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ANNUAL MEETING OF THE SOCIETY FOR TROPICAL ECOLOGY (GTÖ)

CHALLENGES IN TROPICAL ECOLOGY AND CONSERVATION - GLOBAL PERSPECTIVES

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PHYLOGENETIC PATTERNS OF DIVERSIFICATION ACROSS ECOLOGICAL NICHES IN THE AFRICAN TREE GENUS GUIBOURTIA

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Adaptive evolution is thought to be a major driver of organism diversification but the link between phenotypic traits and environmental niche remains little documented in tropical trees. Moreover, the respective roles of phylogenetic inertia and convergent evolution in shaping environmental niche and phenotypic trait similarity among related plant taxa is not well understood. Indeed, a correlation between species traits and species environmental niche among a sample of species may result from (1) convergent evolution if different environmental conditions have selected different sets of traits, or (2) phylogenetic inertia if niche and morphological differences between species are simply function of their phylogenetic divergence, in which case the trait-niche correlation does not imply any direct causal link.

The aim of this study is to understand the relationships between environmental niche divergence and morphological divergence among congeneric species while accounting for phylogenetic inertia. This issue was addressed with the timber tree genus *Guibourtia* Benn. (Leguminosae, Detarioideae) which contains 13 African species occupying various forest habitat types, from rain forest to dry woodlands, with different climate and soil conditions. To this end, we combined morphological data with recent ecological niche modelling and used a highly resolved plastid phylogeny of the 13 African *Guibourtia* species. First, we demonstrated phylogenetic signals in both morphological traits (Mantel test between phylogenetic and morphological distances between species: $r = 0.24$, $p = 0.031$) and environmental niches (Mantel test between phylogenetic and niche distances between species: $r = 0.23$, $p = 0.025$). Second, we found a significant correlation between morphology and niche, at least between some of their respective dimensions (Mantel's $r = 0.32$, $p = 0.013$), even after accounting for phylogenetic inertia (Phylogenetic Independent Contrast: $r = 0.69$, $p = 0.018$). This correlation occurred between some leaflet and flower traits and solar radiation, relative humidity, precipitations and temperature range. Our results demonstrate the convergent evolution of some morphological traits in response to climatic factors in congeneric tree species and highlight the action of selective forces, along with neutral ones, in shaping the divergence between tropical plants.