



THE UNIVERSITY OF
MELBOURNE

THE BOTANY FOUNDATION ANNUAL REPORT 2018

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Front cover image: Pollen is part of the sexual life cycle of flowering plants, distinctive among families, genera and species, and when airborne can cause hay fever and trigger asthma (see the Melbourne Pollen Count at www.melbournepollen.com.au).

Images by Dr Edwin Lamugnani (pollen) and Dr Michael Whitehead (insect pollination)

BOTANY FOUNDATION

The Foundation supports excellence in education and research in the School of BioSciences through student awards and scholarships, support for research programs, and a partnership with the Royal Botanic Gardens Victoria. Plant science contributes to Australia's National science and research priorities and capacity building in the areas of biosecurity, agriculture and food production, the environment, biodiversity classification and conservation, and health.

BOTANY FOUNDATION BOARD MEMBERS 2018

Dr Tony Gregson AM FTSE, External Chairman

Professor Pauline Ladiges AO FAA, Deputy Chairman

Ms Sally Browne AM, External Member

Ms Hayley Buchanan, Student

Professor Adrienne Clarke AC FAA FTSE

Professor Karen Day, Dean Faculty of Science

Associate Professor Alex Johnson, School of BioSciences

Associate Professor John King AM, External Member

Professor Herbert Kronzucker, Head School of BioSciences (to June 2018)

Associate Professor Ed Newbiggin, School of BioSciences

Professor Ute Roessner, Head School of BioSciences (from July 2018)

Dr Janet Schapper, External Member (to March 2018)

Supported by Ms Penny Fairbank, Faculty of Science

REPORT FROM THE FOUNDATION BOARD CHAIRMAN

The Foundation's investment income continues to support students through scholarships and awards, and plant science research through seed grants, travel grants and fellowships. After a challenging year globally in financial markets, at year-end the Foundation's Trust accounts totalled \$7.9 million, similar to year-end 2017.

The Foundation's named, endowed awards provided \$23,000 to 13 plant science students in 2018 (p.5). Eleven were research students involved in projects as diverse as root growth in mangroves, oil chemistry of *Eucalyptus*, 100,000 year-old palaeofloras, and biodiversity of native fungi. The Protist Systematic Research Fund (p.9), for example, supported the research of a student studying the stability of the symbiotic relationship between a photosynthetic single-celled alga, a dinoflagellate, and its coral anemone host of the Great Barrier Reef. Break down of this partnership when sea-water temperatures rise leads to coral bleaching, which is of great environmental concern today.

Two Early Career Researchers (ECRs) were awarded funding to seed research projects that have the potential to attract larger external grants, and two other ECRs were provided with travel grants to attend scientific conferences in their disciplines (p.11).

Launching the Herbarium Online

The Foundation supported an evening event, "The Digital Key to Unlocking the Herbarium" (p.16) to showcase the University Herbarium (MELU) to our Foundation supporters, colleagues, students and the wider community. Guests were treated to engaging presentations from Dr Kevin Thiele (Director of Taxonomy Australia) on the importance of discovering biodiversity, herbarium collections, and the science of taxonomy for Australia, and Dr Jo Birch (Herbarium Curator) launched the MELU "Collection Online". The Fern and Sarafis subtrusters provided some modest funding towards curation and digitising of the fern collection and coordinating the student volunteers involved in the "Online" project.

Research Fellowships

Dr Tanja Schuster completed her 5-year inaugural appointment to the Pauline Ladiges Plant Systematics Research Fellowship, which is jointly funded through

the Botany Foundation and the Royal Botanic Gardens, Victoria. Tanja worked successfully at both the RBG and the University contributing to the shared research goals of both organisations. She provided a report on her achievements (p.15) before taking up a new position in Munich, Germany. The next Fellowship will be advertised in early 2019.

The new WISE Fellowship (for Women in Science of the Environment) was advertised within the School of BioSciences this year and the first awardee was ecologist Dr Katherine Selwood, whose research work is highlighted on page 14.

The Clarke Chair of Botany

Appointment to the Adrienne Clarke Chair of Botany, which became vacant when Professor Mark Burgman moved to London, is anticipated for 2019 with an international search. Income accumulated this year will be carried forward to support the Chair appointment. The School of BioSciences secured significant funding for renovation of glasshouses (shared with the Faculty of Veterinary and Agricultural Sciences laboratory), and a laboratory for the use of the Clarke Chair appointee. With income from our Foundation's Research-Unrestricted subtrust, we have pledged \$30,000 towards new plant growth room facilities.

I am most grateful for the continued support of our donors and alumni in continuing to build our endowment funds for the future of plant science. I would also like to thank members of the Board for their enthusiasm and management of the Foundation.



Dr Tony Gregson AM FTSE
Chairman, Botany Foundation

SCHOLARSHIPS, AWARDS AND PRIZES IN BOTANY

The Botany Foundation has ten awards available to students, including two undergraduate prizes and eight awards and scholarships for research students. This year 30 students applied for the competitive postgraduate awards, some of which have been shared between two equal applicants. Scholarships can greatly assist students personally and be used towards their research projects.

David Ashton Travel Award

Yang Hu "Root growth patterns and fine root turnover rates in temperate mangroves"

David H Ashton Scholarship

SHARE: Brooke Sullivan "Studies of resilience in the temperate Australian seagrass *Heterozostera*" & *David Uribe* "Forecasting redistribution of biodiversity under environmental change: A call to better understand predictive performance of range dynamics models for local plant communities"

Sophie Ducker Scholarship

Krishna Somaetha Chandran "Isolation and characterisation of O- and C-methyltransferases from *Eucalyptus* species"

Bruce Knox Prize

Alice Crowe – top 4th year, Honours student in 2017

Megan Klemm Postgraduate Research Award

Jana Verbancic "Sugars, sinks and cell wall synthesis – how plants use sugar signals to invest their carbon capital for growth"

Ethel McLennan Award

SHARE: Allene Macabuhay "Investigating the role of lipids in the formation of beneficial interactions between plant roots and soil microbiota" & *Ashley Dungan* "The exploration of bacterial probiotics in the model organism *Exaiptasia pallida* to increase climate resilience in corals"

Kinsley Rowan Marine Botany Prize

Clement Zhong Wang Ng – top third year student in marine botany

G.A.M. Scott Research Award

Kia Matley "Southeast Australian palaeofloras of the past 100,000 years,



+ G.A.M. Scott Research Award holder, Kia Matley examines fossil chenopod seeds from Western Victoria using images taken with a scanning electron microscope

and their implications for glacial palaeoclimate reconstructions"

John S. Turner Postgraduate Scholarship

SHARE: Michael Ting "The circadian-regulated dynamics of translation in *Arabidopsis*" & *Mike Ogden* "Improving plant root performance by investigating the relationship between nutrient availability and cell wall biosynthesis"

Gretna Weste Plant Pathology and Mycology Scholarship

James Douch "Tooth fungi: Phylogenetic and taxonomic study of the Bankeraceae in Australia and New Zealand"

RESILIENCE IN AUSTRALIAN *SEAGRASSES*

— By Brooke Sullivan, PhD student awarded the David H Ashton Scholarship

Seagrasses are ecologically important marine angiosperms experiencing wide-spread loss, even extinction, around the world.

As global change disturbances accelerate, seagrass populations continue to decline. Resilience is the ability of an organism or ecosystem, such as seagrass, to resist and recover from disturbances. To understand resilience, we need to understand details of the life history of the species concerned, as we cannot rely on broad 'rules'.

Heterozostera is a genus of subtidal temperate seagrass found on two continents in the southern hemisphere. There are three populations in Chile and a broad distribution throughout the southern latitudes of Australia. It provides habitat structure and hosts a wide diversity of economically and socially valuable fauna and flora. My research aims to build our understanding of *Heterozostera* resilience, including identification of key factors that may aid in the conservation and restoration of *Heterozostera* ecosystems. Specifically, I have developed new methods for collection and storage of reproductive material, identified seed germination cues and developed seasonal transplanting success. I have also collaborated with other researchers to understand better seagrass wasting disease and the resistance capacity of infected plants in Australia.

I have found that *Heterozostera nigricualis* is a remarkably resilient species of seagrass that performs differently from its sister genus, *Zostera*. For instance, *Heterozostera* can recover through a wide variety of both sexual and asexual reproductive strategies – plants flower and set seeds, extend rhizomes beneath the sand, and produce small plantlets that break off and drift away, capable of regenerating from broken fragments. In addition, it is resilient to a range of environmental extremes and disturbances, such as disease. Overall, this work improves both global and regional capacity to mitigate seagrass losses.

Continuing this research on lesser known, and rarer *Heterozostera* species, such as *Heterozostera tasmanica*, is critical for understanding the potential loss of resilience and increased vulnerability (and conversely, the potential for recovery, adaptation and survival) of threatened and endangered seagrass populations of Australia in a future of extreme global change.

The David Ashton Scholarship was critical in providing funding needed to expand analyses of the geochemistry of seagrass beds in different parts of Port Phillip Bay, and to support my efforts to continue to understand infectious disease, physiological responses of seeds to chemical treatments, reproductive ecology and seagrass speciation.

Brooke is supervised by Professor Mick Keough, School of BioSciences



+ Seagrass bed in Swan Bay, 2016

DISCOVERING NEW SPECIES OF 'TOOTH' FUNGI – *A PHYLOGENETIC AND TAXONOMIC STUDY OF AUSTRALIAN BANKERACEAE*

– By James Douch, Honours student awarded
the Gretna Weste Mycology and Plant Pathology Scholarship

Bankeraceae are a family of mushroom-forming fungi that form symbiotic relationships with plant roots. Members of this family smell of fenugreek and most have distinctive spore-bearing spines or 'teeth' rather than gills, while others are pored.

There is concern for the conservation of a number of European species and one species from New Zealand is listed as Endangered by the International Union for the Conservation of Nature. The situation in Australia is especially dire, as only one species in the Bankeraceae has been described here, and the fruiting bodies are only rarely found in nature.

Phylogenetic studies have mostly neglected Southern Hemisphere representatives in the Bankeraceae and have mostly relied on sequencing only a small region of nuclear DNA – a single locus, the Internal Transcribed Spacer. Focusing on the locally rare genus *Sarcodon*, I conducted multi-locus phylogenetic analyses with DNA sequences I generated from herbarium collections, mostly from the National Herbarium of Victoria. I also incorporated sequences from the "metabarcoding" database of DNA in the Australian Microbiome Initiative, isolated from soil samples around Australia. My analyses, supported by morphological observations, resulted in the recognition of four new *Sarcodon* species that will be formally described in a subsequent publication. My analysis of the metabarcoding data also revealed for the first time that two other genera in the Bankeraceae, *Bankera* and *Boletopsis*, occur in Australia.

This work highlights that the diversity of fungi in Australia in many ways remains largely unknown.

James is supervised by Dr Alexander Idnurm, School of BioSciences, and Dr Tom May, Royal Botanic Gardens, Victoria





IMPROVING NITROGEN USE *EFFICIENCY IN PLANTS*

— By Mike Ogden, PhD student awarded
the John S. Turner Postgraduate Scholarship

Nitrogen (N) is a macronutrient essential for plant growth. N sensing, absorption, and transport occur at the root-soil interface.



Over 100 megatons of costly synthetic N fertilizers are added to crops yearly to ensure yields; however, modern crops are highly inefficient in N acquisition, as nearly 75% of applied N is lost to the environment. To improve N use efficiency and increase yields in a sustainable manner, we must understand how N availability affects plant biomass production.

The major component of plant biomass is plant cell walls, which are dynamic extracellular structures dictating cell and tissue morphology. Root growth is drastically altered in N-deficient soils, and cell wall synthesis and composition are regulated in response to N availability; however, the underlying genetic and molecular mechanisms are largely unknown.

I aim to identify these mechanisms in the model plant *Arabidopsis thaliana* by using analytical techniques

and advanced microscopy to characterize how cell wall composition is regulated in response to varying N availability. To reveal genes that are involved in N-mediated cell wall regulation, I am using a unique forward genetic screen to isolate mutant plant lines that can grow long, healthy roots under N concentrations that typically suppress root growth.

These approaches have the potential to elucidate important molecular pathways that can be harnessed to engineer crops with improved nitrogen use efficiency to advance sustainable agricultural practices.

Mike is supervised by Professor Staffan Persson, School of BioSciences.

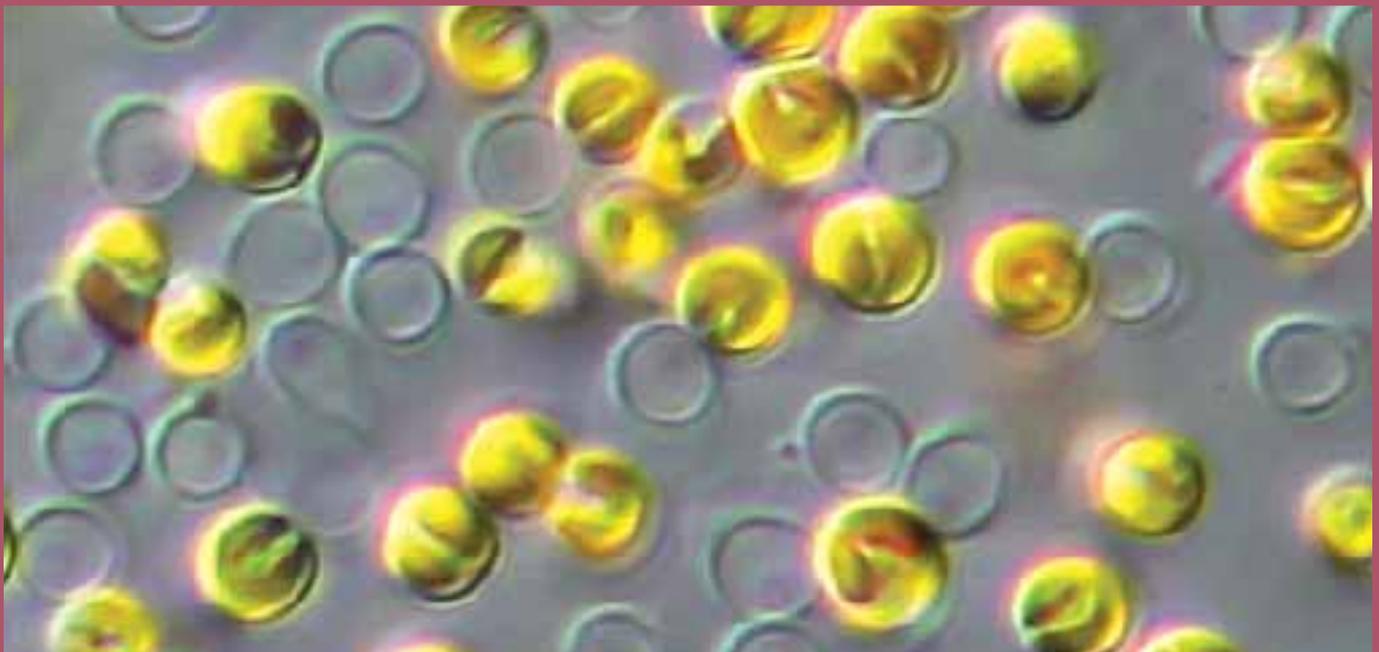
PROTIST SYSTEMATICS RESEARCH FUND SUPPORTS TWO STUDENTS

Two students were awarded \$2,000 each towards their research projects on ‘protists’ from income from the Protist Systematics Research Fund, supplemented by unrestricted funds of the Botany Foundation. ‘Protists’ include a diverse array of organisms, not classified as plants, fungi or animals, that include the algae.

The Golden Paradox: a new heterokont alga

Honours student Sonja Repetti, supervised by Dr Heroen Verbruggen and Dr Christopher Jackson, is studying a newly discovered strain of single-celled algae. This sand-dwelling golden-brown alga is unlike any heterokont alga known to science and especially its chloroplast – the organelle performing photosynthesis – which is highly unusual. Instead of the usual four membranes surrounding the chloroplast found in heterokonts, this alga only has two, suggesting two membranes have disappeared in the course of its evolution.

Because of its highly unusual nature, this new species is being described as the “golden paradox” – *Chrysoparadoxa australica*. The funding provided by the Botany Foundation was used for high throughput DNA sequencing, which has allowed Sonja to closely probe the genetics of this unique alga to pinpoint its evolutionary relationships with other heterokonts and to uncover the nature of how proteins are targeted into its unusual plastid. The findings from this study have been accepted for publication in the *Journal of Phycology*, and Sonja’s work on the phylogenetic position and protein targeting has been central in that paper.



+ The “golden paradox” alga was discovered by Dr Rick Wetherbee

Diversity of coral reef symbionts

Coral reefs are among the most diverse and productive marine ecosystems on the planet, and their foundation relies on maintaining a stable mutualistic association between host and symbiont.

Until the 1970s, *Symbiodinium* was considered to be a single species, *S. microadriaticum*, with a worldwide distribution. However, over the past 30 years, molecular investigations have revealed a rich diversity among the genus with nine evolutionary lineages or clades (A–I) identified. Numerous host-*Symbiodinium* pairings appear to be the result of adaptation of specific host-symbiont associations, suggesting the existence of specific host-symbiont recognition systems.

Giada is studying the specificity and timing of symbiosis establishment in three different genotypes of the anemone *E. pallida* from the Great Barrier Reef. Anemones are chemically bleached and subsequently inoculated with various types of *Symbiodinium* (from clades A, B, C, D, F, G). Significant differences in the rate of symbiont uptake by the anemone were microscopically observed. A critical step is the identification of *Symbiodinium* types in the re-infected anemones, to ensure that the symbiont cells visualised microscopically are those that were used for inoculation and not the result of repopulation of any potentially residual *Symbiodinium* cells not eradicated by the bleaching. This is checked by sequence analysis of *Symbiodinium* DNA extracted from the re-infected hosts.

The molecular identification of symbionts, combined with their host specificity will provide valuable information to better define the taxonomic identity of *Symbiodinium* dinoflagellates.



+ Giada Tortorelli

MSc student Giada Tortorelli, supervised by Professor Geoff McFadden and Madeleine van Oppen, is studying species of the photosynthetic dinoflagellate *Symbiodinium*, which is a symbiont of corals and of the coral model organism anemone *Exaiptasia pallida*.



+ Giada Tortorelli scuba diving

SEEDING EARLY CAREER PLANT SCIENCE RESEARCH

The Foundation continued its support for Early Career Researchers (ECRs). Travel awards support attendance at national or international conferences where ECRs can exchange ideas and interact with colleagues. In addition, a new initiative provided two \$5,000 grants to seed ECR research. To be eligible the awardee had to be within five years of graduating PhD and hold at least a 50% position in the School of BioSciences. It is hoped that a seed grant will help the researcher to be successful with a future competitive grant.

TRAVEL AWARDS

Dr Jo Birch attended the Australasian Systematic Botany Society Annual Conference, in Brisbane. Jo presented a paper on "The evolution and biogeography of Australian Asparagales".

Asparagales is a large group of monocot flowering plants including orchids and economically important plants such as asparagus and onion. Jo is investigating the evolutionary relationships of Australian genera and species based on chloroplast genome data.

Dr Will Morris attended the Ecological Society of Australia Conference also in Brisbane. Will presented a paper on "Value of information for conservation planning".

Will says that: "A value of information analysis can reveal whether and how much new knowledge is worth investing in for conservation. I combine value of information analysis with modern spatial conservation prioritisation tools to achieve more cost effective conservation plans and actions."



+ *Crinum pedunculatum*, Asparagales

FINDING PROTEIN TARGETS OF AN INHIBITOR OF SUGAR SIGNALLING AND PLANT GROWTH

— By Dr Mike Haydon. Mike is a lecturer in the School and leads the Plant Cell Signalling Lab. His seed grant will allow his group to pursue a new approach for identifying protein-small molecule interactions.



+ Members of the Plant Cell Signalling Lab (left to right): Dongjing Deng, Mike Ting, Mike Haydon, Ángela Román-Fernandez, Xiang Li.

Sugars provide the stored energy and basis for the macromolecules required to build cells. In plants, sugars also have hormone-like properties that affect diverse physiological and developmental processes.

Understanding the signalling pathways by which sugars are sensed and affect these processes is fundamental to plant biology with clear potential for impact on important agronomic traits. However, the essential cellular roles of sugars make it difficult to define the signalling components by traditional molecular genetic approaches.

Our lab completed a chemical screen in the model plant *Arabidopsis*, using a sugar-responsive luciferase reporter assay, and we have identified over one hundred small molecules that modify transcriptional responses to sugar. We expect these chemicals inhibit components of sugar signalling, transport or metabolism. Among these are several chemicals that inhibit growth and/or growth promotion by exogenous sugar and implicate calcium

and reactive oxygen species signalling pathways. We believe these compounds inhibit previously undefined sugar signalling components.

Xiang Li is a PhD student in the second year of her project. She is particularly interested in a compound that we predict inhibits a calcium channel. This seed funding from the Botany Foundation will allow Xiang to use a proteomics approach to identify the protein target(s) of this compound and establish the feasibility of this approach for other compounds. Then she will use molecular genetic tools to confirm a role for this protein in plant sugar signalling. We hope this will validate our approach to uncover key proteins involved in fundamental aspects of plant cell biology.

UNDERSTANDING FUSARIUM INFECTION OF CANOLA USING *HIGH-RESOLUTION VERTICAL-STAGE LIVE IMAGING*

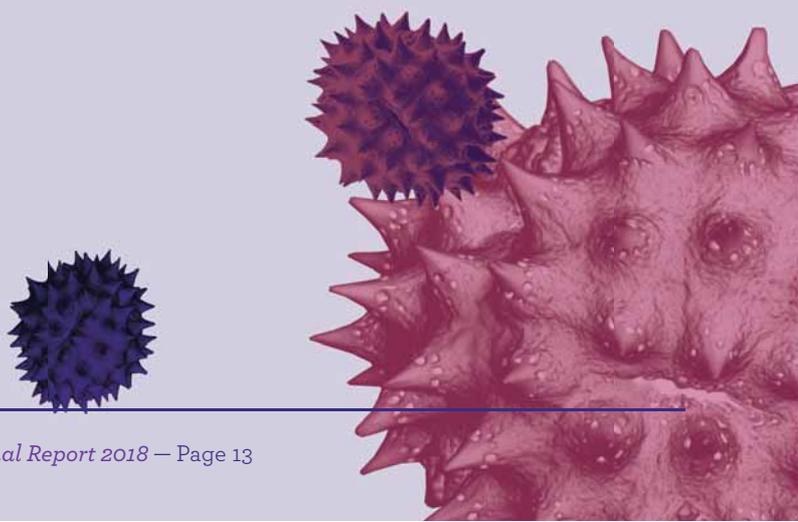
— By Dr Marc Somssich. Marc is a Postdoctoral researcher in Professor Staffan Persson's lab since 2016. His seed grant will establish a new collaborative research project between the Staffan Persson and Alex Idnurm research labs aimed at better understanding *Fusarium* infection of canola.

Fusarium oxysporum is a fungal pathogen of several major crop plants. The fungus grows in the soil, where it invades the root of a plant to drain water and nutrients from it. As a result, the shoot of the plant can no longer be supported, and the plant will eventually die.

Over the past 20 years, *Fusarium* infection has led to severe global yield losses - a development that resulted in an alert to the Australian agricultural sector in the Australian Grains National Biosecurity Plan.

Since Canola is the primary crop for the oilseed industry, and the third overall most important crop in Australia, we chose to study the early stages of *Fusarium* infection in Canola to better understand this process on a molecular level. We are fortunate enough to have both expertise working with plants and fungi (with Staffan Persson and myself from the Plant Cell Wall lab, and Alexander Idnurm from the Mycology lab), as well as a unique, vertical-stage spinning disc microscope setup, which allows us to image growing plant roots and the fungus live along the gravitational vector instead of on typical horizontal microscope stages.

The seed grant from the Botany Foundation will enable us to establish and optimise this kind of microscopy for Canola and *Fusarium*, and to generate transgenic Canola plants that will help us to pinpoint the exact positions and time points of plant infection by the fungus. We hope that the insights gained from this project will be helpful to better understand the plant-fungus interaction, and can eventually be used in the future to improve *Fusarium*-resistance in Canola plants.



WOMEN IN SCIENCE OF THE ENVIRONMENT (WISE) FELLOWSHIP AWARDED TO KATHERINE SELWOOD

A new award supports an early career female researcher in biodiversity conservation. Income from the WISE Fellowship Subtrust in the Botany Foundation provided \$5,000 in 2018 to a female early career researcher in the School of BioSciences.

The award is to assist her career in ecology or environmental science, with a preference for the area of biodiversity and conservation.

The WISE Fellowship was advertised in the School of BioSciences and the successful candidate was *Dr Katherine Selwood*, whose research is directed at identifying and characterising landscape and refuges for conserving biodiversity.

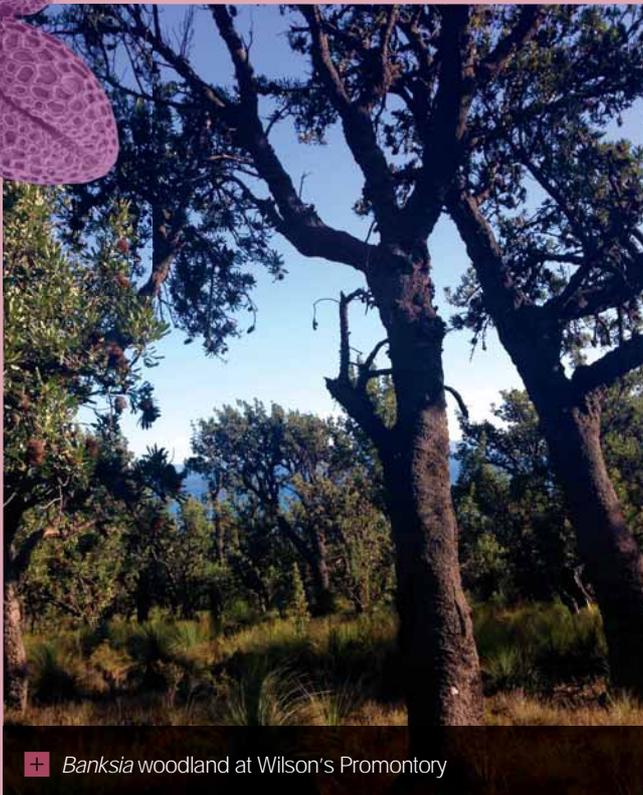
In her application *Katherine* said:

"I am building a research theme around the identification and characterisation of landscapes and refuges that are important for conserving biodiversity in the face of environmental change, with a particular focus on climate change.

This field of research was spawned during my PhD, when I discovered that floodplain and riparian ecosystems buffered bird species against declines during a severe, prolonged drought and provided refuge from arid conditions. This work led to a collaborative research grant with Parks Victoria. I used remotely sensed models of floodplain forest stand condition to map the location of havens for ecosystem resistance and resilience to drought within the river red-gum floodplain forests of the Murray River. I began investigating this theme more broadly, and recently published work showing that remotely sensed vegetation greenness (NDVI) is a promising indicator for identifying drought refugia (Selwood et al. 2018, *Journal of Applied Ecology*).

I intend to build on this growing body of work by testing the relationships between remotely sensed vegetation indices, and on-ground measurements of bird responses in new ecosystems, with the ultimate aim of identifying climate refugia. My aim is to conduct high quality, internationally relevant work on assessing and predicting the impacts of environmental change, firmly founded in robust statistical methods."

Katherine is studying field sites along a productivity gradient in banksia woodland and grassland at Wilsons Promontory National Park.



+ Banksia woodland at Wilson's Promontory

TANJA SCHUSTER REPORTS ON HER PLANT SYSTEMATICS *RESEARCH FELLOWSHIP*

Dr Tanja Schuster has successfully completed her 5 year Fellowship funded jointly by the Botany Foundation and the Royal Botanic Gardens Victoria. Tanja returned to Europe to take up a new position in Munich, Germany. She provided a reflection on her time in Melbourne.

"I was excited to be selected for the Pauline Ladiges Fellowship for Plant Systematics in 2013, as I wanted to work on the particularly diverse and unique Australian flora for two main reasons. As a botanist, I am interested in angiosperm phylogeny and am keen to learn floras and plant species new to me. Also my PhD project involved a group of Australasian plants (*Muehlenbeckia*, in the buckwheat family Polygonaceae) with most species occurring in Australia and the Fellowship allowed me to continue this work. In addition I developed a new collaborative project between the University and the Gardens on the phylogeny of the iconic eucalypts, specifically the bloodwoods *Corymbia* and their closest relatives.

I was successful in obtaining two grants, one from the Australian Biological Resources Study, National Taxonomy Research Grant Program (for *Muehlenbeckia*), and one from the Hermon Slade Foundation (for the eucalypts).

I have published five research articles so far, contributing to understanding the evolution of significant plant groups and improving their taxonomic classification. The projects also allowed me to learn new molecular techniques and methods of analysis for high throughput sequencing data, which is the new gold standard for phylogenetic work. It has been invaluable to work with excellent researchers at the University, and have access to the world-class collections and staff of the National Herbarium of Victoria (MEL) at the Gardens. The Fellowship has been particularly valuable in terms of enabling me to build networks with Australian researchers, and to stay involved with teaching through the botany summer course 'Flora of Victoria'.

It is invaluable how much I have learnt about the Australian flora, ecology, and Southern Hemisphere biogeography by being on the continent. The Fellowship has delivered to me all I had hoped for, and I am sure that the next recipient will be just as thrilled to benefit from this unique opportunity as I have been."



 Dr Tanja Schuster in the field collecting bloodwood samples

THE DIGITAL KEY TO UNLOCKING *THE HERBARIUM*



Did you know that in Australia there is a collection of over 70 million scientific specimens of plants, animals, insects, algae, fungi, bacteria and everything in between, which underpins almost our entire knowledge of the rich biodiversity of Australia?



+ Guests viewing online images



+ Dr Kevin Thiele



Or that this collection has a significantly higher dollar value than the Square Kilometre Array, the Parkes Radio Telescope and the Australian Synchrotron combined? Or that the University of Melbourne Herbarium (MELU) is part of this invaluable science infrastructure?

The Botany Foundation, together with the School of BioSciences and Alumni relations, Faculty of Science, held an event on 24th October 2018 to highlight the importance of the University of Melbourne Herbarium's scientific and cultural collections.

Sixty guests were treated to two engaging presentations from botanist and alumnus Dr Kevin Thiele (past Director of the Western Australian Herbarium and new Director of Taxonomy Australia) and Dr Jo Birch (MELU Curator).

Dr Thiele presented a compelling argument about the importance of discovering and documenting Australia's biota and the need to build our capacity for the sciences of biosystematics and taxonomy to accelerate the rate of species discovery, urgently needed over the next decade.

He argued that: "Biodiversity faces multiple threats, from agricultural, industrial and urban development, pests and weeds, pollution and climate change. Conversely, biodiversity sometimes threatens us, through emerging diseases and agricultural and environmental pests that we need to stop at our

borders. All these aspects of biodiversity need great science and accessible collections. The recent release by the Australian Academy of Science of a 10-year strategic plan for taxonomy and biosystematics, and the establishment of a new body, Taxonomy Australia, aim to significantly accelerate the task of documenting the biodiversity of Australia, for the benefit of biodiversity, society, and future generations."

Curator Dr Jo Birch launched the Herbarium's "Collection Online" project to enable public access to the MELU collections. Digitisation of the collection, 15% of which has been achieved to date, is allowing web access to high-resolution plant specimen images, and the data associated with collections, the collectors, and species geographic distributions that have never been available before. Through this initiative, MELU is the first Australian herbarium to make high quality images available to an online global audience.

The Botany Foundation has set up a Subtrust "The Herbarium Fund", which will provide support for projects, including curation of research collections and coordinating the volunteers, many of whom are botany students in training.

Herbarium website: herbarium.unimelb.edu.au

Collection Online URL: online.herbarium.unimelb.edu.au

DONATIONS 2018

Adrienne Clarke Chair of Botany

Adrienne Clarke AC
Ed Newbigin
Robin Youl

Unrestricted Research

Anonymous
Yolanda Alvares
John Anderson
Steven John Brett
Kevin Clayton-Greene
Trevor Clifford OAM
Gillian Clifford
Jo De Souza
Fengming Dong
Madeline Herron
John King AM
Daniel Lidonnici
Shona McTear
Denise Porter
Mukti Prabhu
Kulasiri Sanduni
Marianne Simpson
Joanna Steinle
Ian Taber
Cameron Twomey
Julian Weilgus-Dillon

David H Ashton Scholarship

Leon Costermans
Brian Snape AM

Sophie Ducker Postgraduate Scholarship

Juliet Flesch
Richard Tudor OAM &
Elizabeth Tudor

Megan Klemm Research Award

Neil Hallam

Bruce Knox Prize

Peter Bernhardt

Pauline Ladiges Plant Systematics Research Fellowship

Winifred Calder
Leon Francis Costermans
Philip Moors AO
Jenneth Meriel
Gareth Nelson
Mary Playford
Max Richards &
Margaret Richards
Jenneth Sasse
Jennifer Steinicke

Ethel McLennan Award

Donald Gaff

Plant Systematics Research Fund

Pauline Ladiges AO
Estate of Margaret Sutherland
Fee for Service income: Murdoch
University

Protist Systematic Research Fund

Anonymous
Roberta Cowan
Helen Kershaw

Kingsley Rowan Marine Botany Prize

Jenneth Sasse

G.A.M. Scott Research Fund

David Meagher

John S. Turner Postgraduate Scholarship

Anonymous
Donald Gaff
Richard Groves & Margaret Groves
Valarie Tarrant OAM

Gretna Weste Plant Pathology and Mycology Scholarship

Alexander Idnurm

The Fern Research Fund

Margaret Regan

The University of Melbourne Herbarium Fund

Anonymous
Michael Bayly
Consultancy income
Tony Gregson AM
Susan Morgan
Gareth Nelson
Janet Schapper

Women in Science of the Environment (WISE) Fellowship

Anonymous
John Harrison
Lauren Salvange

Visit the Botany Foundation website for information on how to donate science.unimelb.edu.au/engage/giving-to-science/botany-foundation

FOUNDATION FINANCIAL SUMMARY 2018



	Balance at 01.01.2018 (\$)	Income ¹ (\$)	Awards & Expenses ² (\$)	Revaluation ³ (\$)	Balance at 31.12.2018 (\$)
Adrienne Clarke Chair of Botany Trust ⁴	3,642,835	145,224	-3,548	-114,573	3,669,939
Botany Foundation Trust					
Research Unrestricted Funds ⁵	1,221,814	21,453	-26,967	-36,406	1,179,894
David Ashton Travel Award	45,902	1,730	-1,643	-1,247	44,742
David H Ashton Scholarship	127,387	6,307	-4,117	-3,924	125,652
Sophie Ducker Postgraduate Scholarship	75,066	3,272	-2,368	-2,343	73,627
Megan Klemm Research Award	108,268	4,093	-3,499	-3,338	105,524
Bruce Knox Prize	42,111	1,665	-1,339	-1,271	41,166
Pauline Ladiges Plant Systematics Research Fellowship	1,224,231	58,960	-37,272	-33,862	1,212,057
Ethel McLennan Award	59,185	2,288	-1,853	-1,809	57,810
Plant Systematics Research Fund	275,917	11,815	-5,259	-7,437	275,036
Protist Systematic Research Fund	55,131	8,247	-2,897	-1,840	58,641
Kingsley Rowan Marine Botany Prize	24,436	1,090	-822	-720	23,984
G.A.M. Scott Research Fund	133,687	5,137	-4,423	-4,127	130,273
John S. Turner Postgraduate Scholarship	84,256	4,340	-2,778	-2,577	83,241
Gretna Weste Plant Pathology & Mycology Scholarship	38,321	1,529	-1,236	-1,175	37,438
The Fern Research Fund	33,855	1,737	-2,031	-964	32,597
V Sarafis Research Fund	58,894	2,335	-1,058	-1,708	58,464
The University of Melbourne Herbarium Fund	560,949	39,201	-553	-15,989	583,609
Women in Science of the Environment (WISE) Fellowship	112,765	5,920	-3,864	-3,203	111,618
Botany Foundation Trust - Total	4,282,173	181,118	-103,979	-123,940	4,235,373
Total of the Two Trusts	7,925,008	326,343	-107,527	-238,512	7,905,311

NOTES

- Income includes donations and earnings on investments
- Expenses include administration charges
- Revaluation amounts represent the change in unit price of the capital units during 2018 of respective Trusts
- Chair vacant in 2018
- Unrestricted Funds support research initiatives, the pollen count, travel awards and events



FOR FURTHER ENQUIRIES

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