

## COMPARATIVE PHYLOGEOGRAPHY, PHYLOGENY, PALEOCLIMATE MODELING, AND TAXONOMY OF NEOTROPICAL REPTILES AND AMPHIBIANS

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FAPESP Process 2011/50146-6 | Term: Jan 2012 to Dec 2017

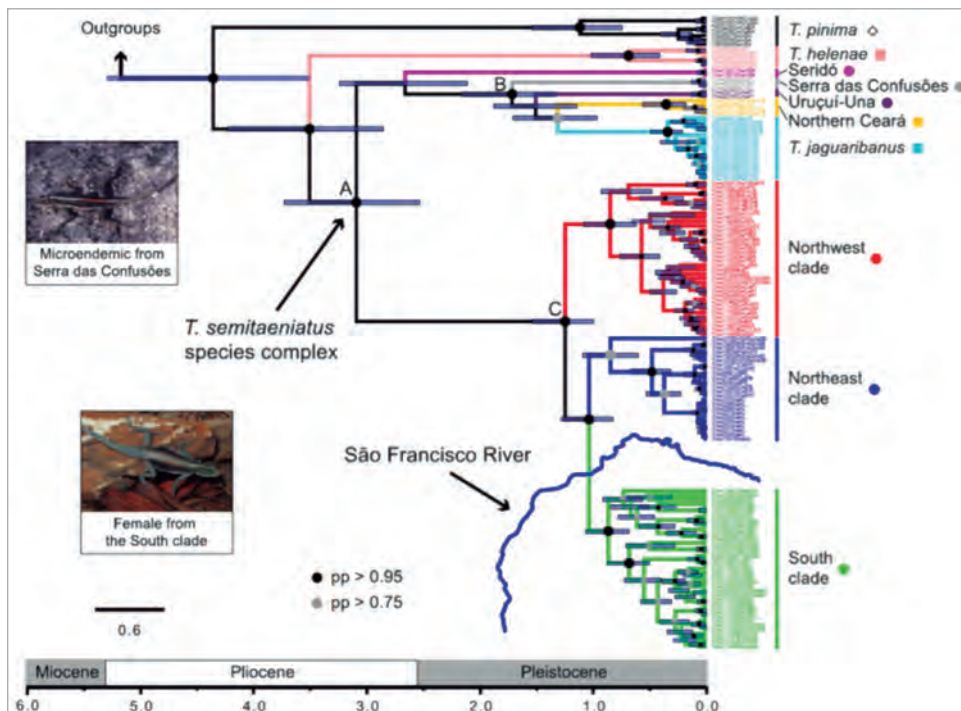


Figure 1. *Tropidurus semitaeniatus* species groups mtDNA maximum clade credibility Bayesian tree and divergence dates. Posterior probability (pp) values are indicated by node colors and nodes with no indicative of support have pp < 0.75. (Photos by MTR).

Recent analyses of endemism and levels of anthropic threat identified the so-called hotspots targets for conservation. However, our knowledge about the origin and distribution of the biodiversity in those areas remains scarce. Such a deficiency limits our power of conservation with respect to the environmental changes caused by a man. One of the aims of this project is addressed to study the influence of Pleistocene climatic fluctuations of the herpetofauna and the levels of genetic diversity of frogs and lizards living in elevated and lowland regions of the Atlantic

Forest. By combining climatic modeling coupled to phylogeography, the project will be recording diversity patterns in an insufficiently studied, highly threatened and megadiverse region, bringing important contributions for the conservation of the remaining fragments of this hotspot. We will be also focusing on the role of mountains as areas favoring adaptive diversification of the herpetofauna, either as refuges to species adapted to cold climates during hot phases, or as evolutionary scenarios for ecogeographic speciation. We also proceed further our ongoing research with reptiles and amphibians from several Brazilian ecosystems under morphological, karyological, taxonomic, phylogenetic and phylogeographic approaches, contributing to a better understanding of their evolution and the biogeographic history of the continent. We will be also conducting a comparative phylogeographic study of a South American clade of lizards and its ecological equivalent in Africa in order to establish intercontinental correlations on their history and origin. The collections obtained in unexplored or little known areas in State of São Paulo and in other Brazilian ecosystems will improve the knowledge on our biodiversity, describing new taxa which, associated to the phylogenetic and phylogeographic data obtained, will contribute to reevaluate conservation strategies to target species.

## SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

We sampled reptiles and amphibians in about 120 localities in all Brazilian biomes totalizing 8609 specimens (4873 reptiles and 3589 amphibians); about 600 additional specimens were obtained in Moçambique for comparative molecular studies, now in course. The specimens and tissues obtained allowed the discovery of three new genera and 35 new species that are described in the about 160 publications of the project. Interdisciplinarity was our permanent guideline resulting in integrative papers focusing one or more of the following areas: taxonomy and systematics, phylogeny, phylogeography, physiological ecology, developmental biology and cytogenetics. Using molecular and phenotypic data of selected taxonomic groups we reconstruct their biogeographic history and its bearing to understand the landscape evolution of our biomes. We detect an unsuspected amount of cryptic diversity in the majority of groups studied, rendering mandatory a review of the presently adopted conservation policies. Comparative studies addressing molecular and phenotypic evolution of selected lizards in Brazil and Africa are underway.

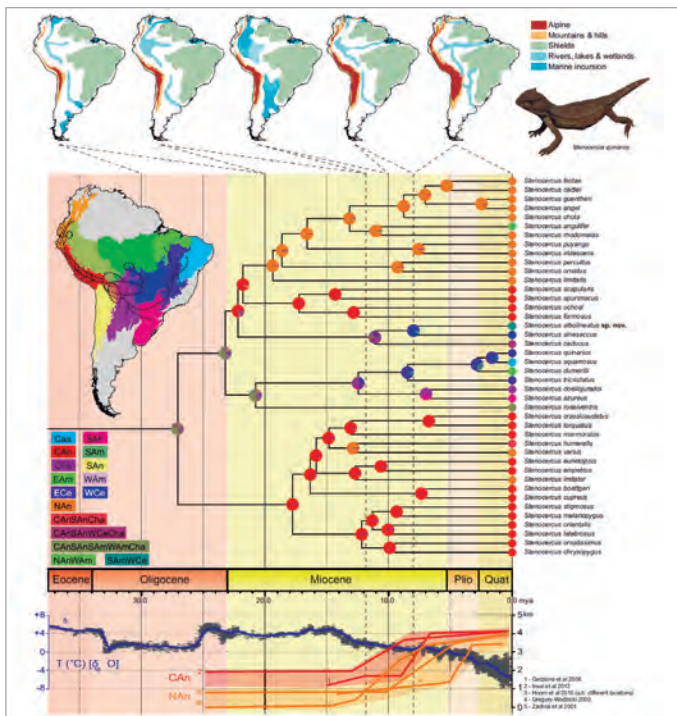


Figure 2. Biogeographical history of *Stenocercus*; top panel: landscape changes (adapted from Cook et al., 2012; Hoom et al., 2010; Lundberg et al., 1998); middle panel: amcestra; area reconstruction (Caa = Caatinga; CAn = Central Andes; Cha = Chaco; EAm = Eastern Amazonia; ECe = Eastern Cerrado; NAn = Northern Andes; SAF = South Atlantic Forest; SAM = Southern Amazonia; SAN = Southern Andes; WAM = Western Amazonia; WCe = Western Cerrado); lower panel: temperature changes (adapted from Zachos et al., 2001) and Andean uplift (adapted from Garzzone et al., 2008; Gregory-Wodzicki, 2000; Hoom et al., 2010; Insel et al., 2012).

## MAIN PUBLICATIONS

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Camacho A, Recoder R, Teixeira Jr. M, Kohlsdorf T, Rodrigues MT, Lee MSY. 2016. Overcoming phylogenetic and geographic uncertainties to test for correlates of range size evolution in gymnophthalmid lizards. *Ecography*. doi: 10.1111/ecog.02282.

Prates I, Rodrigues MT, Melo-Sampaio PR, Carnaval AC. 2015. Phylogenetic relationships of Amazonian anole lizards (*Dactyloa*): Taxonomic implications, new insights about phenotypic evolution and the timing of diversification. *Molecular Phylogenetics and Evolution*. **82**: 258-268.

Werneck FP, Leite RN, Geurgas SR, Rodrigues, MT. 2015. Biogeographic history and cryptic diversity of saxicolous Tropicoduridae lizards endemic to the semiarid Caatinga. *BMC Evolutionary Biology*. **15**: 94. doi: 10.1111/ecog.02282 2015.

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