sur, dibujo de Joaquín Torres García

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Cuestionario

- **Un libro**: *El Mar de los Vascos de* Luís Jímenez de Aberasturi
- **Una película**: *Dersú Uzala*
- **Un tema musical**: *Palabras para Julia* por Paco Ibañez
- **Un artista**: Federico García Lorca
- **Un deporte**: baloncesto
- **Un color**: azul
- **Una comida**: cocochas de bacalao al pil pil
- **Un animal**: mi perro, un Mastín Español
- **Una palabra**: perdón
- **Un número**: 11
- **Una imagen**: el arrecife de coral en la Península del Yucatán
- **Un lugar**: Tassili Ahaggar
- **Una estación del año**: primavera
- **Un nombre**: Paloma
- **Un hombre**: mi padre
- **Una mujer**: Marie Curie
- **Un ictiólogo/a del pasado**: Franz Steindachner
- **Un ictiólogo/a del presente**: Petru Banarescu (fallecido, pero contemporáneo)
- **Un personaje de ficción**: Lisa Simpson
- **Un superhéroe**: Agnes Gonxha Bojaxhiu (Teresa de Calcuta)

Lago de Isly, cerca de Imilchil, Marruecos,.abril de 1988
Expedición conjunta al alto Atlas de Marruecos: Universidad de Casablanca, Marruecos, y Museo Nacional de Ciencias Naturales, España.
De izquierda a derecha: la investigadora Salwa el Gharbi, Ignacio Doadrio, y la familia del guarda del lago en su casa, actualmente desaparecida

Pescando en el lago Kasab, Marruecos, 1988
De izquierda a derecha: atrás, Yasmina Bernat; adelante, Ignacio Doadrio y Juan Cubo, todos del Museo Nacional de Ciencias de Madrid

J Mol Evol (1999) 49:227–237

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Molecular Evidence on the Evolutionary and Biogeographical Patterns of European Cyprinids

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Abstract. The phylogenetic relationships of 106 European cyprinid taxa were determined based on the complete nucleotide sequence (1140 bp) of the mitochondrial cytochrome *b* gene. The molecular phylogeny was used (1) to revise the current systematics of European cyprinids, (2) to establish the phylogenetic utility of traditional morphological characters that are widely used in Cyprinidae systematics, and (3) to discuss alternative hypotheses on the biogeography of the family in Europe. The age of the major lineages within European cyprinids was tentatively estimated with a molecular clock and showed full agreement with the fossil record of the group. Moreover, the results provided unambiguous evidence for a close phylogenetic affinity of some Caucasian and Greek endemic cyprinid taxa (e.g., *B. capito* and *B. brachycephalus* and *Leuciscus keadicus*, *Barbus graecus*, and *B. albanicus*, respectively) to Iberian and North African, but not Central European, cyprinids. The existence of such unexpected phylogenetic relationships refutes the classical hypothesis on the biogeography of European cyprinids, which assumes a dispersal of the cyprinid fauna from central Europe to southern Europe and northern Africa during the Miocene (and, hence, predicts a close phylogenetic relationship of all Caucasian, Greek, Iberian, and North African cyprinids to central European taxa). Instead, the existence of a Mediterranean realm independent of the central European route seems plausible based on the molecular evidence. It is likely that the new biogeographical scenario proposed here might apply to other primary freshwater European animals with low dispersal abilities, including fish, amphibians, and invertebrates.

Key words: Molecular phylogeny — Cytochrome *b* — Biogeography — Cyprinids

Introduction

Cyprinids, the largest and most successful family of primary freshwater fish in Eurasia, Africa, and northern America, are a good model for comprehending the evolutionary mechanisms driving the diversification and distribution of species. Primary freshwater fish are restricted to river and lake drainage systems and show little capacity for transwatershed dispersal. Thus, their distribution closely reflects their biogeographical history.

In particular, European cyprinids have an interesting pattern of distribution, in which numerous endemic species are found on the Iberian Peninsula and in southern Greece, with a relatively uniform fauna in Central Europe. Traditionally, it is believed that European cyprinids originated in eastern Asia and subsequently spread to Siberia during the Eocene (Banarescu 1989, 1992). However, because Europe was separated from Siberia by the shallow Ob Sea, their dispersal to Europe was impeded. During the Oligocene, cyprinids were able to colonize Europe because of the uplift of the Urals but ended once these mountains were formed. Three alternative hypotheses have been proposed to explain the further dispersion of cyprinids across Europe during the Miocene.

The first, classical, hypothesis proposes that cyprinids spread across central Europe via river connections to the

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Phylogenetic relationships within the fish family Goodeidae based on cytochrome *b* sequence data

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Abstract

A phylogeny of the species in the family Goodeidae was constructed based on the complete mitochondrial cytochrome *b* gene (1140 bp). Molecular phylogeny was used to revise current systematic of this group, to characterize the evolution of reproductive characters, and to infer a biogeographical model for the Mesa Central of Mexico during the Cenozoic period. We confirmed the monophyly of the subfamily Goodeinae and defined five different lineages within Goodeinae: Chapalichthyini, Girardinichthyini, Goodiini, Ilyodontini, and Charachontini. The morphology of trophotaeniae widely used to infer phylogenetic relationships within goodeids appears to be homoplasious. In a primitive condition, trophotaeniae seem to be very simple structure as occurs in the Charachontini lineage. There is an evolutionary trend to increase trophotaeniae surface via an increase in the number of branches (ribbon type) or branch widening (rosette type). Goodeidae originated in the middle Miocene and it was in the Pliocene when they radied their highest diversity during a dry period that caused basin splitting in the Mesa Central of Mexico.

1. Introduction

The Goodeidae is a family of 20 genera and about 42 species of freshwater fishes distributed throughout the South-Western United States and the Mexican highlands, extending south to the Balsas and Panuco river basins into the Pacific and Atlantic slopes in Mexico. The Goodeidae is divided into two subfamilies: Empetrichthynae and Goodinae. The subfamily Empetrichthynae inhabits the South-Western Great basin of the United States. This subfamily is considered more primitive and is composed of two genera and four oviparous species with several subspecies. Populations are typical habitants of small springs and are extinct in the wild or endangered. The Goodinae comprises approximately 18 genera and most occur in the Mesa Central of Mexico. This region has had extensive volcanic and tectonic activity since the early Miocene. This geological activity in Central Mexico has generated a complex hydrology for which historical interpretation is difficult. Goodeids are particularly suitable models to test palaeohydrological hypothesis regarding the Mexican Plateau because of (1) their limited dispersal capacity, (2) Miocene origin (Gúzman et al., 1998), (3) wide range of distribution across the Mexican Plateau, and (4) high diversity. Phylogenetic relationships among goodeids lineages reflect associations between different areas minimizing dispersal one of the main problems in historical biogeography (Ronquist, 1997) and contribute to understanding of the biogeographical past of the Mexican Plateau.

The goodeids are also a case model to investigate other topics in evolutionary biology such as the evolution of viviparity and the utility of characters associated to reproduction for phylogenetic purposes. Two different life histories are present in the Goodeidae. Species in the Goodeinae subfamily have internal fertilization, viviparity, and matrotrophy whereas those of the Empetrichthyinae subfamily are characterized by external fertilization, oviparity, and lecithotrophy. The development of viviparity and its associated morphological characteristics have been the basis for different classifications in goodeids and have different evolutionary implications (Alvarez del Villar, 1970; Hubbs and Turner,

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Molecular phylogeny and biogeography of the Cuban genus *Girardinus* Poey, 1854 and relationships within the tribe Girardinini (Actinopterygii, Poeciliidae)

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ABSTRACT

Phylogenetic relationships among members of the freshwater fish tribe Girardinini were inferred to test existing colonization and diversification hypotheses for this group in the Caribbean. The genetic material examined was mitochondrial (cytochrome *b*, 1140 bp) and nuclear (RAG-1 and β-actin, 2450 bp) DNA from 161 specimens representing 44 ingroup and three outgroup taxa. Our mtDNA and combined data matrix (mtDNA + nuclear DNA) results rendered a well-supported phylogeny for the tribe Girardinini and suggest the need to review the group's current taxonomy. From the data presented here, it may be inferred that the Girardinini diverged from other poeciliid fishes approximately 62 Mya ago in the Palaeocene period. This estimate, however, conflicts with the hypothesis that today's vertebrate fauna is the result of the more recent colonization of the Antillean islands during the Early Oligocene (35–33 Mya ago). The isolation of western, central and eastern Cuba during the Miocene and that of the Juventud Island and Guanahacabibes Peninsula during the Pliocene, are the main geologic events that could have promoted speciation in this group.

1. Introduction

The tribe Girardinini Hubbs, 1924 was proposed to comprise 6 genera and 15 species and subspecies of endemic freshwater fishes from the main island of Cuba and Juventud island (former Pinos) (Rivas, 1958; Barus et al., 1991). However, according to the taxonomy of Rosen and Bailey (1963), the tribe is only considered to have three genera (*Girardinus* Poey, 1854; *Quintana* Hubbs, 1934 and *Carlhubbsia* Withley, 1951) and a number of species (from ten to twelve) that depends on the describing author (Rosen and Bailey, 1963; Parenti and Rauchenberger, 1989; Ghedotii, 2000; Lucinda and Reis, 2005). The monotypic genus *Quintana* is represented by the species *Quintana atrizona* Hubbs, 1934 inhabiting both Juventud Island and western Cuba Island. The genus *Carlhubbsia* has two recognized species: *C. kidderi* (Hubbs, 1936) from Mexico and Guatemala, and *C. stuarti* Rosen and Bailey, 1959 from Guatemala and Belize. In turn, the genus *Girardinus* has eight recognized species (Lucinda, 2003): *G. metallicus* Poey, 1854; *G. uninotatus* Poey, 1860; *G. creolus* Garman, 1895; *G. denticulatus* Garman, 1895; *G. cubensis* (Eigenmann, 1903); *G. falcatus* (Eigenmann, 1903); *G. microdactylus* Rivas, 1944 and *G. rivasi* Barus and Wohlgemuth, 1994.

The genus *Girardinus* is among the endemic freshwater fishes that inhabit both the islands of Cuba and Juventud. This genus shows its highest diversity in western Cuba and is absent from central Cuba south of the Sancti-Spiritus district and from some eastern areas of Cuba Island, such as short rivers south of the Sierra Maestra and west of Sagua-Baracoa. Compared to other freshwater fishes of the Antillean islands, *Girardinus* is a good model for deciphering the evolutionary history of Cuban hydrographical systems because of its wider range of distribution throughout Cuba, its higher diversity, its presence on two islands of known geological age and its ecology, being more restricted to freshwater systems. Studies on the salt tolerance of representatives of Girardinini have failed to recover fishes from salt, brackish, or fresh water with a Cl^- content higher than 1000 parts per million (Rivas, 1958, 1986). We can therefore assume that dispersion in Girardinini occurs only via connected freshwater systems (Rivas, 1958).

Models of the palaeogeography of Cuba based on biological data can be useful for geological reconstructions, since Cuba occupies one of the most geologically complex areas of the planet. Cuba's main and Juventud islands boast over 600 fluvial systems mostly crossing karst landscapes. The country's karst topography determines that some rivers are fragmented by waterfalls or disappear for kilometers underground and may also be the cause of local speciation events in freshwater fishes such as *Girardinus* with a limited capacity for dispersal. By identifying the barriers that caused the fragmentation and dispersion of freshwater fishes and the timing

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Viendo cómo bajar al río, Oaxaca, México, 1996
Emilio Martínez (izquierda), investigador del CIIDIR Oaxaca y tesista de Ignacio Doadrio (derecha); al centro un técnico del CIIDIR Oaxaca

Muestreos de campo en Oaxaca, México, 1996
Ignacio Doadrio (derecha) y Emilio Martínez (izquierda), investigador del CIIDIR Oaxaca a quien Doadrio le dirijía su Tesis Doctoral sobre los peces del Estado de Oaxaca

Ignacio Doadrio, izquierda, pescando en un afluente del Elba en la República Checa con Jörg Bohlen del Instituto de Fisiología Animal y Genética de Libechov, 2005

José Luís González de la empresa CBC e Ignacio Doadrio pescando en el río Zújar, Badajoz, España, junio de 2010

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