

Fronds

Friends of the Australian National Botanic Gardens
Number 89 August 2018



Winter colour in the Gardens
Hakea clavata



Friends of the AUSTRALIAN NATIONAL BOTANIC GARDENS

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Email or post material to the *Fronds* Committee at the above addresses or, place in the Friends letterbox, located inside the Gardens' Visitor Centre, between 9.30 am and 4.30 pm, Monday to Sunday. Editorial messages: telephone (02) 6250 9548.

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PAM COOKE



The delicate flowers of the Australian Finger Lime (*Citrus australasica*) have three white petals. Some trees have flowers almost all year round. Image is of an ANBG specimen, Section 150, May 2018

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Front cover: Winter colour in the Gardens: *Hakea clavata* or Coastal Hakea is from SW of Western Australia near Esperance where it grows under hot, dry conditions on granite outcrops. To survive there the hakea has evolved pencil thick fleshy leaves. This image is of a specimen in Section 56, ANBG, May 2018. (PAM ROONEY)

Saving for the future

Judy West, Executive Director of the Australian National Botanic Gardens

At the National Seed Bank (NSB), staff, students and volunteers work each day on a unique savings plan: collecting, sorting, cataloguing and preserving over 7,000 individual seed collections, each carefully stored in case it is needed in the future.

The NSB is the national facility charged with collecting and safeguarding seeds from threatened species, alpine regions, Commonwealth National Parks, grassy woodlands and the ACT and surrounding regions.

Since its beginnings in the 1960's, a succession of dedicated staff members have made the remarkable achievement of filling the cool rooms and freezers in the humble group of buildings at the Australian National Botanic Gardens. The limited available space, now reaching capacity, contains seeds from over 3,650 Australian species.

These important seed collections are used for growing plants for the living collections of the Gardens, for restoration and rehabilitation, and for seed biology and ecology research. **The most important purpose of the NSB is bringing threatened species back from the brink of extinction.**

The bushfires that ravaged Canberra in 2003 scorched the delicate alpine lands to Canberra's south-west. Research from the NSB, utilising its unique collection of seeds, helped determine management

actions to conserve the mossy bogs and fens found in the mountains above the Capital. As well as having their own unique conservation value, the fens purify the water which eventually flows from Canberra's kitchen taps.

To ensure that an individual collection of seeds can be relied upon in the future, each species to be added to the collection needs its own careful plan. The plan must take account of the species' unique characteristics, the environment and geography in which the species is found, the biology of the seeds, and how much genetic diversity is needed in the collection to ensure that a population grown from the banked seeds might be able to become self-sustaining.

The NSB is part of a network of seed banks around Australia and the world. The Australian Seed Bank Partnership coordinates the nine major seed banks located around Australia, ensuring that each collection carefully complements those held at others. The Partnership is also Australia's link to global efforts including one of the largest and most famous seed bank of them all: the Millennium Seed Bank at the Royal Botanic Gardens Kew. Developing the constantly evolving science to ensure that each collection is effective and resilient is one of the most important contributions that the NSB makes to the global effort. Techniques developed at the NSB are used at the Millennium Seed Bank and all over the world.

From 2014 to 2020, the NSB will add a 1000 new species to its collection. These include 300 species to complete the ACT flora collection and 628 threatened and significant species from Uluru, Kakadu, Christmas Island, Norfolk Island and other Commonwealth reserves.

But to reach those targets, the NSB must dream large: more space and dedicated facilities are needed to accommodate the 1000 new collections by 2020, and thousands more in the future. Modern laboratory equipment will ensure that the best techniques can be used by scientists and volunteers to undertake the important work that only the National Seed Bank can do.

A new NSB facility is featured in Phase 1 of Gardens' Master Plan but completing the new building will require a powerful partnership between government, corporate Australia and philanthropists, big and small. Only by working together will the dream of insuring all Australian plant species against the risk of extinction become reality.

Judy West, Executive Director of the Australian National Botanic Gardens, and the Staff of the National Seed Bank wish to express their sincere thanks to National Seed Bank Volunteers, whose painstaking work in assisting with field work, collecting, sorting, and cleaning seeds over many years has made this globally significant work possible.



BROOK CLINTON CANBR©



Small Purple Pea, *Swainsona recta*, flowers and seeds (magnified)

The Small Purple Pea (*Swainsona recta*) is an endangered species. The widespread fragmentation of the endangered woodlands it grows in has resulted in <4000 plants surviving in small, separated clusters. To save the species the National Seed Bank has collected, banked and studied its seeds to develop successful germination protocols. Living Collections has developed methods to grow these seedlings to maturity in the nursery, to produce seeds for future banking without re-harvesting the wild populations. Some plants have also been planted back into the species' native habitat, raising numbers and future hope for the species' survival.

Protecting the Eurobodalla Regional Botanic Gardens Wallace Herbarium

Michael Anlezark, Manager, Eurobodalla Regional Botanic Gardens

Friends will be pleased to learn that Eurobodalla Regional Botanic Gardens (ERBG) is in the midst of a major project to address rapidly increasing visitor numbers and the safety of its herbarium. The ERBG is a young botanic garden with development commencing just 30 years ago. Over this relatively short period it has suffered disasters including devastating fires, major storm damage and funding cuts. Despite adversity, we now see a thriving well supported shining example of community achievement borne from a long and growing partnership between the Friends of ERBG, Eurobodalla Shire Council and the broader community.

From the very beginning regional flora has been the Gardens' focus, collecting, growing and displaying flora from a 6000 square kilometre catchment. Surprisingly there aren't many botanic gardens throughout the world that focus exclusively on their regional flora and in Australia the ERBG is one of only a couple. An important component and resource for the Gardens has always been its heritage listed Wallace Herbarium, a collection of over 14,500 specimens. This publicly accessible herbarium collection represents flora from a collection region of around 6000 square kilometres incorporating much of the New South Wales South East Corner Bioregion.

The Herbarium was named after Dr Murray Wallace (an entomologist) and his wife, June Wallace (a botanist), who initiated the project in the 1980s starting the collection from their own property on the NSW south coast. Jennifer Liney, OAM has curated the collection since 1994 and coordinates a small but important team that works in the herbarium each week.

The vouchered material in the herbarium is 100% data-based and included in the National Herbarium database with many duplicate specimens sent to the Australian National Botanic Gardens in Canberra and Royal Botanic Gardens Sydney.

In 2017 the Wallace Herbarium was placed on the New Wales State Heritage Register due to its scientific integrity and regional importance. The herbarium also represents a significant social contribution in that it has been largely managed by the community for the community.

Over the last five years several projects in the Gardens have been completed to alleviate some of our growing pains including an overflow parking area accommodating an additional 90 cars, upgraded maintenance and nursery depots and additional barbecue facilities. Importantly during this period serious planning was also underway to comprehensively address the growing needs of the Gardens and the community.

As a consequence, the Visitor Centre Redevelopment Project was established which addresses four main issues: upgrading facilities to house the herbarium collection to provide climate control and protection against insect attack; new amenities for large groups; accommodation for exhibitions, meetings, education programs and workshops; and providing capacity to increase revenue opportunities from plants and merchandise sales. A project working group comprising Friends of Eurobodalla Regional Botanic Gardens, Eurobodalla Shire Council, and members of the community is overseeing this project. There are now approved plans that include exhibition and event spaces, additional toilets, administration areas for Friends and staff, a new café and re-purposed space for a large retail and information centre incorporating education.

The Wallace Herbarium will be housed in a new purpose built facility within the fully upgraded nursery precinct. We have secured the funding to complete this modest but still substantial \$3,000,000 project. The hard work of Friends in fund-raising and the combined efforts of Friends and Council in successful grant submissions from NSW and Australian governments will see the project become a reality with work already started. This is a very exciting chapter in the story of our young garden and is positive affirmation of hard work and community spirit. Construction will continue over the next 18 months. We look forward to completion and the day we can share our great new facilities.

ERBG is located on the Princes Highway 4.7 kms south of Batemans Bay. Opening hours are from 9 to 4 on Wednesdays to Sundays. Open every day during NSW School Holidays. Open Public Holidays except Christmas Day.



ERBG Plant Nursery with Jenny Liney on the left, volunteer on right

A closer look at ants on Black Mountain

Judy Kelly

On a late warm summer afternoon earlier in the year, we enjoyed an adventure organised by the Friends of Black Mountain, to look at ants on the lower slopes of the mountain. Dr Ajay Narendra from Macquarie University's Ecological Neuroscience Group, led us enthusiastically into the bush to see what we could find. We obtained a copy of his brochure, *Common Ants of ACT and Surrounds* which includes text and pictures, with illustrations by Ladina Ribi.

Ants are fascinating the way they look, the way they organise their colonies and tasks, and go foraging. Ajay told us that the stinger sits at the end of their last segment, the gaster while they use their mandibles for carrying food, fighting, and building nests.

Australia has about 100 genera and 1300 described ant species and subspecies but there are many ants still waiting to be discovered or described and named. Worldwide there are about 300 ant genera and 15,000 described species.

Ants' habits vary between the different genera and species. The first that Ajay deftly picked up between his fingers was a meat ant (*Iridomyrmex purpureus*). They're big ants that construct large pebble mounds with multiple nest holes. The individual little pebbles collect morning dew acting as a water source for the ants. The meat ant climbs trees to feed off insects, returning to the nest where it regurgitates food to the queens and to its nest mates who tend the eggs, pupae and larvae. Some colonies of meat ants have more than one queen in a single nest.

The ants we most often encounter are sterile female workers who carry out majority of the tasks. Male ants have wings, very large eyes and reduced mandibles. Males are rarely seen and found for just a few days before the first rains each year. Typically, in ants, the queen produces eggs and she decides which eggs will become male and which females.

Another ingenious aspect of the meat ants is the gland just behind their back leg that manufactures antibiotics used to combat fungal growth in their nests.

Despite having a very small brain, ants can teach us a thing or two about navigation techniques. Ants can see colour, but unlike humans, they can see ultraviolet light too. Ants leaving the nest for the first time learn the visual world that allows them to return home after foraging. Ajay and his research group have been investigating ants' navigation techniques for possible leads in designing driverless cars and robotic appliances.

Other facts that emerged were that the ants have different smells between their colonies, and that the ant populations in Black Mountain (sandstone) are very different from those in Mt Ainslie (volcanic) perhaps because of their different geology.



Meat ant (*Iridomyrmex purpureus*)



Bull ant (*Myrmecia pyriformis*)



Valentine ant (*Crematogaster* sp)

We learned that bull ants (*Myrmecia pyriformis*), capable of a painful sting, are solitary, that the valentine ant (*Crematogaster* sp), so called because of its heart shaped gaster, the last segment, is the only ant that can raise its gaster above its head. The good news is that it doesn't sting.

An exciting find for Ajay on Black Mountain was a rare trap jaw ant *Epopostruma* sp, which he took back to the laboratory for further investigation.

While most of us regard ants as pesky stinging nuisances, Ajay's walk showed us the diversity and complexity of ants and their organisational abilities. We were joined on the walk by two very young visitors, one Ajay's son who's already an enthusiastic recruit to ant searches and investigation. It was good to see potential entomologists in the making.

Photos are by Ajay Narendra from his brochure: *Common Ants of ACT and Surrounds*

Crop Wild Relatives seed conservation at Kakadu National Park.

Tom North, Australian National Botanic Gardens; Damian Wrigley, Australian Seed Bank Partnership; Sally Norton, Australian Grains Genebank.

Crop Wild Relatives are wild plant species that are genetically related to crops, but have not been domesticated. They can be defined as 'a wild plant taxon that has an indirect use derived from its relatively close genetic relationship to a crop' (Maxted et al. 2006). They occur in many habitats throughout the world and in Australia include species of *Ipomoea* (sweet potato), *Cajanus* (pigeonpea), *Glycine* (soybean), *Musa* (banana), *Oryza* (rice), *Sorghum* (sorghum), *Solanum* (eggplant) and *Vigna* (mungbean, cowpea).

In 2011 the Global Crop Diversity Trust (the Crop Trust) launched the *Adapting agriculture to climate change: collecting, protecting and preparing crop wild relatives project* (Dempewolf et al. 2014). The Crop Trust, in collaboration with the Royal Botanic Gardens, Kew identified 40 target species for collection in Australia. Many of these species are found in northern Australia and staff at the Australian National Botanic Gardens (ANBG) and George Brown Darwin Botanic Gardens (GBDBG) worked

on identifying locations to collect these species in Kakadu National Park. Out of the 40, we identified 22 species that are found growing in Kakadu with the possibility that they were also used by Traditional Owners.

During April 2018, Dr Sally Norton and Dr Katherine Whitehouse from the Australian Grains Genebank (AGG), Tom North from the ANBG and Ben Wirf from the GBDBG spent 10 days in Kakadu in the Northern Territory collecting crop wild relative seed and sharing their knowledge about seed conservation. The project secured 15 new seed collections from *Cajanus*, *Glycine*, *Oryza*, *Sorghum* and *Vigna* species as part of the global crop wild relative conservation effort.

As well as the collecting program, a significant component of the project was working with locals and international participants to train them in ex situ plant conservation techniques. Project participants included Kakadu National Park Traditional Owners, staff, volunteers and school-based trainees with a focus on women rangers, as well

as visiting scientists from Indonesia and Papua New Guinea. The participants were provided with field based training in the identification, collection and storage considerations for crop wild relative species. Kakadu Rangers and Traditional Owners also shared their knowledge of the traditional management of *Sorghum* found within the National Park.

The training covered aspects of plant identification and seed collection, as well as techniques for cleaning, drying and storing seed. The project team used a modified version of the Millennium Seed Bank's seed conservation drum kit to ensure collections arrive at seed banks across Australia and the UK in the best possible condition. It is hoped that the seed conservation techniques taught at Kakadu this year will support long-term plant conservation throughout Australasia.

Throughout the ten days the team travelled south from Jabiru to the Mary River region. Following the field elements of the training, the international participants accompanied the seed collections back to the AGG in Horsham, Victoria where they received intensive lab-based training in the ways to process crop wild relative seeds for long term storage. Once the collections have been cleaned and dried, duplicates will be sent to the National Seed Bank at the ANBG, the Seed Bank at the GBDBG and the Millennium Seed Bank, Kew in the UK for long-term ex-situ conservation and research.

Access and Benefit Sharing

Access and benefit sharing arrangements are important considerations for this project as Kakadu is jointly managed by the Australian Government and Traditional Owners. Any potential research for the commercialisation of genetic material from seed collected from Kakadu will require approval under



Crop Wild Relatives Project participants. L-R Jimmy (West Papua), Kath (AGG), Sally (AGG), Ben (GBDBG), Tom (ANBG), Gibson (PNG)

the *Australian Government's Environment Protection and Biodiversity Conservation Act* (1999) as well as the support of relevant Traditional Owners and the Kakadu Board of Management. Additionally, Part 8A of the *Environment Protection and Biodiversity Conservation Regulations* (2000) controls the access to biological/genetic resources in Australia's National Parks via permits. These Regulations give effect to the third objective of the Convention on Biological Diversity — 'the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.' The Regulations also ensure that Australia's genetic resources are used for research and development on mutually agreed terms, with prior informed consent and an equitable return to Australia, while ensuring the environment is protected. It is essential that future Crop Wild Relatives collecting in Australia be supported by meaningful access and benefit sharing arrangements that ensure the benefits of commercialising genetic material flow back to the communities from whose country seed is collected.

Acknowledgements

The Millenium Seed Bank and the Crop Trust supported this project together with funding from the Government of Norway

and the Herbert Simon Foundation. Further lab-based training at the AGG was supported by the Crawford Fund. The field component of this research was conducted in Kakadu National Park under Permit No. RK915 and the Kakadu Plan of Management. The Australian Seed Bank Partnership and AGG wish to thank the Traditional Owners of Kakadu National Park for supporting us to deliver this project on country, and to former and current staff at Parks Australia for their support in delivering this project, particularly Anthony Simms, Matthew Quinn, Rachel Price, Shiona MacDonald, Margarita Goumas and Brad Desmond. The team owe a special vote of thanks to Ben Wirf at GBDBG for organising mapping of target species and supplying the blue drum kits.

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Donations to the National Seed Bank

The Curator of the National Seed Bank, Tom North, wishes to acknowledge with thanks two donations:

Full set of the *Flora of Australia* donated by Warwick and Pat Wright

The *Flora of Australia* series documents the families, genera, and species of flowering plants, conifers, ferns, mosses, liverworts and lichens of Australia and its oceanic islands.

Art work, *Maireana tomentosa*, graphite on paper, donated by the artist, Sharon Field

Sharon, an award winning botanical artist, donated the artwork in recognition of the assistance provided by the National Seed Bank in preparation for her 2016 exhibition at the ANBG.



Both donations have been catalogued by the ANBG Library and are now on long-term loan to the National Seed Bank.

Australian Association of Friends of Botanic Gardens Conference

Benalla, an attractive little town just down the Hume Highway, in Victoria, is famous for its many and varied murals, painted during *Wall to Wall Festivals* in 2017 and 2018. In April the Friends of the Benalla Botanical Gardens and Riverine Parkland hosted the biennial conference of the Australian Association of Friends of Botanic Gardens (AAFBG). On the first day the main speakers were: Lucy Sutherland from Adelaide, on keeping Gardens relevant to their communities; Chris Russell from Cranbourne, on how their Garden

has improved the surrounding suburban biodiversity; and John Hawker, a heritage horticulturalist, on the heritage trees in the Benalla Gardens.

Day two was for Friends; six groups talked for 15 minutes each in *Gardens as Glue*, and ten for three minutes each in the *Rapid-Fire Forum*. We heard about training guides (Arboretum); building an Instagram community (Camperdown); rodents eating pipes (Mildura); moving on-line (ABNG); selling pens made from a descendant of the Gallipoli

Lone Pine (Warrnambool); and Myrtle Rust in Lismore.

In between times we admired the historic elms in Benalla's Gardens, visited a Stephanie Alexander Garden at a primary school where we had delicious afternoon tea made by the gardeners, and went to Winton Wetlands that were not wet. You can read all about the conference in the latest issue of AAFBG's newsletter, *Eucalypt*, available on our website at www.friendsanbg.org.au/.

Anne Rawson

Friendly Chatter

Photographic Group

The Photographic Group is experiencing a productive year, successfully conducting its first full day *Introduction to Photography* workshop, offered to all members of Friends and again for the first time, providing all the photos for the 2019 Bookshop Gardens Calendar, now on sale at the Bookshop.

The photography workshop was overseen by Helen Dawes and the course work developed and delivered by David Cox and Helen Dawes with the assistance of the remaining committee. The workshop, aimed at beginners with cameras capable of independently controlling both aperture and shutter speed, was a great success and may be offered again in the future.

The Calendar was an interesting project with members offering approximately 70 individual photos for consideration, from which the Bookshop management chose the final 13 for publication. The Photographic Group has again been asked to provide the photos for the 2020 Calendar and members are now collecting their images season by season.



David Cox presenting *Introduction to Digital Photography* – Crosbie Morrison Building

Included in this issue of Fronds is a Bookmark advertising the **Photography Group 5th annual Photo Exhibition, this year titled *Perspectives*. It will open to the public 22 November to 9 December, between 9.30 am and 4.30 pm**, following an Exhibition launch Wednesday Evening 21 November. All photos on display and for sale will be a selection of the year's best from members of the Photography Group, highlighting the fauna and flora of the

ANBG and surrounds. Great for that special Christmas present or card or just a special purchase. In previous years the Photographic Group has produced excellent framed photographic works and like a good wine, it is expected these will only get better this year. Use the bookmark to "keep the date" and be sure to visit the exhibition, supporting Friends and its Photographic Group members.

Derek Corrigan

Vale David Cox

Many of the Friends were shocked to hear of the sudden death of David Cox at the age of 71 after a motorbike accident on Wednesday 20 June.

David and his partner, Heloisa Mariath, have been Friends' members since 2009, Heloisa as one of our botanic artists and David involved in the Photographic Group, including as Convenor for two years. He was also elected to Friends Council in 2015, retiring as Vice-President in 2017.

David was a wonderful photographer and could often be seen in the Gardens with a camera at the ready. One of his images is on the cover of the current Friends membership brochure. He also made thoughtful contributions to Council discussions.

These words from his Photographic Group colleagues sum up beautifully the contribution David made to the Friends:

"I write this on behalf of the ANBG Photographic group in memory of David Cox, sadly departed and missed by all.

David has been an active member of the Photographic group for many years holding positions, including as Convenor, on the committee for a number of them. He was a man with many strengths, possessing vitality and enthusiasm that enhanced the photographic passion of all members. He was wonderfully non-judgemental and accepting of everyone and their photography skills.

His involvement in past exhibitions and many other agendas has contributed greatly to the current professionalism of the group.

His project this year was to produce a workshop called *Introduction to Digital Photography*. This was successfully launched on 19 May, one attendee asking 'How much did you have to pay him?' – the reply – 'We're all volunteers!' It was so good! That is how David lived his life – he had goals and strove to achieve them."

Our thoughts go to Heloisa and David's wider family.

Lesley Jackman and Helen Dawes

Plant Science Group

In addition to the monthly technical talks, there were two opportunities for participation in other activities: a visit to the ANBG Nursery with briefing by Joe McAuliffe, Nursery Manager; and one to see the Pollination display at the Calyx at the Royal Sydney Botanic Gardens. This latter was organized by Pam Cooke of the Guides. (see p 10)

Over the last quarter, the monthly technical talks have covered an eclectic range of topics from seed dispersal and drought to polyploidy in *Pomaderris* to ensuring camera records are accurate.

The first of these, by Dr Robert Godfree, Centre for Australian National Biodiversity Research, covered the role seed awns play in surface dispersal and burial of Australian grasses, and then covered the Federation Drought (1895-1903). This drought caused mass mortality of native plants and animals plus ecosystem collapse across at least 36 per cent of the continent, and ranks as perhaps the most geographically extensive

and impactful drought event observed in the colonial to modern era.

Dr Alexander Schmidt-Lebuhn, CSIRO, highlighted the work of a CSIRO vacation student studying differences in genome size and number of genome copies within and between *Pomaderris* species and how this fits into and matters for conservation management.

The Canberra Nature Map, which contains tens of thousands of records of about 2,000 plant taxa, provided by people loading images directly from smartphones or cameras, highlights key issues of accuracy of location, nomenclature adopted, uncertainty in identification and the uses that can be made of this data. Dr Michael Mulvaney, Conservation Research Unit, ACT Environment and Sustainable Development Directorate, noted that this is a significant tool in the understanding of plant distribution and abundance and is used daily in plant management and conservation.

For further information, or to be put on the email list for advice on impending Plant Science Group activities email: plantscience@friendsanbg.org.au or see the Friends website under Activities.

Anne Campbell

Growing Friends

Since our very successful autumn plant sale in April we have been busy propagating, and enjoying our newly upgraded seed beds. **Our next sale will take place on Saturday 10 November.** Details of the sale including a list of the available plants will be on the Friends website one week prior to the sale. Money raised from the sale goes to support the ANBG.

If you are interested in joining the Growing Friends, please talk to one of the Growing Friends, or telephone John Connolly (0477 257 188) or Maurice Hermann (0429 361 256) for further information.

Wendy Merritt

Botanic Art Groups

On 16 March to 17 April we held our annual art exhibition, this year featuring threatened and endangered species. Once again we were pleased not just to have so many people come to see botanical art but over 60 per cent of the artworks were sold raising \$5,271 for the Friends. This is a very good result for any art exhibition to achieve demonstrating the ongoing popularity of this art form. The Friends had a special preview prior to the official opening and two artworks were purchased by the Friends for the Gardens' collection.

At the Botanical Art Group Meeting on Thursday 14 June the two art works purchased were handed over officially by the President of the Friends, Lesley Jackman, to the Executive Director of the Gardens, Judy West, in the presence of the artist, Beth Roberts (see photo). Both artworks



From left to right: Judy West, Lesley Jackman & Beth Roberts

were Beth's beautiful scraperboard black and white artworks of banksia pods, two different species.

The Botanical Art groups meet three times a month. Membership is open to

all interested Friends. There are currently over 100 members. New members are always welcome.

Cornelia Buechen-Osmond

Guides and other Friends trip to Sydney

Glenys Bishop, Volunteer Guide

There was an air of excitement as we arrived at the Gardens at sunrise on May 1st. All 28 of us, mostly guides, but a few non-guiding Friends as well, were anticipating an enjoyable day trip to Sydney, but I don't think we realised just how good it would be.

Pam Cooke, the trip organiser, had left nothing to chance. She allocated us to car pools so that we would not fill the car park for the whole day; she provided water and snacks on the way up because we had all had a very early breakfast; and she negotiated a comfort stop each way for us, a good chance to buy coffee.

Once we had left Canberra and were on the road, we put our knowledge of plants in the ANBG to the test with a series of quizzes. Plants were grouped according to where they could be found in the Gardens and there were a number of clues for each plant. With right answers being rewarded with a confectionery item from a lucky dip bag, it was a lot of fun.

On arrival at the Royal Botanic Gardens (RBG), Sydney, we were met by staff member, Paul Nicholson, and two volunteer guides, Jim Nicol and Rosemary Roberts. We divided into two groups

and Paul and Jim each led a group on a tour with the theme of Pollination. Each tour, taking one hour and a half, had nine stops. Among these, we visited the Cadi Jam Ora garden that celebrates the traditional owners of the Sydney Gardens, the native bee hive and the Latitude 23 Glasshouse with its orchids and other tropical plants. These very experienced guides used humour and stories to explain the importance of different pollinators. For instance, *Eucalyptus grandis* is pollinated at night, when the nectar flows, by the grey-headed flying fox, but during the day by bees and birds. On the other hand, the red-leaved fig (*Ficus congesta*) with its flowers inside the 'fruit' is pollinated by a host specific wasp, which breeds inside the fruit. This interaction between fig and wasp is considered by many as the pinnacle of plant insect interdependence in the natural world.

The last stop was at the Calyx, with its living wall of plants currently showing a pollination-themed display. Included were models of native blue-banded bees and touch panels for information. This is well worth a visit if you are in Sydney but we found that our expert guides gave us much more information about pollination.

Advance Notice:

Would you like to become a volunteer guide at the ANBG?

Advertisements seeking applications from people interested in becoming a volunteer guide at the ANBG will appear from 1 September. More information will be available on the ANBG website and through the Friends at that time.

If you would like to receive notification of the advertisement please email:

guides@friendsanbg.org.au

After a late, quick lunch, many of us visited some of the exhibitions that are currently on display at the Sydney RBG. The Margaret Flockton Award for Scientific Botanical Illustration exhibition and/or the Botanica exhibition with very interesting examples of botanical art, including an impressive painting of Davidson's plums by Elaine Musgrave, and a detailed work of lichens on a branch which had been sent to the ANBG for identification. Beautiful scarves and wraps were temptingly displayed in the Palm House exhibition of textiles.

The weather was perfect, we learnt a lot and had fun. It was a good way to spend a day!



Pollination of *Ficus coronata* (photo from RBG) and *Ficus congesta* (see text) is a fascinating story



The Calyx; a wall of plants with the pollination display including the blue-banded bee models

PHOTOS: NARILIA HIRSCH

Tree changes at the ANBG

Dave Taylor, Peter Feilen, Mark McMahon & Phil Hurle

The ANBG is undergoing and planning significant changes to the site and landscape. A key part of these changes includes the removal and succession of large and mature trees, so we thought it timely to give an update and insight into some of the considerations for managing this transition.

Specifically, the main drivers for recent and upcoming tree removals centre on two key areas:

SAFETY

First and foremost is safety. Trees may be removed following an assessment by our tree team that they pose an unacceptable risk. The risk rating of any tree will change as the tree ages and grows, and a tree's condition will be affected by many factors including: impact of disease, an extreme weather event, or a change to surroundings (including below ground). Change can happen slowly or suddenly and our tree team combines a regular across-site assessment with assessments following triggers such as a severe weather event or a report from staff or the public that a tree may be unsafe.

Not all unsafe trees are removed. Changes to paths and / or access to the area under trees can mitigate the safety risk. An example is a *Eucalyptus macrorhyncha* (Red Stringybark) with

many hollows (potential wildlife habitat) on the Eucalypt Lawn; the lawn under the tree was replaced with a garden bed, resulting in fewer people accessing the potentially hazardous area near the tree.

The ANBG site has been prioritised into risk zones as a guide in the assessment of trees according to how much an area is used, and the type of use. This indicates the risk of someone being injured by a failure of some type under normal weather conditions (see map). As the Gardens are closed to the public above the café during extreme weather events, it is necessary to assess all trees in the red zone to a very high level.

LANDSCAPE REDEVELOPMENT AND SUCCESSION PLANNING

Succession planning sometimes requires tree removal to create optimum growing conditions for new plantings.

With around 10,000 trees in the living collection succession planning is a big challenge and sometimes difficult or even unpopular decisions must be made, to allow for succession and the needs of a diverse collection.

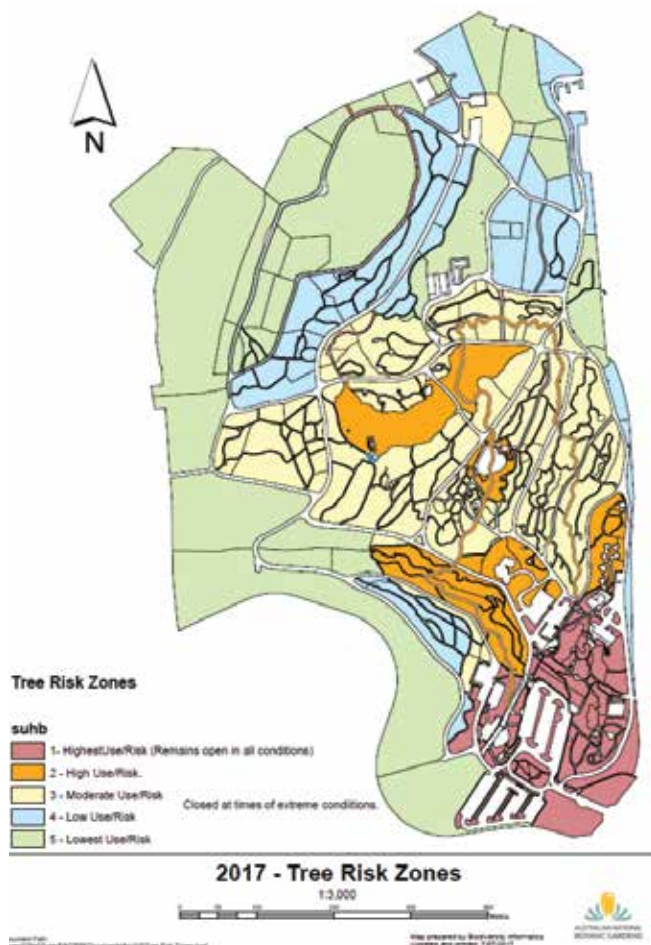
Where possible and practical we keep trees for habitat purposes, and we have developed as part of our tree management strategy a 'naturally occurring tree canopy map' indicating where we will maintain tree canopy corridors and significant tree stands and habitat areas. This approach ensures there are areas where stands and corridors of trees enable wildlife such as gliders to easily move around the site. In addition the retention of dead wood on trees provides platforms for 'launching off'.

Apart from the diversity of trees on-site, we also plant, display and maintain them in diverse ways for different reasons, including aesthetics (from tidy to wild), creating canopies and microclimates, lifting lower branches allowing winter sun to penetrate beneath foliage, exposing trunks for their splendour, planting tight thickets and of course the classic specimen planting.

The Australian National Botanic Gardens Tree Management Strategy 2016-2026 provides more detail on these and other tree management issues, and we encourage you to read it at <http://www.anbg.gov.au/gardens/about/management/policy-docs/index.html>

THE TREE TEAM

We currently have four staff who are trained arborists and another who is in training, but currently on leave. Our aim is to maintain an active team of at least four staff trained in arboriculture. Although they are all multi-skilled and are not solely focused on arboriculture, they do all work together as a team on tree work once a week.



Discovering Biodiversity: A vision for taxonomy and biosystematics 2018-2027

Dr Sue Fyfe, Director, Biodiversity Science

The science of discovering, naming, classifying and documenting nature had a momentous day on 27 April 2018 when a decade-long plan to research biodiversity in Australia and New Zealand was launched at Parliament House. The plan, *Discovering Biodiversity: A Decadal Plan for Taxonomy and Biosystematics in Australia and New Zealand 2018-2027*, provides the vision, recommendations and strategies to ensure a sustainable future for the core Biodiversity Science Section based at the ANBG. It outlines a stepwise

change in the outcomes that taxonomists and biosystematists could achieve if adequately supported with funding, resources and access to new technologies, innovations and training.

The Australian Academy of Science, the New Zealand Royal Society Te Aparangi and 18 Partners have identified the key issues and milestones to complete this ambitious task. It is endorsed by the entire Australian and New Zealand taxonomy and biosystematics community (eight national level organisations). The lead author is Dr Kevin Thiele, Academy of Science. Dr Judy West chaired the Plan's Advisory Committee. It was funded in part by the philanthropic Ian Potter Foundation.

Between 2006 and 2015, 1,648 new plant species were discovered, documented and named in Australia, second in number only to Brazil

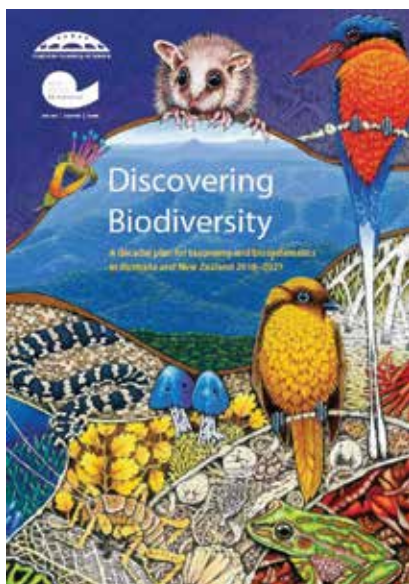
KNOWING WHAT IS THERE

Taxonomists and biosystematists document, name and describe species, study evolution and genetic relationships, and classify organisms into genera, families and higher taxa. Estimates suggest that

around 70 percent of the species that exist in Australia and New Zealand have not yet been discovered, named and described but the sciences of biology, ecology and conservation depend on this foundation knowledge. Species must be documented before they can be listed and managed as threatened species. Information on species, their relationships and characteristics can be critical to food production, trade, biosecurity, medicine, public health, industry, and our society. Thousands of new and powerful drugs including anti-cancer drugs and antibiotics, have been discovered from marine organisms in the past decade. Innovative new industrial processes based on living organisms, such as plastic eating bacteria, are being invented each year. Uncertain taxonomy can have serious economic consequences, for example, a shipment of Australian wheat was rejected by Pakistan in 2004 for a loss of \$35 million on the basis that it contained the serious wheat disease karnal blight, when in fact the shipment had small quantities of a related but harmless fungal disease of weedy grasses.

WHAT WE NEED

At the same time that our biodiversity is most under threat from a rapidly



Dr Kevin Thiele, Project Lead (far right) and members of the Advisory Committee (from L-R) Dr Thomas Trnski, Dr John Hooper, Professor Pauline Ladiges AO FAA, Professor Wendy Nelson MNZM FRSNZ and Dr Judy West AO at the launch of *Discovering Biodiversity: A Decadal Plan for Taxonomy and Biosystematics in Australia and New Zealand 2018-2027* at Parliament House. Sir David Attenborough (here on screen) wrote the Foreword to the Plan saying: *We cannot properly grasp or understand the natural world without this taxonomic system. Every time I show the world a species and its life, I depend on the work of these scientists.*

changing environment, funding and resources for taxonomy and biosystematics have been declining. Australia is one of 17 countries recognised as biologically megadiverse and our current taxonomic capacity is not adequate for the magnitude of the task of documenting our biodiversity before many species potentially become extinct. We don't know how many species might already have become extinct before being discovered and named.

WHAT DO WE DO NOW?

The Biodiversity Science Section based at the ANBG plays a central role in taxonomy and biosystematics in Australia. The Australian Biological Resources Study (ABRS) offers the only dedicated source of funding for taxonomy research in Australia, providing scientists and research

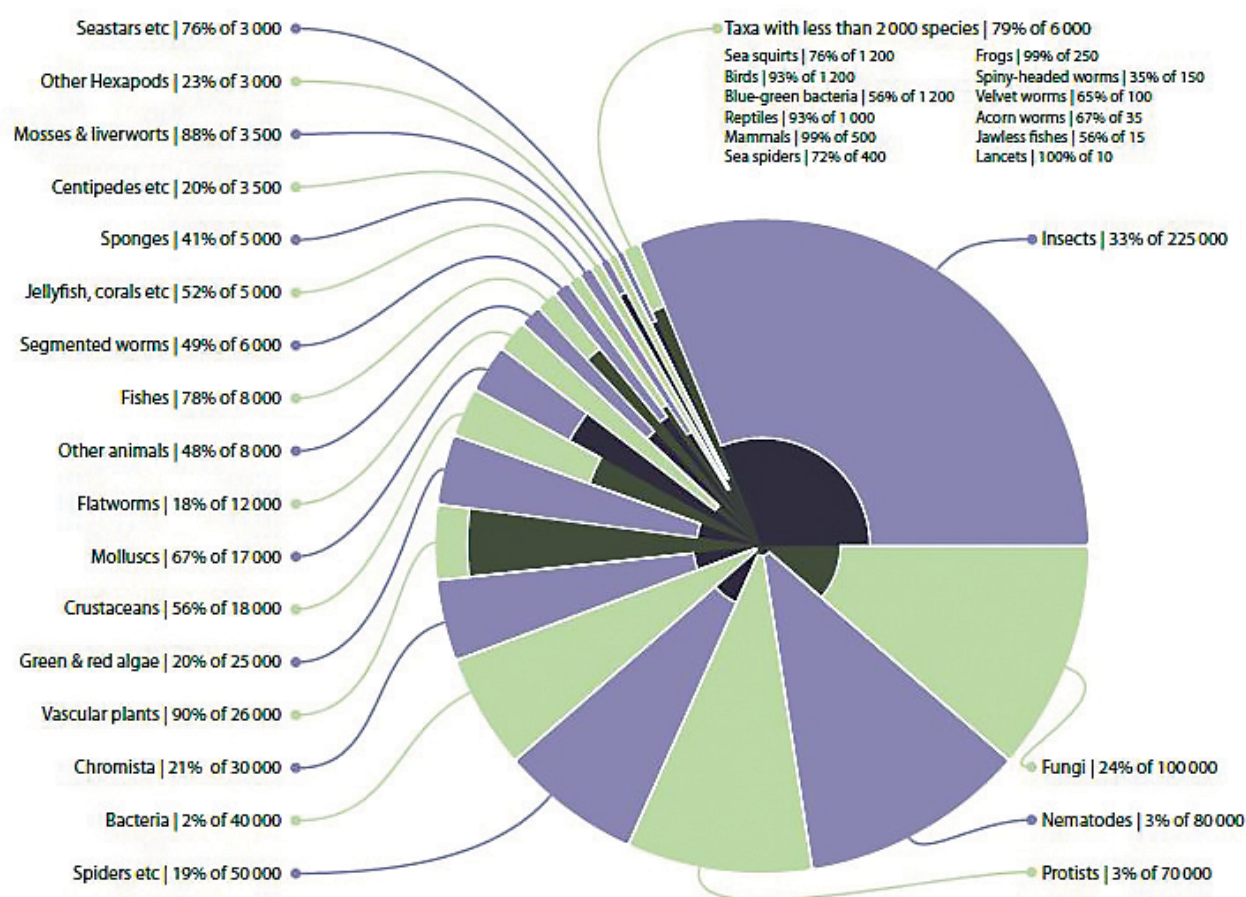
students with around \$1.8 million in grants each year. ABRS, with assistance from our Biodiversity Informatics unit, compiles, curates and publishes species checklists, taxonomic treatments, identification keys and other biodiversity resources at the national scale. We work in partnership with the Atlas of Living Australia, the Council of Heads of Australasian Herbaria and Council of Heads of Australian Faunal Collections to make scientific quality databases such as the *Flora of Australia*, *Australian Faunal Directory* publicly accessible online. Our Bush Blitz program (a partnership between the Australian Government, BHP and Earthwatch) has led to the discovery of over 1,700 new species over the past eight years by leading expeditions of scientists into understudied regions of Australia and funding specimen curation

and follow up research in museums and herbaria. Biodiversity Science and the ANBG are partners with CSIRO in the Centre for Australian National Biodiversity Research, with Biodiversity Science staff comprising much of the curation team of the Australian National Herbarium, including the cryptogam herbarium annex at the ANBG.

THE FUTURE?

The Decadal Plan recognises the Australian Biological Resources Study and natural history collections such as the Australian National Herbarium as core infrastructure, which must be maintained into the future. Over the next decade, with support from government, industry and society the Plan seeks to expand online services and enhance the understanding and use of taxonomy

Biodiversity in Australia & New Zealand across different organismal groups



Biodiversity in Australia and New Zealand across different organismal groups. Numbers refer to the sum of estimated species and percentage of these that have been described in Australia¹⁹ and New Zealand²⁰. Dark sectors in the centre represent named species (drawn in proportion to radius). Insects and fungi are the two largest groups in the region, followed by nematodes, protists and bacteria. Very few species in these groups have been named; all are hyperdiverse. Note that estimates for total species for these groups are highly uncertain.

Discovering Biodiversity

2018 - 2027 (contd.)

and biosystematics knowledge for public good outcomes, making knowledge readily accessible to end users. The Plan intends to significantly accelerate species discovery and documentation by growing taxonomic workforce capacity and capability, and by applying innovative new technologies in genetics, 3D imaging, big data computation and machine learning (artificial intelligence).

Well-managed, integrated and shared biodiversity infrastructure across Australia and New Zealand will create synergies to ensure world leading biodiversity science outcomes. Education is seen as the key to the future of taxonomy and biosystematics, and is necessary to ensure future generations of Australians appreciate the richness and importance of our biodiversity. The Plan also recognises the deep connections that the Indigenous peoples of Australia and New Zealand have with the living world, and seeks to ensure they are respectfully engaged in the mutual exploration of biodiversity.

The taxonomy and biosystematics community of Australia and New Zealand, including staff of the Biodiversity Science Section, and key stakeholders worked collaboratively to develop this decadal plan.

The Plan is ambitious and implementation will depend to a large extent on a clear roadmap and strong advocacy for increasing resourcing and investment in the taxonomy and biosystematics infrastructure, capability and capacity.

Diagram from *Discovering Biodiversity: A decadal plan for taxonomy and biosystematics in Australia and New Zealand 2018–2027* (Australian Academy of Science and Royal Society Te Apārangi: Canberra and Wellington) p 18 © Australian Academy of Science 2018; available at <https://www.science.org.au/support/analysis/decadal-plans-science/discovering-biodiversity-decadal-plan-taxonomy>

Bushland Nature Walk – Regeneration

The Bushland Precinct is a great asset for the Australian National Botanic Gardens. Though it is not common for botanic gardens to include areas of the pre-existing native vegetation, there are at least two other Australian Gardens the ANBG can look to for inspiration: Royal Botanic Gardens Cranbourne, Victoria and the Hunter Region Botanic Garden.

The Master Plan for the ANBG, launched in 2015, envisaged ecotourism in the Bushland Precinct, and two key principles for ecotours are conserving the natural biodiversity and regenerating damaged areas. The damaged entry way to the Bushland Precinct at the corner of Clunies Ross Street and Black Mountain Drive had been used as a minor quarry, illegal dumping ground by builders and renovators, and more recently re-location of soil for ANBG projects elsewhere in the Gardens. When the Bushland Precinct and the Bushland Nature Walk were officially opened on 16 December 2016 the damaged area was recognised as a Regeneration area.

Twelve months later some Friends, who were concerned about the prolific weeds, gained permission to remove them, especially near the path so that weed seeds etc would not be inadvertently carried further into the Precinct on walkers' shoes and clothing. The horticulture staff also sprayed other parts of the area. Everyone was delighted with the results.

But how does one prevent weeds re-establishing? Shall we plant local native plants in the area? David Taylor, Phil Hurle and Geoff West acquired 200 local native plants as tube-stock from Greening Australia and a number of Friends

volunteered to help them and horticultural colleagues with planting on 11 April 2018. Weed regrowth was poisoned a week or so before and sections of the regeneration area were ripped, but even so the ground was so tough crowbars and mattocks were needed to make holes deep enough for the tube-stock. Horticulturalists and volunteers collected water mixed with Seasol from the tank and planted and guarded the tube-stock from rabbits and other fauna.

At the end of the morning the pathway showed where we had planted:

Australian Blackthorn (*Bursaria spinosa*), Australian indigo (*Indigofera australis*), Cauliflower Bush (*Cassinia longifolia*), Clustered everlasting (*Chrysocephalum semipapposum*), Early Wattle (*Acacia genistifolia*), Green Wattle (*Acacia mearnsii*), Narrow-leaved Hop Bush (*Dodonaea viscosa* subsp. *angustissima*), Native raspberry (*Rubus parvifolius*), Prickly Tea-tree (*Leptospermum continentale*), Red Box (*Eucalyptus polyanthemos*), and Wedge-leaved hopbush (*Dodonaea viscosa* subsp. *cuneata*).

A big thank you to the horticulturalists and volunteers, who are also looking forward to caring for the plants and more planting next autumn.

Linda Beveridge



After weeding along the path



Crowbar and mattock were needed!



Plants protected by guards

PHOTOS: LINDA BEVERIDGE

What's new in the ANBG Image Collections?

The Australian Plant Image Index (APII) holds over five thousand 35 mm slides of eucalypt species donated by the late Ian Brooker (<https://www.anbg.gov.au/biography/brooker-ian.html>) and David Kleinig.

Ian was a world authority on eucalypt taxonomy, discovering and naming many new species. David became proficient in identifying eucalypts when working with the collection at the Seed Section of CSIRO's Division of Forest Research, Canberra. Together they authored the popular three-volume series *Field Guide to Eucalypts* and also contributed to the interactive identification key *EUCLID: Eucalypts of Australia*.

Some of the images published in their field guides and *EUCLID* have now been incorporated into APII. These images are a significant contribution to the collections because they are a great representation of many species of eucalypts and were captured by photographers with a knowledge of the important characters for species identification. They include photographs of habitat, whole trees, bark, buds, flowers and fruit, which were mostly taken in the wild, and illustrate the amazing diversity of these iconic plants.

About 80 per cent of the donated slides have been databased and I am currently scanning and making these slides

available via APII's online interface. In addition, I am cataloguing the rest of the Brooker and Kleinig slide donation.

Photos donated to APII by Ian Brooker and David Kleinig can be viewed on the ANBG website by selecting *Plant Information* then *Plant images* then *Complex Search for records of all plant photos using a range of criteria* and in the query box (photographer) type %Kleinig% then *Execute Query*.

Or use the following link,
<https://www.anbg.gov.au/cgi-bin/photo?FORMAT=TABLE&BY%23050=1&280=Brooker%25&400=%25&410=%25>

Cheryl Backhouse (Photograph Curator)



Examples of Ian Brooker's photographs showing characteristics of four eucalypts from south-west WA, clockwise from above:

Eucalyptus pileata: whole tree

Eucalyptus accedens: bark

Eucalyptus ewartiana: fruit

Eucalyptus lehmannii: buds and flower



Gardens Shorts

Executive Director's Report

We have been using this winter season in the Gardens as a time to plan and prepare in the warm-up for the busy summer period and next year's lead up to our 50th anniversary in 2020.

You will notice as you walk through the Gardens many exciting developments underway. Clearing has commenced in an area within the Myrtaceae section in preparation for construction of the Ian Potter National Conservatory. The space around the Banks Building is also being redeveloped to accommodate a new Banksia Garden. Both major projects are planned to be opened during the 50th Anniversary year.

Earlier this year the Gardens hosted a fund raising dinner to attract donations for a new National Seed Bank facility that will enable the Gardens to extend and enhance our collection of unique Australian seeds and expand our capacity as a productive research hub and ex situ vault storing seeds for future generations. We will continue to build the National Seed Bank campaign over the coming months.

Visitation to the Gardens has been strong this year. We have hosted several successful events over the past months, including the Earth Festival focussing on sustainable living, the ACT Tree Climbing Championships featuring the best professional arborists of the region and a great program of exhibitions in the Visitor Centre. Our expanding program of workshops has also been very popular.

It is lovely to experience the changing seasons in the Gardens. The winter days generate a different character to the Gardens with more opportunity for visitors seeking quiet contemplation. I look forward to these days and the coming transition into spring.

Introducing Sebastian Lang

Sebastian Lang has recently joined the ANBG and Parks Australia teams, and is acting as the Assistant Secretary of the Parks Island and Biodiversity Science Branch and the General Manager of the Gardens. He has been in the Australian government's Environment Department since 2000. Over the last four years he established and led the Office of the Threatened Species Commis-

sioner, including a time acting as the Commissioner. Sebastian has previously worked in bushfire management planning, overseeing the 2011 State of the Environment reporting program, leading environmental information policy reform, and designing and delivering natural resource management programs.

Conservation Research Garden gets official attention



Local children plant in the new Conservation and Research Garden with *Gardening Australia's* Costa Georgiadis

Local children joined *Gardening Australia* and *Get Grubby* TV host Costa Georgiadis, in planting several *Pomaderris walshii* plants to officially open a new Conservation and Research Garden, featuring a living collection of threatened plant species in the Gardens.

The new Garden contributes to the conservation of some of Australia's rare and threatened species for placement back into the wild to support threatened wild populations. The Garden illustrates how botanic gardens are not just collections of plants for display (as valuable as that is), but that they also have collections backed by genetic diversity and valuable provenance information that are actively used for conservation and research.

This Garden is a great example of the work being done by botanic gardens across Australia and New Zealand. It has been made possible by multiple partners working together to bring



New signage at Conservation and Research Garden

expertise in horticulture, science and seed production to secure the future of some of Australia's rare and unique plants.

World Bee Day

The Gardens teamed up with Bush Blitz to host a display and information stand on the importance of native bees, and native plants for bees. The display was part of a day of celebration for the first ever World Bee Day at the Embassy of Sweden in Canberra. Participants were able to challenge their conceptions about bees, while learning more about Australia's over 1600 species of native bees and making their own native bee hotels to take home.

First strike for future display garden

Nursery staff celebrated a win when they were able to grow on new plants from a little-known genus, *Homoranthus*, from cuttings taken out in the field by a botanist partner from the Australian Wildlife Conservancy.

Plans are afoot for a *Homoranthus* Garden to highlight this significant endemic genus of many beautiful species that are not yet widely cultivated but have great horticultural potential. This Garden will also raise awareness about the threats faced by many species in the genus – many



Gardens staff member, Megan Donaldson, explains the importance of Australian native bees.

have extremely limited distributions and/or small population sizes. Current estimates suggest that only 200 to 300 plants of *Homoranthus cummingii* exist in two small populations in the wild. The success in growing it on is a step toward securing as many of the *Homoranthus* species for our collection and new garden as possible.

Take a ride on the wild side

Visitors with limited mobility can look forward to an effortless ride through many of the Gardens' iconic areas, including the Rainforest Gully and Red Centre Garden, along the wheelchair friendly Main Path. Thanks to funding support from the Friends, the Gardens have purchased two new Comet 'Alpine' scooters. The scooters include



New *Homoranthus cummingii* plants grown from cuttings taken in the wild.

more adjustability and special features than the old scooters, as well as a more powerful motor, which is important on the Gardens' steep site. Visitors can borrow the scooters free of charge from the Visitor Centre, where they will receive a brief introduction on use from the rangers or one of the friendly volunteers.

Botanic Gardens Day

Botanic Gardens Day is an initiative of Botanic Gardens in Australia and New Zealand to encourage people in both countries to get out and enjoy their botanic gardens and to raise awareness that conservation, research and education are key to all that we do. This year the Gardens hosted a series of workshops where participants made their own bees wax wraps, an eco-friendly alternative to plastic food wrap. There were also *Printing with Plants* workshops with local artists Jennifer and Phil from Wellspring Environmental Arts & Design. The national day highlights the diverse and important conservation work that takes place within botanic gardens.



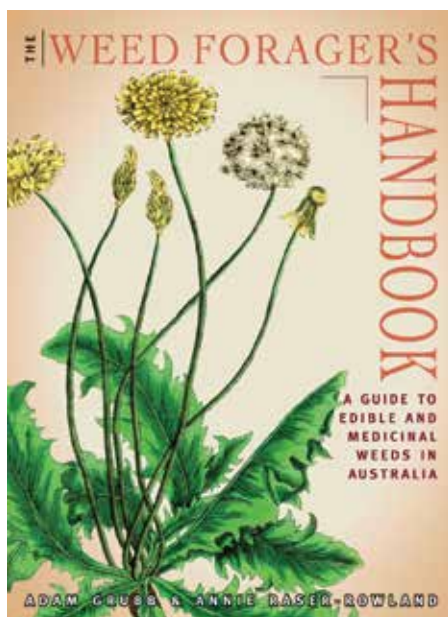
Visitor Centre volunteer, Wendy Antoniak, takes one of the new scooters for a test drive



The Weed Forager's Handbook – A guide to edible and medicinal weeds in Australia

Adam Grubb & Annie Raser-Rowland, 2012 - reprinted 2017, Paperback, 166 pages, Colour drawings and photographs, \$21.95

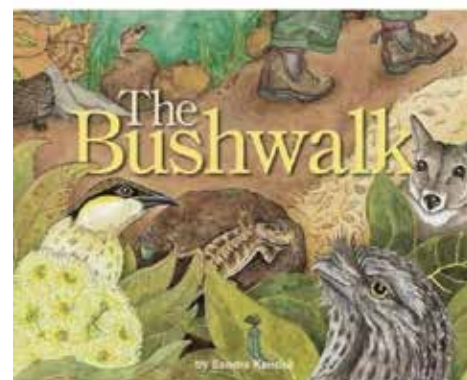
This popular little handbook is an essential text for both novice and experienced weed foragers. Beautifully illustrated with full colour photographs and drawings, this book opens our eyes to the myriad of uses for those 'pesky' weeds in the garden... and just to prove things the authors have included some great recipes using some plants we may never have thought to serve up at the dinner table. Just to tempt your tastebuds why not try 'Nettle Gnocchi', 'Purslane Yoghurt Dip', 'Weedy Frittata' (which recommends inclusion of an array of weeds including dandelion, amaranth, mallow, plantain, sow thistle and wild brassica) and 'Prickly Pear Pizza'. Oh, and there is also a recipe for 'weed tea' but that is a brew designed



to turn weeds into a liquid fertiliser for the garden!

The book has been well set out with an introductory piece looking at weeds in general, followed by notes of caution on poisonous weeds and other safety precautions. Then the top 20 edible and medicinal weeds are listed with detailed notes on their history, distribution, growth, uses and identification. Each plant is illustrated with photographs and drawings to help with their recognition and to clarify the useful parts.

With an enthusiastic foreword by Costa Georgiadis, this book is an eye-opener to the world of weeds and how they can actually benefit us in our daily lives.



The Bushwalk

Sandra Kendell, 2012 - Reprinted 2016, Paperback and Hardback, 28 pages, Colour drawings, \$19.95 and \$26.95 respectively

We are led on a bush-walk through the beautifully illustrated pages of this book! On the way we discover the eucalypts, hear a honeyeater, find a Rocket Frog, a Bearded Dragon, a snake, an echidna, some wallabies, learn about camouflage and disguises and finally we get to meet a Tawny Frogmouth and many other nocturnal animals. The animals featured in Sandra Kendell's 'The Bushwalk' are common across a wide range of habitats in Australia. This book will suit primary aged children and each page also includes a little fact 'box' which provides further information about the animal or plant featured on that page. Children are encouraged to look and listen and if they do, the bush will often reveal some pretty special surprises.



Always welcomes Friends!

with a 10% discount on purchases over \$10, including the purchase of gift vouchers, on production of the customer's membership card for the person whose name is on this card.

No discount on redemption of gift vouchers.

www.botanicalbookshop.com.au

The 2019 Calendar is now for sale at the Botanical Bookshop



For the first time all photos were taken by members of the ANBG Photographic Group. The Bookshop made a donation to the Friends for the use of the images (Cost: \$13)

Friends Briefs

David Mellowship

David was a long time and respected member of the Friends of ANBG. We were very sorry to hear that he passed away on 30 April in Port Macquarie.

David joined the Friends in 1997 and continued as a member until 2011 when he and Dorothy moved to Port Macquarie from Canberra. He was Membership Secretary for some years and only handed over to Barbara Scott in 2007. He was also a member of the Friends Council for several years and was Vice President for a time.

David was involved with important functions of the Friends in a period when a number of initiatives were put in place that have been key to



the later success of the Friends. The Friends greatly appreciate his contributions over many years.

David Coutts

Friends Walks: New plantings in the Rainforest Gully

In June this year Toby Golson lead four walks, each with up to 15 Friends, through the Rainforest Gully (RFG) to thank the Friends for their financial support for two collecting trips; the first to Mt Kaputar (NSW) in 2014 (*Fronde* April 2015) and the second to Mt Lewis in north Queensland in 2017 (*Fronde* April 2018). The purpose of the walks was to look at the places where these plants will be displayed in the RFG. Some plants grown on from the 2014 collection have already been planted out and some from 2017 are almost ready.

An area at the top of the RFG as been chosen because it offers a balance between overhead protection from frosts by the colonised *Allocasuarinas*, and enough sunlight to allow optimal growth. This area is outside the RFG irrigation, so the plants will need to be hand-watered to get them established. Many of these plants are from dry rainforests and Toby

expects them to survive here based on the persistence of many plants from similar areas planted out in the 1970s. The area near the three bottle trees on the southern road also has reasonable sun and is less frost-prone because it is higher and the bitumen road provides a heat sink and allows cold air to drain away. Plants from the Mt Kaputar trip and from the Bush Blitz trip to the Oxley Wild Rivers area have already been planted out here, some

Annual General Meeting 2018

The 30th AGM of the Friends of the ANBG will be held on Thursday 27 September 2018 at 5.30 pm in the Gardens Theatre. Light refreshments will be served from 5 pm in the Dickson Room.

Elections will be held for the position of President, Vice President, Treasurer and three ordinary members of Council. If a current ordinary member of Council nominates for and is elected to a vacant executive position, there will be an additional vacancy for an ordinary member. In addition the agenda will include an award of Life Membership.

The AGM will be followed by an address by Dr Sally Box, Threatened Species Commissioner, Department of the Environment.

(See the back of your Fronds Address Sheet for more details, including information on how to nominate)

protected from our macropods by wire cages. Among the many plants we saw were *Pimelea venosa* (only six plants are known to survive in the wild), *Beyaria viscosa* a blue leafed plant from near Gunnedah and a *Prostanthera* species from Mt Kaputar.

We all enjoyed the walk very much, thank you Toby for sharing your time.

Anne Rawson



Toby Golson with Friends, all of us well rugged up on the morning of the Winter Solstice!

PAM ROONEY

Correction: In *Fronde* 88 April 2018, An ANBG role in high altitude tropical plant conservation, p 13, the caption mentioned *Alyxia ruscifolia*. This should have been *Alyxia orophila*.

Details of events are correct at the time of printing. For changes and updates please check the Friends' website at www.friendsanbg.org.au or the Gardens' site at: www.anbg.gov.au

The Friends of the ANBG thank the many speakers who volunteer their time and talents to further the knowledge of all who attend the events in the Gardens. The Friends use the 'gold' coin donations received at each activity to support Gardens' programs and development. The Friends thank all those who have donated. Please note: unless otherwise indicated, talks are in the ANBG Theatre.

Spring Walks with Guides

Friends of the ANBG are delighted to present a number of themed walks this spring. Last year the Volunteer Guides prepared specialised walks for the Australasian Botanic Volunteer Guides Conference which was held at the ANBG. **You are invited to join a Guide on one of these recreated walks.** Please note there is a limited number of places available for each walk. **The walks are free of cost and open to the public.**

Bookings essential: www.friendsanbg.org.au on ANBG Friends Home Page under 'Coming Up'.

Enquiries: memberswalks@friendsanbg.org.au.

Meet: Visitor Centre, ANBG. Wear appropriate footwear.

Getting to Know Eucalypts

Sunday 12 August, 1 pm to 2 pm

Explore Australia's iconic tree species on this one-hour walk with Volunteer Guide John Turnbull. Stroll through the ANBG admiring the eucalypts; learn to identify the three eucalypt genera in the Myrtaceae family; discover the stories behind their naming as well as more about their leaves, flowers, fruits and growth habits.

Time Travel

Monday 13 August, 11.30 am to 12.30 pm or Wednesday 15 August, 11.30 am to 12.30 pm or Saturday 18 August, 11.30 am to 12.30 pm

Discover the major events in the evolution of plants from their humble beginnings to the amazing diversity of flora we can see today. These walks coincide with Science Week. Children aged 10 and over are welcome on these walks.

Step back 3,000 million years to look at the origin of all plants. Meandering through the Gardens, the major events in the evolution of plants will be explored with living plants illustrating each step. Using a timescale of one year we will travel forward to today, watching the development of plants from humble beginnings to the amazing diversity of Australian flora. Join us in an incredible journey through time.

Bushland Nature Trail

Thursday 20 September, 10 am to 11.30 am or Thursday 18 October, 10 am to 11.30 am

Discover the variety of plants on the Bushland Nature Trail. The trail in the Bushland Precinct of the Gardens is part of the local Black Mountain environment. Discover the plants flowering at this time of year and enjoy spectacular views over Lake Burley Griffin. Our walk will end at the Lookout and return along the trail to the Visitor Centre.

Gradient: Class C – easy to moderate difficulty on a formed track with some uneven ground, a few steps and some short steep sections.

Bring: Water, snacks and wear walking gear.

Distance: 3.2km return from the Visitor Centre.

Australian Plants in Art: From Postcards to Politics

Wednesday 10 October, 10 am to 11.30 am or Wednesday 17 October, 10 am to 11.30 am

How have artists responded to Australian native plants over the last 200 years? Come for a stroll with our Volunteer Guides to discover and discuss what have been the inspirations behind the artwork and the messages conveyed.

Guided Walks

Daily at 11 am and 2 pm

Meet a volunteer guide at the Visitor Centre for a free one-hour tour of the Gardens.

Flora Explorer tours

Weekends & public holidays, 10.30 am & 1.30 pm. Purchase tickets from the bookshop. Tours cost \$8 for adults and \$5 for children and concessions. Children under 3 travel free.

Forty-five minutes of discovery around the Gardens.

Storytime in the Gardens

**First Friday of every month.
10 am – 11 am.**

Cost: \$5.00 per child

Annual General Meeting, Friends of ANBG,

Thursday 27 September 2018 at 5.30 pm in the Gardens Theatre.
See details page 19

Weeding Black Mountain

**Saturday 4 August 9 am to 12 noon,
Saturday 1 September 9 am to 12 noon,
Saturday 6 October 9 am to 12 noon,
Saturday 2 November 8.30 to 11.30 am,
Saturday 1 December 8.30 to 11.30am.**

Removing Woody Weeds from Black Mountain and within ANBG. Check Friends of Black Mountain website for meeting place. Please email your name and phone number to friendsofblackmountain@gmail.com or phone Linda (0437 298 711) or Libby (02 6296 1936) so there is enough delicious morning tea.

Wattle and Eucalypt Dyeing Workshops

Wednesday 22 August, Sunday 9 September and Sunday 16 September 9 am – 1 pm. Banks Building, Cost: \$70

Celebrate Wattle Day and learn how to make flower, leaf and bark dyes to make imprints on fabric. Each participant will dye a scarf to take home as well as samples of wool, silk and linen dyed in local acacias and eucalypts. Limited to 15 participants, suitable for 15 years and over. Bookings essential on Gardens website and close 2 days prior to event.

Black Mountain Symposium 2018

Friday / Saturday 24 - 25 August.

Black Mountain was declared a nature reserve on 23 July 1970. In the lead-up to the 50th anniversary of this declaration, on the 24 August the Friends of Black Mountain in association with the Molonglo Catchment Group is holding a Symposium with presentations summarising what we know about the area. Themed walks on the morning of 25 August. Details and registration: Friends of Black Mountain website.

Treasures in Timber Exhibition

Thursday 4 October – Sunday 7 October

Crosbie Morrison Free Entry

Explore the exquisite work of the ACT Woodcraft Guild in the annual guild members' competition. Enjoy demonstrations of different wood working techniques and discover significant timber trees in the Gardens.

Orchid walks on Black Mountain

Sunday 7 October 10 am & 1.30 pm

Meet at the car park on Caswell Drive (head south towards Glenloch interchange). ANBG Friends only.

Join Tony Wood & Jean Egan to discover some spring flowering native terrestrial orchids and learn something of this fascinating group of plants. There is some off-track walking so wear sturdy shoes. Bring your hand lens.

Numbers are limited to 15 for each walk so early booking is essential. For more information and to book ring Tony on 6254 1795. The afternoon walk is a repeat of the morning walk. Tony has conducted these popular walks every year since 2011.



CHRIS ROGERS

Tawny Frogmouths, ANBG

Wake Up With the Birds

7.45 am on weekends from 22 September to 14 October. Meet at the Visitor Centre. Bookings essential

The ANBG provides a fantastic habitat for many of Canberra's birds, with water and nectar in abundance. During Floriade join us for a 90 minute guided walk to see many of the Gardens' amazing birds. Following the bird walk you are welcome to stay on for coffee, tea or breakfast at Pollen – the Gardens' café, (bookings at: www.pollencafe.com.au).

Spring is a great time to observe the feeding and nesting behaviour of our birds and their young. We will show you how to identify our most common black birds, for example, magpies, currawongs, ravens, choughs and magpie larks; introduce you to some cockatoos, parrots and honeyeaters; show you how to distinguish all those small brown birds and the habitat where birds are most commonly encountered in the Gardens. We are hoping for a return visit by the Scarlet Honeyeaters, rare visitors in Canberra.

Please wear comfortable footwear and warm clothes. Some binoculars will be provided but bring your own if you have them.

Cost: \$12 for Friends of the ANBG, and \$15 for others. (Not suitable for children under 8 years old.)

Bookings essential: see Friends website www.friendsanbg.org.au and use the link to the booking site. Enquiries: email birds@friendsanbg.org.au or telephone 0421 131 898



Rose Robin, ANBG

STEVE ROGERS



Caladenia fuscata, Black Mountain

TONY WOODS

What's on (contd.)

47th Black Mountain spring wildflower ramble

Saturday 13 October 9.30 am - 12 noon
Belconnen Way entry just before Caswell Drive turnoff - watch for balloons.

BYO morning tea, water, hat, sunblock and stout shoes.

BOOKING ESSENTIAL to ensure we have enough guides. Contact friendsofblackmountain@gmail.com or Libby Viccars 6296 1936

Australian Native Plant Society Native Plant Sale

Saturday 20 October. 8.30 am-1.30 pm or until sold out

Find a great range of many local species, ideal for new or established gardens, suitable for Canberra's climate and soil.

Plant list at www.nativeplants-canberra.asn.au/

Special Walks for Friends of ANBG: Pollinators At Work In The Gardens

Tuesday 30 October, 10 am to 12 noon or Tuesday 20 November, 10 am to 12 noon

Join our local expert, Dr Roger Farrow, a retired entomologist from CSIRO, on a walk through the Gardens observing a variety of pollinators at work.

Discover the myriad of ways flowers attract pollinators and guide them to their pollen. Visual aids will be used to help identify pollinators.

Bookings essential: Friends website Cost: free

Dr Farrow will be leading separate walks for Volunteer Guides & Plant Science Group. Details at their meetings.

Jindii Eco Spa's Sunday Sessions

All are welcome to attend Jindii's community wellness and education initiative. Information under 'Events' at www.jindii.com.au

Date: Sunday 21 Oct, all day

Beauty & The FEAST: A retreat day for women.

Date: Sun 18 Nov, 10 am-11.30 am

Speaker: Kurt Barnett 'The Honeysmith *The Secret Life of Bees*, in celebration of Pollinator Week.

EXHIBITIONS

Visitor Centre Gallery, Open Daily 9.30 am - 4.30 pm, FREE

RESONANCE — 1 AUGUST – 8 SEPTEMBER

An exhibition of watercolour paintings and drawings by the *Painting with Parkinson's* group, an Art Therapy Program working with those who have Parkinson's disease and their carers.

BUSH PORTRAITS — 11 SEPTEMBER – 24 SEPTEMBER

A show of original drawings and watercolours from the ANBG's *Who Did That?* children's trail as well as other portraits of animals from the Australian bush.

DIRKSWIRKS III — ANBG IN ART 27 SEPTEMBER – 27 OCTOBER

A sculptural feast of three dimensional decorative wood mosaics by Dirk Lejeune. Inspired by his fascination of the Australian bush his artworks consist timber, bark and crosscuts of branches.

FRIENDS SCHOOLS PHOTOGRAPHIC COMPETITION 30 OCTOBER – 18 NOVEMBER

An annual exhibition of photos taken in the Gardens by local high school and college students.

PERSPECTIVES, FRIENDS PHOTOGRAPHIC GROUP 22 NOVEMBER – 9 DECEMBER

An exhibition of photographs of flora and fauna, mainly taken within the Gardens. Unframed prints, cards and other photographic products will be on sale.

Living Mindfully Series

Tickets under 'Events' at www.jindii.com.au

Date: Sun 16 Sept, 10 - 11.00 am

Topic: Mindful Stress Management

Date: Sun 14 Oct, 10 - 11.30 am

Topic: Mindfully Restoring & Re-energising Your Body & Soul

Date: Sun 11 Nov, 10 - 11.30 am

Topic: Harnessing Resilience

Bees Wax Wraps Workshops

Sunday 18 November 2018. 10am - 12.30 pm & 2 pm - 4.30 pm

Banks Building, Cost: \$30

Make your own Bees Wax Wraps for Pollinator Week. Use less plastic at home and get creative at the same time. Join Annette in this fun and relaxed workshop in a creative setting. Limited to 16 participants, suitable for 18 years and over. Bookings essential on Gardens website and close two days prior to event.

Carl & Eric's Mobile Disco

Saturday 24 November

1.00 pm - 9.00 pm

An event on the Eucalypt Lawn by two veterans of house, soul and funk music. Carl & Eric will perform classics in a picnic environment.

Growing Friends — Plant Sale

Saturday 10 November, 8.30 - 11.00 am or earlier if sold out.

Carpark near Crosbie Morrison building. Details will be available the week before the sale on the Friends' website

Thursday Talks: August – November 2018

Lunchtime talks are held at 12.30 pm every Thursday from February to November in the Gardens' Theatrette. Talks last for 1 hour. Admission is by gold coin donation. There is no need to book but please note, that for safety reasons the ANBG Theatrette seating is strictly limited to 90 people. So, do come early for a seat at a Thursday Talk.

Some summaries or PowerPoint presentations of Thursday talks are available to Friends from the ANBG library. A donation to the Friends for the use of this material will be gratefully accepted.

Please direct queries about Thursday Talks to Doug Laing, email lilley@iimetro.com.au

August

Thursday 9 August 12.30 pm

Dr Don Fletcher 'Goannas in the ACT'

Since retiring from various roles as a land manager with the ACT Government, Don has investigated the ACT's two goanna species. This talk will reveal what a research team funded and run by local volunteers, with in-kind support from the ACT Government, has learnt about the goannas of Namadgi National Park.

Thursday 16 August 12.30 pm

Emeritus Professor Patrick de Deckker 'Implications for your health, that of the environment and climate change'

Patrick from the ANU will talk about ubiquitous airborne dust. Where does it come from and where does it go, and have dust concentrations changed through time? He will try to answer these questions by taking you on a fascinating dust collecting trip to many parts of Australia.



Katrina Muir watercolour. From *Resonance*, an exhibition of watercolours and drawings by *Painting with Parkinson's* group.

1 August - 8 September.

Thursday 23 August 12.30 pm

Doug Laing 'The Apothecary's garden – a gem in London's heart'

Doug, chair of the Thursday Talks Committee, will trace the history of the Chelsea Physic Garden in London – a tiny garden that has left an indelible mark on modern pharmacology and medicine.

Thursday 30 August 12.30 pm

Julie Ryder 'Nature as muse: the interaction between art and botany'

Julie, Canberra textile designer and artist, will talk on the influences botany has had on her work. She uses natural dyeing, mordant printing, screen-printing and embroidery as language on cloth to tell narratives about place and people.

September

Thursday 6 September 12.30 pm

Dr Richard Groves 'The Genus Acacia at home and abroad'

On this week's anniversary of the 108th Wattle Day, Richard, formerly from CSIRO Plant Industry, will briefly summarise the biological significance of the genus Acacia in Australia – it is the most species-rich of any Australian genus.

Thursday 13 September 12.30 pm

Dr Erin Walsh 'History, human brain and scientific illustration'

Erin's talk will bring together history, the human brain, and the place of scientific illustration in academia and the world at large. Drawing (pun intended) from her scientific and artistic practice, the talk will conclude with some step-by-step examples of how her illustrations are created.

Thursday 20 September 12.30 pm

Dr Matthew Colloff 'Landscapes of our hearts'

Matt, from the CSIRO, will talk about the evolving relationship between people and landscapes: how non-Indigenous Australians are re-framing their perspectives on the nature of the Australian environment and how they contrast and overlap those of Indigenous Australians.

Thursday 27 September 12.30 pm

Dr Liz Truswell 'What does deep sea drilling tell us about the former land vegetation of Antarctica and its extinction?'

Liz, a Visiting Fellow at the ANU, will illustrate that drill holes in the marine realm of Antarctica provide the best evidence of the nature, decline and eventual extinction of the vegetation.

October

Thursday 4 October 12.30 pm

David Stuart 'Australian botany: the Vienna connection'

David, a former Australian ambassador to Austria, will focus on some of the historical reasons for the extensive collections of Australian botanical material held in major museums and institutions in Vienna, including many of Ferdinand Bauer's original sketches and drawings.

Thursday 11 October 12.30 pm

Genevieve Jacobs 'Great Scottish Gardens'

Genevieve will talk about design and display in Scottish gardens she has seen.

Thursday 18 October 12.30 pm

**Honorary Professor George Wilson
'Can vulnerable animals find new
homes on private land?'**

George, from the ANU, will reflect on the many and complex issues that need to be considered in addressing the protection of vulnerable animals.

Thursday 25 October 12.30 pm

**Associate Professor Jamie Pittock
'Can the world feed 10 billion people
sustainably?'**

Jamie, from the Fenner School at the ANU, will explore if it will be possible to eradicate hunger and sustain a healthy environment as the population approaches 10 billion people.



Thursday 11 October, Genevieve Jacobs speaking about 'Great Scottish Gardens'

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Australian National
Botanic Gardens

November

Thursday 1 November 12.30 pm

**Dr Laura Dawes 'Hedgerows for
victory! Wild plant gathering to keep
the wartime medicine cabinet stocked'**

Laura, a medical historian, and author of 'Hedgerows for Victory' will tell the story of the scientific inventiveness by many volunteers who rambled Britain gathering plants and seaweed to provide raw material to British drug companies during World War II.

Thursday 8 November 12.30 pm

**Nicki Taws 'Birds in revegetated
habitat'**

Nicki is from Greening Australia. It is often said 'plant it and they will come'. Greening Australia has been revegetating the ACT region for 35 years. This talk will explore what we know about birds' response to re-establishment of native vegetation.

Thursday 15 November 12.30 pm

**Emeritus Professor Jim Hone 'In the
footsteps of Alfred Russel Wallace'**

Jim will review aspects of the British naturalist's life and work in Indonesia, based on his travels from Sumatra in the west to New Guinea in the east. He wrote a joint paper with Charles Darwin on what is now called the theory of evolution.

Thursday 22 November 12.30 pm

**Dr Francisco Encinas-Viso 'Plant-
pollinator networks in Kosciuszko
National Park'**

Francisco, from CSIRO, will speak on his current research which is using historic natural history specimens and field data to unravel the past structure of pollen transport networks in Kosciuszko National Park.

Thursday 29 November 12.30 pm

**Dr Pep Canadell 'Climate change: tales of
the future today'**

Australia has seen unprecedented impacts of climate change over recent years associated with climate extreme events superimposed on an always increasing warming trend. Pep, from CSIRO, will discuss some of the impacts, what makes them unprecedented, their future evolution and current and emerging opportunities for mitigating climate change.

FRIENDS BENEFITS

As a Friend you are entitled to:

Three issues of *FronDS* a year
Three hour free parking pass

Discount at:

Botanical Bookshop (most items)
Pollen
Jindii Eco Spa
Cool Country Natives in Pialligo
Australian Choice, Canb. Centre

You also receive:

Advance details of lectures
Advance bookings for some events
Discounts on some events
ANBG library membership –
borrow books, serials, videos,
DVDs plus use of computers and
interactive CD ROMs
Function facilities – special rates
for functions at ANBG

And opportunities to:

Join Botanical Art Groups
Growing Friends
Photographic Group
Plant Science Group
Assist with Gardens' research
projects
Become a Guide
Relax in the Friends Lounge
in the Ellis Rowan Building,
open to members 9.30 am to
4.30 pm. Relax with tea/coffee
and lots of interesting reading.



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