2022_81_Kew_Bramley: Understanding diversification and distribution patterns of the New Guinea flora

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New Guinea is the most floristically diverse island as well as the largest tropical island in the world. Uniquely in Asia, >75% of its forests are still intact, but although these forests are recognised as vital for climate change mitigation, they are under threat of deforestation for infrastructure development and conversion for oil palm concessions. Understanding the composition of New Guinea’s flora is dependent on baseline taxonomic knowledge; the integration of well-sampled, well-resolved phylogenies into critical taxonomic research is a key step towards an improved understanding of species rich groups. Increasing the speed that taxonomic outputs are produced is key to acting against the threats to the island’s habitats.

Ascertaining what determines distribution patterns within the New Guinea flora is also key to conservation efforts. Plant traits dictate their distributions by allowing them to succeed in specific environments. This project will focus on Cyrtandra, an understory genus of shrubs and herbs in the Gesneriaceae (African Violet family), one of the most diverse genera on New Guinea in terms of native species, with over 95% endemic to the island. Since the majority of the species diversity in New Guinea consists of non-trees (63%), Cyrtandra is an ideal case study for understanding diversification and distribution patterns of the New Guinea flora. Furthermore, it displays suitable variation in plant traits, both vegetative and reproductive.

Using NGS techniques the student will construct a phylogeny of New Guinea Cyrtandra to reveal its evolutionary history and inform ongoing taxonomic work. They will build a plant trait database from Herbarium specimen observations to investigate whether plant traits can be associated with particular lineages. Are there suites of traits that enable some species to be more widespread and limit others to smaller geographic areas? Do any of these plant traits correlate with environmental variables, or biotic factors such as pollinators and dispersers? Furthermore, they will test whether we can use patterns in plant traits and environmental data to predict the effects of habitat loss and climate change on the distribution of Cyrtandra species.

The student will be part of a Kew team documenting the flora of New Guinea with partners in Indonesia and Papua New Guinea, both priority countries in Kew’s new Science Strategy. They will participate in fieldwork on New Guinea, gain skills in genomics, taxonomy as well as ecological and environmental modelling. By mapping species distributions and modelling plant traits and their relationships with environmental variables in Cyrtandra, and comparing these to other genera studied at Kew, they will impact on efforts to conserve the island’s flora to protect species diversity and the livelihoods of local communities, building on the successful strategies applied in other Kew projects e.g. Ebo forest.

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