

Forest plants on the edge of existence in tropical Africa

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Credit: Manuel de la Estrella Gonzalez

Tropical rain forests are one of the most biologically diverse habitats on the planet but description of flora and fauna and understanding of their evolutionary history are far from complete. As they are a source of sustainable resources including potential pharmaceuticals, cuisine and timber, there is an increasing need for assessing global biodiversity changes.

The [GLDAFRICA](#) project chose to study a subfamily of the legumes, the Detarioideae, to investigate the geographical patterns of species richness. "Using next-generation sequencing, we want to identify hotspots of evolutionary diversity and recent speciation events in west central Africa," outlines Dr Felix Forest, project coordinator.

Constructing the branches to arrive at the tree

Extracting appropriate DNA sequences from a few plastid markers, the team used standard methods to reconstruct the evolutionary or phylogenetic relationships between the members of the group. "We then used the resulting tree to investigate the biogeographical patterns and biome shifts within the subfamily," continues Dr Forest. Biomes have a wider range than habitat, being communities that have adapted in response to a shared physical climate.

The next step was to gather a lot more DNA sequence data, which should result in a more detailed phylogenetic tree. The fellow with the GLDAFRICA project, Dr Manuel de la Estrella, developed a targeted enrichment approach that enables a better resolved tree with more detailed evolutionary relationships. "The result was that we could sequence a few hundred markers from the nucleus. Analyses are ongoing and the new tree is expected within the next few months," Dr Forest informed us.

A key result so far is that the work has been used in evidence for a new classification in the legume subfamily. "The tribe Detarieae has been upgraded to the subfamily level recently and is now named subfamily Detarioideae," explains Dr Forest. "Further analysis will most likely change the way we view evolution of this important group of west African plants."

Looking to future conservation assessment and threats to species

International Union for Conservation of Nature (IUCN) conservation assessments are another deliverable, and "these will be used to produce an [Evolutionarily Distinct and Globally Endangered] EDGE list of the

most threatened and evolutionary distinct species in the Detarioideae group," states Dr Forest.

Use of data can be extended to predictions as to where the species will end up in the tree under different climate change scenarios. "When all the spade work has been done, we will use species modelling and the Intergovernmental Panel on Climate Change predictions to examine the fate of species in the future."

The amount of data produced is way in excess of what was initially expected for the project and the team are still working on the analysis for the final results and publication. Already published are two papers on the evolution of Detarioideae, one in *New Phytologist* and the other in the *International Journal of Plant Sciences*.

"GLDAFRICA focused on the subfamily Detarioideae from west Africa. The next step is to expand this study to the neotropical [species](#). We already obtained some pilot funding to explore the feasibility of this and it looks very promising," Dr Forest concludes.

The phylogenetic tree grown from GLDAFRICA research will be the most complete for such a large group of legumes. Given the economic importance of this group in west African rainforests, it will serve as basis for many evolutionary studies that will look into the evolution and ecology of these amazing ecosystems.

More information: Manuel de la Estrella et al. Insights on the evolutionary origin of Detarioideae, a clade of ecologically dominant tropical African trees, *New Phytologist* (2017). [DOI: 10.1111/nph.14523](https://doi.org/10.1111/nph.14523)

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