

# Bentham-Moxon Trust

## Summaries of grants awarded in November 2022

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*The Trustees made their awards in November 2022 for projects running between 1 January 2023 and 31 March 2024*

### Section A: Awards for plant and fungal collection and field research expeditions

Kew's scientists work with international partners to address key botanical issues facing the world such as climate change and maintaining biodiversity. Bentham-Moxon Trust is an independent small grants scheme and in this section the Trustees have contributed towards nine of Kew's research projects running in 2023/24 including two in Africa, three in Asia, one in Europe and three in North America.

- ❖ **Sidonie Bellot and Mr. Jeronimo Cid** awarded **£3,715** to fund fieldwork in Gran Canaria re project "Investigating genomic adaptations to drought in the endemic Canary palm". This project is to understand how plants adapt to drought is crucial to assess the vulnerability of wild and cultivated species to climate change, inform in-situ and ex-situ plant conservation programs and support the development of sustainable agrosystems. Comparative studies including model crop species and their wild relatives occurring in wet and dry environments show great potential to progress our understanding of plant adaptation to drought.  
A good model to perform such studies is the Phoenix genus, which includes the culturally and economically important date palm crop, and thirteen wild species occurring in habitats that vary in aridity. However, how Phoenix species adapt to these different habitats has not been elucidated so far. This slows down the development of less water-demanding date palm cultivars and prevents robust estimations of how wild species may suffer from future aridification.  
They will investigate genomic adaptations to drought in the endemic Canary Island date palm (*Phoenix canariensis*) in the island of Gran Canaria. Sampling based on local expertise will capture the range of ecological variation in which Canary Island date palms are found. They will disseminate results in scientific papers and via social media channels, enhancing Kew's visibility and reputation in the field of plant adaptation studies.
- ❖ **Dr. Gemma Bramley** awarded **£3,545** to fund fieldwork in Borneo re "Cyrtandra (Gesneriaceae): a model system for the rain forest understorey". *Cyrtandra* (Gesneriaceae) is a large genus of herbs and shrubs, a key element of the understorey of Southeast Asian rain forests. Gaining knowledge of the tropical herbaceous plant community, historically neglected in comparison to tropical trees, is vital to obtain a thorough insight into the species identity and diversity and overall functioning of this ecosystem, necessary for effective conservation strategies. The observations of *Cyrtandra* in the field needed to fully comprehend species, their role within the understorey layer, and effectively identify and describe them are scarce. Through scoping visits to field-sites in Borneo, this project seeks to rectify this situation. Areas for long-term study of *Cyrtandra* will be established, methods ground-

truthed, and as a result a programme of Cyrtandra research involving several postgraduate projects with UK and international partners and students will be developed, as well as a pilot study for a broader research proposal to determine the ecological significance of the herbaceous rain forest community.

- ❖ **Mr. Stuart Cable** awarded **£3,600** to part-fund a fieldwork expedition to undertake a full-scale botanical inventory of East Caicos. This project is a full-scale botanical inventory of the largest uninhabited island of the Turks and Caico Archipelago, including a complete inventory of the flora, and mapping important populations of rare and threatened species and the vegetation of the island. It will enable our in-country partner, Department of Environment and Coastal Resources (DECR), to manage applications for new development as well as prioritise areas for conservation. The work will also contribute to the Kew Tropical Important Plant Areas (TIPAs) programme. The funding supports a 12-day expedition for an eight-person team (4 DECR and 4 Kew).
- ❖ **Dr. Ruth Clark** awarded **£4,290** to fund fieldwork in the West Papua Province of New Guinea researching *Cynometra*. This project will collect material of the poorly understood woody legume genus *Cynometra* in New Guinea. New Guinea has exceptionally high floral diversity with at least 13,500 species and ca. 70% endemism, but is facing substantial threats from logging and conversion to agriculture. *Cynometra* has a centre of diversity in New Guinea; however, very poor taxonomic resolution means that the true number of species there is unknown. The most recent treatment was published over 40 years ago, in which 18 putative new species were indicated but not described, and little taxonomic progress has been made since then, due largely to a deficit of material for study. Unravelling the taxonomy of *Cynometra* requires a combined approach of morphological and molecular phylogenetic analyses for which newly collected herbarium specimens and silica-collected samples are essential. Field work will target the West Papua Province in collaboration with UNIPA (Universitas Papua) and in conjunction with Kew's Tropical Important Plant Areas (TIPAs) New Guinea program to collect material for taxonomic studies, along with data that will ground truth Species Distribution Models and contribute to the TIPAs program. The work will establish processes and build relationships that will facilitate Kew's future program in New Guinea.
- ❖ **Dr. Ben Kuhnhäuser** awarded **£4,969** to part-fund joint fieldwork visit to the North Moluccas with Randi Agusti re project "Accelerating species discovery in Indonesia through next-generation DNA barcoding". Indonesia is one of Kew's high priority regions as its flora is insufficiently known but believed to be incredibly species-rich. The Moluccas, situated in the heart of Indonesia, are illustrative of this: the island group is one of the last big unknowns on the map of the world's palm flora, with many species likely still awaiting scientific description. The proposed project will address this knowledge gap through a three-week expedition to the North Moluccas in collaboration with Indonesian botanists. They will focus on three islands to conduct an inventory and collect herbarium specimens of all species of *Calamus*, the most diverse genus of palms. Using a 'DNA first' methodology, he will establish preliminary species identities of all collections using next-generation DNA barcoding. This approach will utilise an outstanding phylogenomic dataset covering 411 species (99%) of *Calamus* that he has already generated. In a second step, these preliminary identifications will be verified with Indonesian taxonomists, and species new to science will be described in collaboration. The project will validate the potential of DNA-based methods for species discovery, which can then be applied at a larger scale. It will contribute to Kew's Science Strategy to speed up the description of plant diversity.
- ❖ **Dr. Isabel Larridon** awarded **£2,500** to part-fund fieldwork in Northern Zambia researching Cyperaceae and Compositae. In the context of two ongoing research projects, a field expedition to Northern Zambia is proposed. These projects are a PhD study focused on "Untangling the diversity and evolution of hairsedges (*Bulbostylis*, Cyperaceae) in Africa" and a research project called "Subtribal classification and generic delimitation among Eastern Hemisphere ironweeds (*Vernonieae*, Compositae)". As a

result, the aims for the field expedition are to collect herbarium specimens and leaf samples on silica gel for species of the genus *Bulbostylis* and tribe Vernonieae.

- ❖ **Dr. Manuel Luján** awarded **£3,000** to fund for fieldwork in Mexico for the project "Plants of The Ring: botany of the Mexican cenotes". Sixty-five million years ago, a meteorite struck the Earth near the Yucatán peninsula in south-eastern Mexico, causing global-scale bioclimatic changes that lead to the extinction of all non-avian dinosaurs. Deep and large water-filled sinkholes called cenotes formed along the edge of the crater basin, making a ring around the centre of the crater. Cenotes are striking elements of the natural landscape in the Yucatan peninsula and were sacred worship places for the Mayan culture. Although, urban development is threatening cenotes as they are being polluted or transformed during road and railway construction.  
The flora associated with cenotes remain largely undocumented, and it is unknown how many native and endemic plant species thrive around these formations. This project aims to undertake field expeditions to documenting plant species diversity associated with the cenotes. Furthermore, this project will support visits to the Centro de Investigaciones Científicas de Yucatan (CICY) where the most important herbarium collections are maintained, to gather plant species occurrence data. Information about species geographic distribution, as well as the potential threats they face, will be used to evaluate species extinction risk following IUCN criteria. This collaborative work will partner with colleagues at CICY who will facilitate field and herbarium work.
- ❖ **Dr. Alex Monro** awarded **£4,100** to part-fund fieldwork in Costa Rica to undertake an exploration of Cerro Congo. This proposal supports the exploration of an isolated and threatened mountain range on the Pacific coast of Costa Rica, Cerro Anguciana, Kew botanist Alexandre Monro with the aim of improving conservation and scientific knowledge of the area. Cerro Anguciana has been poorly explored to date, but initial collections suggest an unexpected relationship to South America with several species collected there previously known only from South America. Cerro Anguciana sits within a heavily deforested agricultural landscape and has itself been partly deforested and so is itself threatened. Through lobbying by Monro and collaborators, there has been provisional agreement from the Government of Costa Rica to include Cerro Anguciana into a planned biological corridor. Motivation to do so will be strengthened by the collection of more evidence demonstrating its important plant diversity and scientific interest. Cerro Anguciana also represents a limestone massif and its exploration will contribute to an ongoing research programme at Kew into the plant diversity associated with this kind of rock.
- ❖ **Mr. Tim Wilkinson** awarded **£3,800** to part-fund a fieldwork survey in South Africa searching for Strydom's yam with unmanned aerial vehicles (UAV's). Field surveys in remote areas can be costly, hazardous, and time consuming to undertake, making it hard to provide much needed monitoring for rare and threatened species such as Strydom's Yam *Dioscorea strydomiana*. This critically endangered species is on the brink of extinction, but suitable habitat in the region has not been adequately explored and may reveal additional populations. To more efficiently target likely new sites of occurrence, species distribution models of *Dioscorea strydomiana* will be used to suggest new areas to survey with UAVs. They propose the use of the ultra-high resolution image maps derived from the UAVs analysed with image recognition models to identify candidate sites for targeted ground surveys. Results will provide greater clarity on the known sites of individuals including the spectral and thermal responses of the individual plants and will potentially yield sites of interest for further exploration and manual survey. Results will inform the conservation management plan for this species.

## Section B: Overseas botanists and mycologists visiting, training or working at Kew

Providing training for botanists and mycologists from around the world helps Kew achieve its aim of training the next generation of plant and fungal scientists. At the same time Kew also invites expert scientific collaborators to work at Kew, analysing and improving the quality of its collections. The Trustees have made fifteen awards for these types of projects running in 2023/24. The awards in this section are always given via a Kew staff member.

- ❖ **Dr. Sara Barrios** awarded **£2,950** to fund a three week visit to Kew by **Dodley Prosper's (Turks and Caicos Islands)** for training in plant identification and curation of botanical data and images. This proposal seeks to increase botanical capacity in the Turks and Caicos Islands (TCI), by providing training in plant identification and curation of botanical data and images for the Terrestrial Conservation Officer in the TCI Government's Department of Environment and Coastal Resources. This training opportunity will support Kew's current TCI Tropical Important Plant Areas (TIPAs) project and it will help to consolidate TCI and Kew's plant data for future conservation action. It will equally contribute to science-based decision making which will protect TCI biodiversity, enabling the identification of threatened plant species and the development of strategies for their long-term conservation.
- ❖ **Ms. Renata Borosova** awarded **£1,400** to part-fund a four-week visit to Kew by **Dr Andrey S. Erst (Russia)** re project "Collaboration on taxonomic revision of Ranunculus in New Guinea and Integrative taxonomy of Ranunculus, Eranthis and Trollius". Andrey S. Erst, a senior researcher at the herbarium of Tomsk University and the herbarium of Central Siberian Botanical Garden in Novosibirsk, Russia, will collaborate with Renata Borosova on investigating Ranunculus in the Ranunculaceae (the buttercup family) from New Guinea. Ranunculaceae in New Guinea comprises of three genera (Thalictrum, Ranunculus and Clematis) and nearly 50 species. The genus Ranunculus is the largest genus of the family in New Guinea with an estimate of over 30 species. The genus and the family is yet to be treated for the Flora Malesiana, or recent regional floras such as the Flora of New Guinea. Recent work at Kew has recognised several new species of Ranunculus in preparation of a taxonomic revision of the family. Andrey's work on the project will include a critical examination of data using Kew herbarium specimens as well as loans from several herbaria, currently present at Kew herbarium and it will provide understanding of morphological and geographical patterns in this family. These data will be added to our existing datasets for analysis and a checklist and a revision of New Guinea Ranunculaceae will be published. Andrey would also like to explore the possibility of future collaboration and developing research proposals for phylogenetic analysis of DNA.
- ❖ **Ms. Marcella Corcoran** awarded **£3,450** to fund a three-week visit to Kew by **Mr. Junel Blaise (Turks and Caicos Islands)** to work with and be trained by Kew horticultural staff. Training and building skills at RBG Kew for Nurseryman Mr. Junel Blaise of Turks and Caicos Islands (TCI). This attachment will enable Mr. Blaise to experience a wide range of horticultural and scientific facilities at both Kew and Wakehurst facilities and work alongside a range of Kew staff to gain experience in growing and conserving threatened species. Introducing their project's local collaborator to Kew's horticultural techniques will directly assist them to conserve species and to protect biodiversity in Turks and Caicos Island as well as strengthening links with TCI Government Department of Environment and Coastal Resources (DECR) and RBG Kew.
- ❖ **Dr. Iain Darbyshire and Dr. Ian Turner** awarded **£4,271** to fund a three-week visit to Kew by **Dr Pulchérie Bissiengou (Gabon)** for the project "Generic circumscription in Old World Ochnaceae subtribe Ochninae". Ochnaceae subtribe Ochninae is an important plant group ecologically across the tropics, with a number of its constituent species being significant within the woody flora of habitats

ranging from fire-prone savannas to rainforests. The group also has conservation importance as many species are rare and range-restricted.

The circumscription and nomenclature of the genera of subtribe Ochninae continue to cause problems. Taxonomic treatments have varied between a single genus (*Ouratea*) to the 34 genera recognised by Van Tieghem. There is general agreement now that *Ouratea* is confined to the New World. The 150 Old World species are currently accommodated in *Brackenridgea*, *Campylospermum*, *Idertia*, *Ochna* and *Rhabdophyllum*.

Molecular studies demonstrate that *Campylospermum* is polyphyletic -- the West and Central African species representing a clade (Clade A) separate from the East African, Madagascan and Asian species (Clade B). Clade A is sister to *Rhabdophyllum* but Clade B is sister to *Brackenridgea* and nested with *Idertia* and *Ochna*. Molecular data support splitting *Campylospermum* into two genera. However, the morphological grounds for doing this remain uncertain.

A research visit to Kew by Dr Pulchérie Bissiengou in order to collaborate in searching for morphological support for a revised generic classification of Old World Ochninae is to be undertaken.

- ❖ **Miss. Nina Davies** awarded **£3,550** to part-fund an eight-week visit to enable a member of the Kew Madagascar Conservation Centre (KMCC) team in Madagascar to attend the Tropical Plant Identification Course (TPIC) and receive training from Kew curation staff. The team member will benefit from the intensive training in plant identification, curation and digitisation techniques that Kew specialises in. The project has a strong collaboration element, to bring together colleagues from across Kew to work together on 1) facilitating access to Madagascar specimens in the backlog waiting to be processed with Nina Davies (P0) and 2) working with Isabel Larridon (P4) on the TFT project. During their visit the KMCC team member will gain formal training in plant identification through the two-week Tropical Plant Identification Course and an additional six weeks in the Kew Herbarium with specialist curators and researchers, with access to Kew's extensive Madagascar collections. This will be of benefit to both KMCC, through the transfer of skills, and to Kew, through the support of Kew's Science Strategy.
- ❖ **Dr. Félix Forest** awarded **£1,200** to fund laboratory costs to support **Sandra Reinales** visit to Kew re project "Phylogenomic reconstruction and diversification dynamics of Sauvagesieae (Ochnaceae)". South American rocky outcrops such as the Brazilian Espinhaço Range and the Amazon-Guyanas are considered global biodiversity hotspots, harboring an incredible richness of endemic or highly restricted species. Tribe Sauvagesieae (Ochnaceae) is one of the spectacular radiations in Espinhaço, represented by genus *Sauvagesia* with up to 32 species occurring in this area. Due to the ancient geological origin of Espinhaço, the herbaceous species at these mountains could have diversified because of short-time scale drivers instead of longer geological processes used to explain the diversification dynamics in the Andes. This study will reconstruct a DNA-based evolutionary tree for Sauvagesieae, which will be used to estimate the diversification rates in the group, associated with fruit and seed character evolution. Reduced dispersal could generate population isolation of these small plants, even more so because they occur in heterogeneous and climatically variable microhabitats. This grant provides an opportunity to receive training in cutting-edge molecular techniques, increasing the molecular and morphological data for this understudied group of angiosperms, and contributing to the knowledge of the evolutionary dynamics in these globally threatened environments. The results are expected to be published in high impact scientific journals in the area of plants molecular systematics and evolution.
- ❖ **Dr. Helen Fortune-Hopkins** awarded **£2,750** to fund a four-week visit to Kew for **Dr Oscar Ahossou (Benin)** to work on the project "Species delimitation in African *Parkia* (Leguminosae: Caesalpinioideae, mimosoid clade)". Three widespread and variable species of *Parkia* (Leguminosae: Caesalpinioideae, mimosoid clade) occur in mainland Africa. One of these is *P. biglobosa*, a significant non-domesticated food plant throughout the savanna zone of West Africa and the other two are both forest species. A

recent study of microsatellite markers identified genetic clusters within all three species, and the challenge of this project is to investigate the taxonomic boundaries amongst the genetic clusters, by identifying and scoring morphological characters in the herbarium at the Royal Botanic Gardens, Kew. We expect the outcome to be the recognition of additional species and subspecies within African *Parkia*.

- ❖ **Dr. Bente Klitgård** awarded **£2,200** to fund a four-week visit to Kew for **Ms. Laura Albreht (Brussels)** to work on the project "Species delimitation of African *Pterocarpus*". *Pterocarpus* (Fabaceae, Papillioideae) is a pantropical genus of overly logged trees with currently twelve recognised species in Africa. The high morphological variability of individuals within some *Pterocarpus* species has caused issues for taxonomists trying to properly delimit them based on morphological characters. Moreover, genetic data that would help clarifying species boundaries has been scarce. Thus, the main goal of our project is to better understand the diversity of African *Pterocarpus* by improving species delimitation, based on a combination of phylogenetic and morphological analysis. Our recently obtained genetic data show that one of the currently recognised widespread species, *Pterocarpus rotundifolius* (Sond.) Druce may consist of two or more monophyletic species, which are geographically separated. To confirm this hypothesis, we propose to study the rich *Pterocarpus* collection of the herbarium of the RBG Kew and conduct a detailed morphological analysis of *Pterocarpus rotundifolius* and the eight names currently in synonymy with *Pterocarpus rotundifolius*. Doing so, they want to investigate the presence of morphological differences between the monophyletic clades resolved in phylogenetic relationships to finally delimit them in a revised taxonomy of the species. The data acquired will be immensely valuable to guide national and international decisions regarding the conservation of traded and threatened species and their look-alike species.
- ❖ **Dr. Manuel Luján** awarded **£2,280** to fund a two-week visit to Kew for **Dr Francisca Ely (Venezuela)** to work on the project "Assessing new species of endangered woody bamboos in the Northern Andes". *Chusquea* is a diverse genus of woody bamboos, accounting for almost half of the woody bamboo species in the Neotropics. Despite been a group of plants with particularly high cultural and ecologic importance in the Northern Andes, many species of *Chusquea* remain insufficiently documented and some await to be scientifically described. This proposal will bring Dr. Francisca Ely to Kew herbarium to undertake an extensive revision of the collections of Andean *Chusquea* to identify putative new species, gather data to assess species conservation status, and generate an updated inventory of the species occurring in the Northern Andes. This is an exciting opportunity for Kew scientists to explore potential collaborations with Dr. Ely and her research group to advance in the documentation of the Neotropical flora, as well as to promote the utilization of herbarium collections in biodiversity research.
- ❖ **Miss. Alison Moore and Ms. Marie Briggs** awarded **£1,250** to part-fund a four-week visit to Kew for **Mr. Thomas Magun**, an Herbarium Curatorial Technician and Field Parobotanist from LAE (**Papua New Guinea**) to attend the Tropical Plant Identification course (TPIC) and work with Kew staff. Mr Magun has been recommended by the head of LAE herbarium as a good generalist botanist who would benefit highly from participation in the Tropical Identification Course run at Kew. The transfer of knowledge gained at Kew would benefit other botanists and technical staff in-country upon Mr Magun's return to PNG.  
Whilst at Kew Mr Magun would also continue his work on his areas of specialism; gingers (Zingiberaceae) and *Saurauia* (Actinidiaceae) in New Guinea facilitating collaborations with members of Kew staff already working on these groups. He is also talented in the general identification of plants from New Guinea, which will help to improve the quality and utility of the collections at Kew. Knowledge gained by working alongside curators in the Asia team will provide excellent experience in specific herbarium techniques which can then be transferred to colleagues at LAE, thereby improving the collections there which include a number of duplicates from Kew expeditions.

- ❖ **Nomentsoa Randriamamonjy & Andotiana Andiamanohera**, two Kew Madagascar Conservation Centre (KMCC) seed botanists were awarded £6,600 to part-fund their four-week visit to Kew for training and collaboration with Kew staff in respect of seed conservation. They are young botanists at KMCC currently collecting seeds for the Garfield Weston Global Tree Seed Bank and identifying the associated specimens.

Owing to some long delays between seed collection, processing of material at our National partner (Silo National des Graines Forestières) and onward despatch to the MSB, there have been issues regarding seed quality which this visit will address. During their visit they will develop their skills in seed processing and make improvements on the post-harvest handling of seed material prior to despatch.

They will address the backlog of specimen identification with a focus on the identification of selected critical plant groups (Asteraceae and Malvaceae) which are part of a larger backlog of collections due to be sent from KMCC to Kew.

On behalf of the KMCC Seed Conservation team they will be undertaking a project development process to scope a new project for the team targeted for 2024/25 onwards.

- ❖ **Dr. Charlotte Seal** awarded **£5,392** to part-fund a thirteen-week visit to Kew for **Dr Hillary Mireku Botey's (Ghana)** to receive seed phenotyping training and collaborate with Kew staff. Climate change is placing an unprecedented demand for a secure and sustainable source of food across the globe. One solution is to grow crops that are already adapted to the future climates. In sub-Saharan Africa, the cultivation of underutilised plants by households is common practice, providing nutritious foods from plants that are already heat or drought tolerant. However, scaling this up relies on baseline data at all stages of plant growth, and knowledge is lacking on the seed germination characteristics to develop any formal seed production system. To address this, their project will focus on training a visiting scientist, Dr Botey from the Crops Research Institute of The Council for Scientific and Industrial Research (CSIR) in Ghana, a seed phenotyping tool that is used to assess and select fit-for-purpose seed lots for different climate scenarios. They will analyse seeds of four species from Ghana, generating novel germination data through laboratory experiments and data analysis through germination modelling tools. On return to Ghana, the knowledge gained will be disseminated to over 100 colleagues and students at the CSIR-College of Science and Technology, broadening the reach of seed phenotyping techniques with a view to inspire the next generation of plant scientists.
- ❖ **Dr. Juan Viruel** awarded **£2,420** to fund a four-week visit to Kew for **Miss. Irene Masa Iranzo (Spain)** to work on the project "Integrated botanical monograph of *Hypericum* L. (Hypericaceae, Malpighiales)". The genus *Hypericum* L. (St. John's wort and related species) is in the top 100 most speciose genera. It comprises between 500 and 600 species of mostly herbs, but also shrubs and trees, with a cosmopolitan distribution. They mainly occur in temperate regions of the Northern Hemisphere, although many can be found in the Southern Hemisphere tropics. In recent times, several studies of *Hypericum*, using nuclear and plastid markers to reconstruct relationships across the genus, have helped clarify its evolutionary history. However, many species in the genus could not be sampled at the time, which combined with the limited information contained in the markers used, did not provide a stable enough backbone for the classification of genus *Hypericum*. Relying on traditional morphological and phenotypic observations, and modern technologies, both molecular (high-throughput sequencing of herbarium tissue) and computational (bioinformatics in high-performance supercomputers), Miss Irene Masa Iranzo aims to provide a solid backbone for an integrated classification of *Hypericum*. This 'herbariomic' approach will help unveil the origin and diversification of this most diverse genus through time and across space, which will, no doubt, help better conserve it and the ecosystems where its species thrive.
- ❖ **Dr. Alexandre Zuntini** awarded **£2,980** to part-fund a four-week visit to Kew for **Dr Verônica Aydos Thode** to work on the project "Revisiting the classification of Verbanaceae based on nuclear data".

Verbenaceae has 32 genera and ca. 800 species, which are found mainly in New World, except from a few taxa endemic to Africa and the Indian Ocean rim. The family includes forest trees, shrubs, lianas, and herbs, and occur in open and forested, xeric and mesic habitats. Verbenaceae include several economically important species used for wood, pharmaceuticals cosmetics, spices, and as ornamental. The last comprehensive Verbenaceae phylogeny was published twelve years ago based on chloroplast DNA regions for 109 species. After many years and with the advance of new sequencing approaches, revisiting the relationships within Verbenaceae in the light of nuclear markers becomes necessary. This study is essential for a better understanding of the evolution and conservation of the family as a whole and of the Biomes where its representatives occur. They aim to construct a solid backbone (with c. 200 species) for the “vervain” family Verbenaceae, built upon existing data produced at Kew, using target enrichment data, complemented with a denser sampling for large genera, such as *Lippia*, *Lantana*, and *Verbena*. This framework will be used to revisit the infrafamilial classification and will constitute a stepping stone for their ongoing project on the evolution and biogeography of Verbenaceae.

## Section C: Travel to botanical and mycological institutions

Kew's collections provide a rich resource for plant and fungal enquiry. However, their usefulness can be enhanced by visiting and working at other institutions around the world in areas where Kew's collections or expertise are lacking. The Trustees have supported six projects for 2023/24, one in Asia, two in Europe, and three in South America.

- ❖ **Dr. Elena Castillo-Lorenzo** awarded **£2,728** to fund a visit to the germplasm bank of Misión Biológica de Galicia, Spain for the project "Securing agricultural sustainability through training and partnership: Brassicaceae in Spain". Knowledge of key traits from crops and wild species is essential to face environmental and other global challenges. The characterisation of beneficial traits, such as drought tolerance, pest resilience or high nutritional value will support food security and sustainable agriculture. The Brassicaceae family is economically important around the world as edible root crops, vegetables and oilseeds and it has a wide diversity of crops and wild species. This large diversity contains an enormous source of useful traits that will contribute to generate new data to improve crops. However, little knowledge is available regarding the interaction of those traits under different stresses, especially for wild species and local cultivars or landraces. This project will contribute to understanding the characterisation of traits sought in cultivated Brassicas and the impact of environmental stresses on those traits to generate new data for application with wild species.
- ❖ **Dr. Bente Klitgård** awarded **£1,816** to part-fund visits to the Colombian herbaria in the cities Bogota and Medellin for the project "Taxonomic revision of *Pterocarpus*". Systematic studies of the Neotropical species of *Pterocarpus* have been underway for years by the Dr. Bente Klitgård and thesis students. So far, they have published three papers on systematics, phylo-ethnobotany and biogeography of the genus. These papers highlighted that a taxonomic revision of the neotropical species of *Pterocarpus* is overdue, specifically because Rojo's 1972 circumscription of some widespread *Pterocarpus* species left several perfectly good species in synonymy. *Pterocarpus rohrii* is such an example.

Phylogenetic and morphometric analyses of *P. rohrii* and its synonyms, recognise 10 species, nine of which have been hiding in synonymy for 40 years. Rojo's (1972) monograph recognised six *Pterocarpus* species in the Neotropics. However, they recognise 19 species, one of which is new to science. Latest they have published the Brazilian *Pterocarpus* species in the Flora of Brazil, recognising 11 species. Time has come to complete the taxonomic revision of the Neotropical *Pterocarpus* species. Meanwhile, they aim to resolve the remaining doubts about some northern South American species



during visits to the Colombian herbaria. The results will be communicated to various organisations, such as Convention on International Trade in Endangered Species of Wild Fauna and Flora - CITES, International Timber Trade Organisation and the Illegal Wildlife Trade conference.

- ❖ **Dr. Eve Lucas** awarded **£2,815** to fund an extension to a visit to Kew to undertake research in the Kew herbarium, and the herbaria of: Paris (France), Geneva (Switzerland), and Munich and Berlin (Germany) for **Fábio Christiano Speck Vieira**. Myrtaceae is a flowering plant family with exceptionally high levels of species-richness in the Neotropics. Understanding the diversity of Myrtaceae genera is crucial to developing conservation strategies for the fragile biomes where they occur, such as the Atlantic Forest, a biodiversity hotspot where the 33 species of *Myrceugenia* from eastern South America are predominantly distributed. The objective of this project is to review the complicated taxonomy of this genus, analysing type materials deposited in Kew and other European herbaria. The project will produce a botanical monograph of the study species as well as associated trait and distribution data that can be used to better understand the evolution and biogeography of the genus, and to produce the most accurate species conservation assessments.
- ❖ **Dr. Tom Prescott** awarded **£2,080** to fund a visit to University of Padjadjaran, Indonesia for the project "Building a Kew-Indonesia research capability in bioactive natural products". Indonesia is a country with enormous potential for natural products research. The high number of endemic species suggests it may be a hotspot for the discovery of novel bioactive compounds. The natural products laboratory based at the University of Padjadjaran (Java) has an efficient pipeline for the isolation of pure chemical compounds from plants and fungi and is an ideal partner for Kew. On the other hand, Kew has the expertise and equipment to test pure chemical compounds from plants and fungi in advanced biological tests, for example with microorganisms and human cells, to understand their potential applications. This makes the two partners ideal collaborators. The purpose of this visit, it to tailor some of the compound isolation work being done in Indonesia to work with the biological assays being carried out at Kew. This means the compounds they isolate will be pre-selected to have effects on microorganisms and human cells. Thus far their collaboration has already resulted in a joint research publication, and now by adapting their respective research programs to work together they can expect more to follow. This, it is hoped, will lead to a grant application sometime in the future.
- ❖ **Dr. Natalia Przelomska** awarded **£1,932** to fund Visit to Universidad Distrital, Colombia for the project "Delimiting and preserving biodiversity in the misunderstood medicinal crop coca". Coca (encompassing *Erythroxylum coca* and *E. novogranatense*) is an alkaloid-producing crop plant native to the South American tropics. It is of tremendous cultural and medicinal value to local peoples and has a colonial history of use in medicine. More recent legal crackdowns on one of its alkaloids – cocaine – have impeded research of this plant: its medicinal properties have not been fully scientifically explored and untapped biodiversity may confer further medicinal benefits. Furthermore, our understanding of the domestication of coca and taxonomic circumscription in the context of its wild relatives is rudimentary. Meanwhile, current biodiversity in this group is under threat due to illegal coca monocultures and deforestation. In collaboration with researchers at Universidad Distrital, Colombia, they plan to genotype hundreds of herbarium specimens of different coca varieties encompassing a broad geographic range. The aim of this research trip would be to a) develop the scope of research jointly with the guardians of this biodiversity; b) generate molecular data from these specimens for domestication and conservation genomic research; c) provide training in bioinformatics to jointly develop markers for future barcoding of coca varieties by the local partners; and d) collect morphological data to complete the taxonomic element of the research.
- ❖ **Mr. John Wood** awarded **£2,150** to part-fund visits to the four principal Bolivian herbaria for the project "Taxonomic revision of selected plant families in Bolivian herbaria". This project has three principal aims. The first is to revise collections of Acanthaceae, Convolvulaceae and Lamiaceae in all four Bolivian herbaria to benefit the herbaria concerned, support Kew's Bolivia TIPA project and

provide data for the applicant's revision of *Evolvulus* to be published in *Kew Bulletin*. The second aim is to collaborate with and stimulate Bolivian colleagues in the preparation of taxonomic studies of Malvaceae (Maira Martinez), Bauhinia (Daniel Soto) and hopefully others. The third aim is to strengthen links between the four Bolivian institutions and Kew using his long-standing links with all involved.

## Section D: Travel to and presenting at conferences

Conferences bring researchers and others together enabling them to compare notes, establish new collaborations and seek out new funding opportunities, as well as helping to maintain Kew's premier international research reputation. The awards in this section contribute towards Kew staff making presentations, spoken or in poster form, and organizing, at conferences around the world. The Trustees have provided funding for Kew staff to attend five international conferences during 2023/24, two in Europe and three in North America.

- ❖ **Ms. Sonia Dhanda** awarded **£1,510** to attend and present at the Society of Economic Botany Conference in 2023, Atlanta, Georgia, USA & visit Missouri Botanic Gardens's Economic Botany Collection. The Society for Economic Botany is about people exploring the uses of, and our relationship with plants, cultures and our environment - plants and human affairs. The society organises yearly scientific conferences for ethnobotanists. As a member of the society and PhD student these meetings are valuable to form and renew collaborations with other researchers and institutions and learning about methodologies and research in this field. She will be presenting her PhD research via an oral presentation to the international research community. The theme of the conference is human and planetary health which connects with her research on medicinal plants. She will also take the opportunity to visit the Economic Botany Collection at Missouri Botanic Gardens and connect with researchers in the capacity of her role as a science policy officer and doctoral researcher. At the conference, she is intending to share aspects of her doctoral research which she will be submitting to a scientific journal in 2023. The conference is an opportunity to present these results orally and connect with medicinal plant researchers.
- ❖ **Mrs. Olinirina Nanjarisoa** awarded **£3,330** to attend and present at the International Grassland Congress (IGC XXV) in Kentucky, USA. Olinirina is the Grass Botanist on the Darwin Initiative Productive Pastures Partnership project. In 2013 she began to study the grass diversity of the Itremo Massif Protected Area, Madagascar, and was surprised to discover the high grass diversity in Itremo grassland. She has become curious about grasses and motivated to build grass and grassland research. The Darwin project gave her an opportunity to contribute to valorising and sustainably managing pasture and grassland in the Madagascar Highland. She will give a talk on her results on pasture grass diversity and the key native and endemic forages in Central Madagascar at the International Grassland Congress. This congress is an opportunity to exchange expertise with experts in the agricultural industry, to build a long-term relationships between Kew and other institutions and businesses working on grass and grassland though the world, in order to secure sponsorship for future work.
- ❖ **Ms. Nantenaina Rakotomalala** awarded **£3,230** to attend and present at the Botany 2023 conference in Boise, Idaho. She will present a talk on her research on the taxonomic revision of *Digitaria*, as part of the project: " Grass classification and identification to manage weeds and forages, build smallholder food production resilience, and establish molecular identification in Madagascar of weedy grasses in central Madagascar". Most forages and weeds are grasses, including *Digitaria* species, but they are difficult to classify and identify. Their aim is to name *Digitaria* correctly and enable them to be

identified by Malagasy researchers, agronomists and farmers to unlock access to existing information on which species are nutritious for livestock and how to control the weeds, to improve smallholder agricultural production in central Madagascar. For that, morphological studies, phylogeny, and ethnobotany research is carried out in parallel by researchers and students of Kew in the UK and in Madagascar. She will be able to present the progress of the morphological part of the project at Botany 2023.

- ❖ **Dr. Carolina Tovar** awarded **£930** to attend and present at the 11th Biennial Conference of the International Biogeography Society to be held in Prague in January 2024. She will present her research about Climate change impact on the ecosystem functioning of the paramos, a high tropical Andean grassland ecosystem with high biodiversity that provides several ecosystem services, most notably water provision. The project is a result of a collaboration between Kew Garden researchers and researchers from the Universidad de las Américas (UDLA) from Ecuador. By using a warming experiment at 4200 m asl in Ecuador installed in 2012 by their partners, they are starting uncovering questions around climate change impact on plant biodiversity but also on ecosystem functioning such as aboveground biomass. Understanding ecosystem functioning of the paramos is vital to preserve its ecosystem services, specially under climate change scenarios. Our most recent research focuses on whether plant community functional traits (key morphological, chemical and genetic characteristics) are affected by warming because these are hypothesised to be directly related to ecosystem functioning. Presenting the work in the conference will create visibility of the research conducted by the successful collaboration between Kew and UDLA researchers and enhance opportunities for future potential collaborations.
- ❖ **Dr. Torda Varga** awarded **£3,125** to attend and undertake training at 2023 European Workshop on Genomics in Český Krumlov, Czech Republic. One of the five Scientific Priorities of the Royal Botanic Gardens, Kew is the “Accelerated Taxonomy”. As part of this priority, the Tree of Life Initiative aims to expand as well as fill the gaps of the tree of life for plants and fungi. In line with this, the Comparative Fungal Biology Team has generated hundreds of genomic data (i.e., the whole genetic information of an organism) from the specimens held in Kew’s Fungarium, which urgently require state-of-the-art methods to be analysed. This workshop provides participants with the practical experience required to meet the challenges presented by modern genomics research. Participation will not only benefit Dr Varga but will contribute to accelerating the processing of data for the reconstruction of the Fungal Tree of Life.

## Section E: Marjorie Hurley - Restricted fund for the preservation of wildflowers at RBG, Kew and Wakehurst Place

The Trustees have made an award for a project running in 2023, from the Marjorie Hurley Fund, bequeathed for the preservation of wildflower sanctuaries at Kew's world-leading botanic gardens.

- ❖ **Miss. Sandra Bell** awarded **£9,217** to provide continued support for Honeybees for Pollination at Kew project. This funding will provide a stable platform for the apiary to prevent the hives from deteriorating in poor weather and, with the addition a new path and an area for the storage of bee equipment and waste bins, will allow the volunteer beekeepers to access the hives regularly, safely and efficiently, and maintain the hives in good health, so that the bees can do their work. Additionally, it will provide for the ongoing annual care of the bees and purchasing locally sourced Yellow Rattle seeds to restore and maintain the balance of plants in the Quarantine House meadow.

The threats to pollinating insects worldwide seem to grow worse with each year. In many countries including the UK honeybees are excellent pollinators as they are generalist feeders visiting a wide range of flowering. It is widely recognised that pollinating insects are under threat worldwide as never before. In the UK honeybees are ideal pollinators as they feed from a wide variety of flowers pollinating them inadvertently while they take nectar and pollen. Under favourable conditions honeybee numbers can be increased by good care benefitting pollination in the surrounding area. Thanks to the support of the Bentham Moxon Trust and beekeeping volunteers hives have been maintained on the Quarantine House meadow since 2013 and bees from them pollinate plants both inside and outside the Gardens for up to 10 months of the year.