"Neotropical Riverine Cichlids: Adaptive Radiation and Macroevolution at Continental Scales"

Most contemporary studies of adaptive radiation focus on relatively recent and geographically restricted clades. It is less clear whether diversification of ancient clades spanning entire continents is consistent with adaptive radiation. My lab uses phylogenomics, fossil dating approaches, phylogenetic comparative methods, fieldwork and data from museum collections to test whether patterns of lineage and morphological diversification in Neotropical cichlids are congruent with hypothesized ancient adaptive radiations in South and Central America. We found that diversification in the whole Neotropical cichlid clade and in the highly diverse tribe Geophagini was consistent with diversity-dependent, early bursts of divergence followed by decreased rates of lineage accumulation. South American Geophagini underwent early rapid differentiation in body shape, feeding and swimming morphology, and vision attributes congruent with expansion into novel trophic and habitat-driven ecological specialization. Early divergence of the tribe Geophagini into new niches may have precluded divergence in other South American cichlids, particularly the tribes Heroini and Cichlasomatini. Later colonization of Central America by Heroini renewed ecological opportunity and led to the diversification of Central American cichlids into forms broadly convergent with their South American counterparts. More generally, Neotropical cichlids appear to have repeatedly radiated by taking advantage of ecological opportunity in novel environments across the Neotropics, resulting in widespread convergence. We are now starting to explore the evolutionary patterns and processes of diversification in other South and Central American fish families to further understand how Neotropical fishes became the most diverse freshwater fish assemblage on the planet.