

# Model-based analyses suggest pleistocene refugia over ancient divergence as main diversification driver for a neotropical open-habitat treefrog

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## Abstract

Studies about diversification of Neotropical open-habitat organisms are scarce, especially in frogs, in which almost all studied species from Cerrado, Chaco, and Caatinga are mainly associated with gallery forest. Here we tested hypotheses about diversification in Neotropical open habitats (savannas and grasslands) using as model a small treefrog associated with these environments and widely distributed throughout South America. We sampled 68 individuals from 43 localities throughout the geographic distribution of *Scinax fuscomarginatus* and used one mitochondrial and three nuclear DNA markers to define genetic clusters. Based on population assignments and previously proposed diversification hypotheses for the Cerrado, we designed different models to be tested by approximate Bayesian computation (ABC). We found four genetic clusters which reflect the current distribution of open habitats of the Central Brazilian plateau and of the Cerrado lowlands. Among the models tested with ABC, the best-supported model was a scenario of multiple refugia in which all populations experienced population size reduction (bottleneck) in a relatively recent time, with the most ancient split event surrounding the Last Interglacial (LIG). During interglacial periods, warmer and wetter climate would have favored the geographic expansion of forests, resulting in the retraction and fragmentation of open habitats like savannas and grasslands. Populations of species associated with open habitats, including *S. fuscomarginatus*, would have remained isolated in relatively small stable areas with reduced gene flow among them.