

## RBG Kew – QMUL MSc Student Project Presentations: Plant and Fungal Taxonomy, Diversity and Conservation

With only a small percentage of the planet's diversity formally described by science, it is more important than ever to train a new generation of taxonomists who will go on to describe, understand and conserve biodiversity. The exciting new MSc programme in *Plant and Fungal Taxonomy, Diversity and Conservation*, delivered by the Royal Botanic Gardens, Kew and Queen Mary University of London, teaches vital plant and fungal identification skills in the context of evolutionary biology and conservation.

Join the first cohort of students as they showcase their research projects in this end of year finale.

### Ryan Hills

**Title:** Conservation assessments of South African Dioscorea with the incorporation of phylogenetics

**Abstract:** As there are often limited funds available in species-conservation planning, it is imperative that efforts are focused wisely. Traditional IUCN Red List assessments that judge how threatened a species is with extinction will be compared to recent techniques such as EDGE (Evolutionary Distinct and Globally Endangered) that incorporate the phylogenetic importance of species, using South African Dioscorea (Elephant Foot Yams and their allies). This genus contains species of significant conservation concern and potential economic value due to their steroid-based chemistry.

Ryan Hills completed a BSc at UWE studying Biological Sciences and is now a Royal Botanic Gardens, Kew MSc student.

### Natalie Konig

**Title:** Bowal in Guinea: Mapping and Species Composition

**Abstract:** My project has involved analysing bowal, a vegetation type in West Africa. Recent findings by Kew botanists suggest that bowal ecosystems in Guinea may represent a threatened vegetation type with unique species. My project has involved mapping the extent of bowal in Guinea, as well as researching plant species composition and differences between two bowal soil types.

I graduated from Miami University in 2014 with a Bachelor's degree in Botany and Environmental Science. I spent the following year working at Longwood Gardens as a horticulture research intern before deciding to pursue the Master's degree at Kew.

### Bruce Murphy

**Title:** A molecular phylogeny of *Macrolobium* (Fabaceae): a morphologically diverse and species-rich genus from the Neotropics.

**Abstract:** *Macrolobium* (subfamily: Detarioideae) is a Neotropical woody genus of around 90 species, with most species confined to lowland rain forest. Last revised in 1953, the genus contains two sections distinguished by floral morphological differences. Contrasting distributions of these sections correspond to the Andean/Amazonian biogeographic pattern. However, monophyly of the genus has been questioned on the basis of morphological diversity and previous molecular studies. Using the widest sampling to date, a broadly sampled molecular phylogeny of the genus is produced from nuclear and plastid DNA markers. Monophyly of the genus and sections is tested and evolutionary implications discussed.

### Georgina Werkmeister

**Title:** Discovering the Distribution of *Tapia* in Madagascar

**Abstract:** *Tapia* (*Uapaca bojeri*) is a tree species endemic to Madagascar, where it holds great importance for local communities. However, *Tapia* faces a number of threats and little is known about the ecological factors that affect *Tapia* growth and distribution. Georgina Werkmeister will speak about her work using species distribution modelling to investigate these factors, and the possible implications for *Tapia* conservation.

Georgina graduated from the University of Edinburgh in 2014, with a BSc (Hons) in Biological Sciences (Plant Science) and is now completing her MSc. She hopes to follow her interests in conservation and sustainable development into a future career.

### Nathan Smith

**Title:** *Boletus edulis*: Population structure and host association

**Abstract:** *Boletus edulis*, the King Bolete, is an economically-important mushroom consumed across the world. A holarctic ectomycorrhizal species, it is possessive of a wide geographical and ecological range and has been found to associate with both angiosperm and coniferous species. The focus of this talk will be whether geographic distance or host association has a greater role in genetic variation, whether there are signals of adaptation, and the species' demographic history.

Nathan Smith gained his BA in Natural Sciences from Churchill College, Cambridge. He is currently a Masters student at QMUL and RBG, Kew.

### Richard Dee

**Title:** The Evolution of the Unique Aloes of Madagascar

**Abstract:** This presentation will describe the findings of a phylogenetic study of Aloe in Madagascar, an important centre of diversity for the succulent-leaved genus outside continental Africa. A representative sampling of a quarter of Aloe species from the island were analysed using molecular techniques to ascertain their relationship to each other and species from the African mainland. The resulting phylogeny will be used to address questions regarding the biogeography and systematics of Aloe on Madagascar. Richard Dee is a mature student, interested in conservation, ecology, and plant sciences, and in particular, African succulents.

### Sarah Perillo

**Title:** Uncovering Dispersal Anachronisms in Madagascar's Endemic Arecaceae

**Abstract:** Over the last fifty years a growing body of research has sought to understand and quantify the impacts of dispersal disruption on plant families. This piece of research focuses on disrupted dispersal of the endemic Arecaceae in Madagascar. It is part of a greater body of work being conducted by Dr Wolfgang Stuppy and Dr Aurélie Albert-Daviaud at the Millennium Seed Bank. Indicators of dispersal anachronisms; large seeded species without morphological space from extant dispersers, locational 'mis-match' for dispersal opportunities, "riddle of the rotting fruit", are retrieved from literature, Herbarium specimens and present-day collecting logs such as i-naturalist. This data informs assessments of species vulnerability and provides an opportunity to be one step ahead in identifying populations that have a 10-fold increase in the probability of extinction where dispersers are lost.

### Andrew Webster

**Title:** Application of (sucrose, glutathione and orthodox LEA proteins) using vacuum infiltration to improve the desiccation tolerance of recalcitrant avocado (*Persea americana*) embryonic axes

**Abstract:** Seed banking orthodox seeds is an efficient method of ex-situ conservation. Recalcitrant seeds still are problematic and limited largely to live botanic collections or cryopreservation. Desiccation tolerance in orthodox seeds is achieved by a mixture of LEA, (late-embryogenesis-abundant) protein, antioxidants and sugars. This project aims to vacuum infiltrate excised avocado (*Persea americana*) axes to seven *Arabidopsis thaliana* LEA proteins, cloned and purified in *E. coli*, in addition to sucrose glutathione. Axes will then be incubated to test whether desiccation tolerance has been improved. This project will be carried out by Andrew Webster, Canadian by origin and secondary sciences teacher within the UK for the past 9 years.