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Biogeografia historica de los Goodeidos (Cyprinodontiformes: Goodeinae) en la Mesa Central de Mexico

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Historical biogeography of the livebearing splitfins (Cyprinodontiformes: Goodeinae) in the Mesa Central

The Goodeinae are a diverse group of small, viviparous freshwater fishes distributed throughout the Mesa Central of Mexico. Since the early Miocene, the landscape of the Mesa Central has been continuously altered by widespread volcanism and tectonic activity, resulting in a complex hydrologic system characterized by repeated isolation and reconnection of drainage systems. Previous studies of the historical biogeography of the Goodeinae agree that basin compartmentalization and river piracy played significant roles in driving patterns of diversification within the clade. However, the spatial and temporal patterns of goodeine diversification with regard to many individual species remain uncertain. A more complete understanding of the biogeographic history of the Goodeinae relies on formulation of a well-supported phylogeny for the subfamily, but recent molecular phylogenetic analyses, all of which are based only on mitochondrial DNA sequence data, have produced incongruent tree topologies. The objectives of this study were to employ novel molecular data and comparative phylogenetic approaches in order to infer the evolution of the geographic distribution of Goodeinae in the Mesa Central. The phylogenetic relationships of all goodeine species were recovered using a dataset of 10 nuclear genes analyzed under Maximum Likelihood and Bayesian frameworks. A time-calibrated phylogeny produced using the nDNA sequence data and several fossil calibration points was used to estimate divergence times within the clade. Finally, we analyzed the time-calibrated phylogeny in the context of current geographic distribution data in the program Lagrange to provide the first likelihood-based inference of the biogeographic history of the subfamily Goodeinae.