

Rivers of Life

Fishing for answers in the exotic biodiversity of the Amazon's headwaters

BY NATHAN K. LUJAN AND HERNÁN LÓPEZ-FERNÁNDEZ



ROM scientists collecting fish in the Puyo River, a tributary of the upper Amazon in Ecuador.



Royal Ontario Museum Ichthyology
 ROM: 93656 Loricaridae 2012
Chaetostoma cf anale
 Identifier: Lujan, N. K. - Oct 2012
 Locality: Ecuador, Pastaza
 Merá (Canton), Macha Tierra (SALON) Puyo River, Puyo
 site of confluence with Pastaza, 22 km SSE of Puyo,
 1 65278 -77.92445, Elev: 773 m
 Collectors: N.K. Lujan, D.C. Taplin, R. Sandoz, A. ...
 Date: 09 Sep 2012
 Acc. No.: 7873 Field No.: EC-12-04
 25 spec. (82.5x122 x mm SL)

In northern South America, the colossal Amazon and Orinoco rivers originate from mountainous headwaters in the centrally located Guiana Shield plateau and the far western Andes Mountains. The Guiana Shield, which is a longstanding research focus of the ROM's Department of Natural History, became a plateau hundreds of millions of years before the Andes uplifted, and as a result it shelters a wide variety of often bizarre and evolutionarily ancient species. In contrast, the Andes gained most of their elevation less than 30 million years ago and host fish assemblages that are generally more recently evolved.

Understanding the correspondence between the geologic history of these two South American highlands and the evolutionary diversification of organisms is a central step in revealing the mechanisms that create and maintain biodiversity on the continent that has the largest richness of fish species on Earth. Although the terrestrial biodiversity shared by both mountain regions is fairly well studied, our understanding of the historical relationships of highland fish groups is still very incomplete. Scientists in the Ichthyology section of the ROM have recently begun investigating the connection between the geologic expansion and contraction of headwaters around the outskirts of the Amazon Basin and species generation in Amazonian fishes. While the ROM's existing collections from the Guiana Shield provide a great foundation for these studies, a thorough understanding of transcontinental patterns of upland biogeography requires that we expand our collections to include the Amazon's Andean headwaters.

Research by some of our collaborators suggests that at least one very distinctive group of fishes, the suckermouth catfishes, may have somehow surmounted a broad lowland gap in suitable habitat separating the highlands and then invaded the flanks of the then newly formed Andes. Suckermouths were likely originally specialized for life in steep, fast streams around the Guiana Shield. They

could have arrived in similar habitats along the foothills of the Andes during periods of low sea level, when rapids habitats would likely have been exposed in the intervening lowlands. To collect data to test these hypotheses, we recently conducted an expedition to survey the Andean rivers of Ecuador. Although we are just beginning to examine our collections in detail and many big questions remain unanswered, some initial discoveries—including several new species—are giving us cause to celebrate. Highlighting the serendipity often involved with species discovery, one new suckermouth species, as yet to be named, was being advertised by a local restaurant as the key ingredient in its soup dish, *Caldo de Corroncho*!

NATHAN K. LUJAN is an international research fellow at the Royal Ontario Museum. **HERNÁN LÓPEZ FERNÁNDEZ** is associate curator of Ichthyology in the ROM's Department of Natural History.



Inset: A gallon jar with specimens of a new suckermouth catfish species discovered in the Puyo River.

Bottom: A local restaurant sign advertising soup made with the new catfish species we had recently "discovered."