

Drainage basin formation as a key driver of diversification in neotropical aquatic frogs

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Abstract

The Neotropics are one of the most biodiverse regions in the world, yet the processes driving this diversity remain poorly understood. This study explored the spatio-temporal diversification of *Pseudis paradoxa* and *Pseudis platensis*, two closely related aquatic frog species associated with rivers and floodplains throughout South America. We addressed two questions: (1) How were the hypothetical ancestors of the *P. paradoxa* + *P. platensis* clade distributed? and, (2) What biogeographic processes influenced the diversification and current geographic distribution of the clade? Using two mitochondrial and three nuclear markers, we conducted lineage delimitation, divergence time estimation, and historical biogeography with BIOGEOBEARS. Results showed that both species consist of multiple lineages. The initial divergence was estimated at around 4.8 million years ago (2.8–7.2 Mya), at the Miocene–Pliocene transition. Ancestral range estimation recovered the origin of the *P. paradoxa*/*P. platensis* clade in a paleo-region spanning the Amazon and La Plata basins. Vicariance processes split this ancestral range, leading to allopatric populations in each basin. The establishment of the modern Amazon Basin, shaped by river capture events approximately 4.9–5.6 Mya, was likely the key factor promoting the diversification of the *P. paradoxa*/*P. platensis* clade.