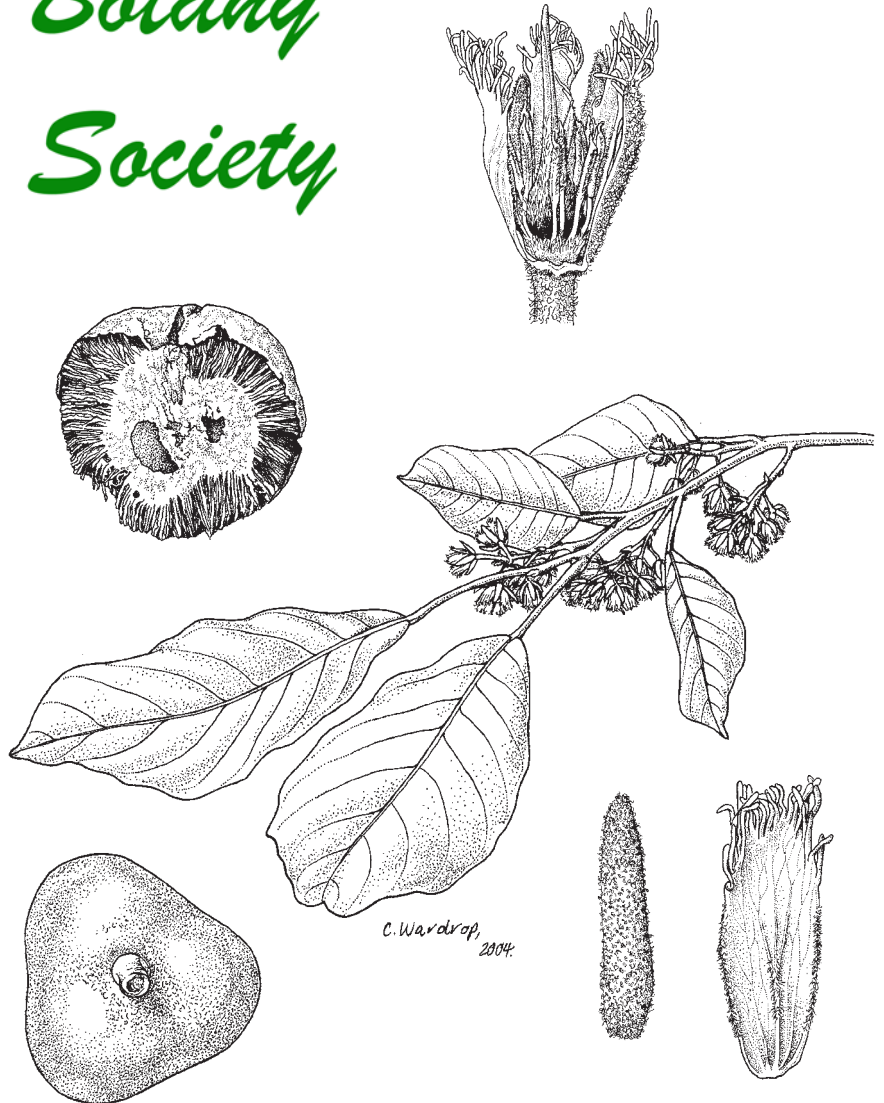


ASBS

*Australasian
Systematic
Botany
Society*



Newsletter

No. 177 December 2018

Price: \$5.00

ISSN 2204-910X

AUSTRALASIAN SYSTEMATIC BOTANY SOCIETY INCORPORATED

Council

President

Darren Crayn
Australian Tropical Herbarium (CNS)
James Cook University, Cairns Campus
PO Box 6811, Cairns Qld 4870
Australia
Tel: (+617)/(07) 4232 1859
Email: president.asbs@gmail.com

Secretary

Jennifer Tate
Institute of Fundamental Sciences
Massey University
Private Bag 11222, Palmerston North 4442
New Zealand
Tel: (+646)/(6) 356- 099 ext. 84718
Email: secretary.asbs@gmail.com

Councillor

Ryonen Butcher
Western Australian Herbarium
Locked Bag 104
Bentley Delivery Centre WA 6983
Australia
Tel: (+618)/(08) 9219 9136
Email: councillor2.asbs@gmail.com

Hansjörg Eichler Research Committee

David Glenny
Sarah Mathews
Heidi Meudt
Joanne Birch
Katharina Nargar
Murray Henwood
Chair: Dan Murphy, Vice President, *ex officio*

Grant application closing dates

Hansjörg Eichler Research Fund:
on March 14th and September 14th each year.
Marlies Eichler Postdoctoral Fellowship:
on July 31st each year.

Public Officer

Anna Monro
Australian National Botanic Gardens
GPO Box 1777
Canberra, ACT 2601
Tel: (+612) (02) 6250 9530
Email: anna.monro@environment.gov.au

ASBS Website: www.asbs.org.au

Webmasters

Anna Monro
Australian National Botanic Gardens
Canberra, ACT 2601 Australia
Tel: (+612) (02) 6250 9530
Email: anna.monro@environment.gov.au

Murray Fagg

Australian National Botanic Gardens
Tel: (+612) (02) 6250 9561
Email: murray@anbg.gov.au

Vice President

Daniel Murphy
Royal Botanic Gardens Victoria
Birdwood Avenue
Melbourne, Vic. 3004
Australia
Tel: (+613)/(03) 9252 2377
Email: vicepres.asbs@gmail.com

Treasurer

Matt Renner
Royal Botanic Garden Sydney
Mrs Macquaries Road
Sydney NSW 2000
Australia
Tel: (+61)/(0) 415 343 508
Email: treasurer.asbs@gmail.com

Councillor

Heidi Meudt
Museum of New Zealand Te Papa Tongarewa
PO Box 467, Cable St
Wellington 6140, New Zealand
Tel: (+644)/(4) 381 7127
Email: councillor1.asbs@gmail.com

Other constitutional bodies

Affiliate Society

Papua New Guinea Botanical Society

Advisory Standing Committees

Financial

Patrick Brownsey
David Cantrill
Bob Hill

Ad hoc adviser to Committee: Bruce Evans
Chair: Matt Renner, Treasurer, *ex officio*

Grants Policy

Gillian Brown
Alexander Schmidt-Lebuhn
Jen Tate (Council)
Peter Weston
Peter Wilson

Chair: Daniel Murphy, Vice President, *ex officio*

Web presence

ASBS Facebook Group

Viewable currently to any member of Facebook;
permission to post by application to administrators.

Administrators

Todd McLay, email: tmclay@unimelb.edu.au
Mike Bayly, email: mbayly@unimelb.edu.au

Cover image: *Elaeocarpus sedentarius* Maynard & Crayn.

Leafy twig with clockwise from top: open flower, petal,
sepal, proximal end of fruit, longitudinally sectioned fruit.
Artist: Catherine Wardrop (NSW).

With permission of CSIRO Publishing.

Publication dates of previous issue

Australas. Syst. Bot. Soc. Newslett. 176 (September 2018)
ASBS Web site: 22 Oct 2018. Printed version: 2 Nov 2018.

From the President

Adjournment of AGM

Due to a delay in obtaining an audit of the society's accounts it was decided to hold the AGM as planned at the Brisbane ASBS conference, complete all business except the tabling of the auditor's report, then adjourn the meeting to a later date to deal with the audited financial report. A result of this is that the change-over to the new ASBS council will be also be delayed, as the society's constitution states council

members "hold office until the conclusion of the annual general meeting following the date of the member's election".

It was decided to reconvene the AGM in Sydney as soon as possible after the audit is complete.

Members will be notified once a date is fixed to enable them to attend.

Darren Crayn
Outgoing President

Taxonomy Australia report

In the last *ASBS Newsletter* I gave an overview of Taxonomy Australia and its role and governance. Recapping, Taxonomy Australia's primary role is to advocate, implement and coordinate actions under the taxonomy and systematics decadal plan, with an overall aim in the medium and long term to reinvigorate investment in taxonomy and biosystematics in Australia. It has been established initially as a program within the Australian Academy of Science, and is governed by an Advisory Committee and representative Steering Committee, and advised by a broad-based Reference Group.

So, Taxonomy Australia is now established. It now needs to fulfil its vision and promise.

An important early goal of Taxonomy Australia is to raise awareness of, and improve the profile of, taxonomy and systematics in the community and with government. To do this, early in 2019 we will embark on a media campaign and launch a Taxonomy Australia website and social media channel. This report will focus on these.

The Taxonomy Australia website

The core of the new Taxonomy Australia website is still under construction and not ready yet for general release. I'll be happy to share the url with anyone who would like to check it out. I'm also keen for volunteers to help create and curate content. More on this later.

The overall aim of the Taxonomy Australia website is to provide a channel for the taxonomy and systematics community to tell our stories – stories of discovery, of discoverers, of the marvels of biodiversity (marvels that are often commonplace to us but fascinating for people

outside our sector), and of the importance and impact of our work.

The Taxonomy Australia website is focused on stories for two reasons – because we have good stories to tell, and because there are many people in the general community who would like to hear them. Good stories are one of our important assets, and we need to make the most of them.

Of course, every media channel is in the storytelling business. Stories about taxonomic discovery appear on occasion in the conventional news media, usually when they have a cute hook such as a species named after a celebrity or a bizarre new discovery. However, while a good hook is important to a good story, a good story needs more than a good hook. It also needs solid, well-crafted context, it needs to explain why people should care, and it needs to be based on a sound understanding of the breadth and depth of our science.

For these reasons, Taxonomy Australia plans to provide an opportunity and mechanism for us to tell our own stories, rather than relying solely on the traditional media (important though they are) to tell our stories for us.

A key transformation in the 21st Century has been the democratisation and decentralisation of media. Traditional media no longer have a monopoly on storytelling – any community with enough creativity and energy can now create their own channel. This is what Taxonomy Australia plans to do.

Why do we need to tell our stories? Because what we do – discovering new species and new knowledge about the biodiversity of Australia and

its surrounding oceans – is really cool science. Many of the organisms we work on and with every day are also really cool. Many people don't know this yet.

This is important for the advocacy that is another key role for Taxonomy Australia. Our advocacy will be much more effective if we can position ourselves as a science that has a demonstrated impact and is perceived as cool by the public. Telling our stories is thus part of a broader strategy.

Of course, the website is only one part of a broader media channel, which in the next few months (once the website is up and running) will include other social media feeds on Twitter, Facebook, Instagram etc. I'll report on these in the next *ASBS Newsletter*.

Volunteers needed

I said earlier that Taxonomy Australia needs content contributors and curators. Stories of discovery are best if they are told by the discoverers. So – this is your chance to get involved with Taxonomy Australia.

This is how it will work. The Taxonomy Australia website has a very easy-to-use blogging tool that manages blogs for several separate feeds, under the following headings:

- **Discoveries* – this feed will be used to keep subscribers up-to-date with new species and other publications, in real time. Whenever a paper comes out that describes new Australian species or other significant taxonomic changes, we plan to write a short blog about it
- *Discoverers* – this feed will have profiles of taxonomists and their lives and stories
- **Exploring Now* – this feed will keep subscribers up-to-date on interesting and noteworthy field trips, voyages and expeditions
- *On the Horizon* – this feed will be used to announce and discuss forthcoming taxonomic changes, so subscribers can keep abreast of changes just around the corner
- **In the News* – this feed will link to news items on other sites and in the traditional media, and give context and a deeper coverage of the news item when appropriate
- *Life Matters* – this feed will have stories about the impacts of taxonomy and systematics
- *This Wonderful Life* – this feed will showcase stories about the lives and biology of interesting and extraordinary organisms from

across the breadth of biodiversity

- *Dark Biodiversity* – this feed will be used for blogs about the things we don't know (but suspect).

Three of the feeds in this list are preceded by an *asterisk**. These ones will need constant attention – whenever a new paper is published, a news article comes out, or a good field trip or expedition gets underway, we need to blog about it. This can take as little as a few minutes for simple announcements or can be longer when the story demands it.

The feeds without asterisks will be more occasional, but still need to be regular.

I'm very keen to get volunteers to help manage this content. Volunteers would help by writing announcements and articles for the site. For the asterisked items, it will be very helpful to have volunteers who can keep abreast of the literature and the news, and write short articles whenever an item appears.

In addition, it will be helpful to get a short (or longer) announcement blog whenever you publish a paper – an announcement would be best coming from the authors rather than from a third party.

Taxonomy Australia and you

Taxonomy Australia has been established to support and advocate for all taxonomists in Australia. Initially, as discussed, a key task is to raise the profile of taxonomy and systematics and to reposition our science to enable more effective advocacy. In the longer term, the goal is to effect a substantial increase in funding for our discipline.

Importantly, we're all in this together. I encourage all ASBS members to think of Taxonomy Australia as your organisation, as an extension of your work, and as a mechanism through which we can all promote taxonomy and systematics and the work we do.

Please get involved – the more broadly we can all support and contribute to the vision, mission and goal of Taxonomy Australia, the more effective it will be.

I very much encourage ASBS members to contact me at kevin.thiele@science.org.au, with feedback on the website, with suggestions for Taxonomy Australia's work for 2019, and particularly with offers to volunteer and help curate the content on the Taxonomy Australia website.

Kevin Thiele
Director, Taxonomy Australia

The Nancy Burbidge Medal

Introducing the 2018 Nancy Burbidge Medallist – Ilse Breitwieser

Darren Crayn
President, ASBS

Ilse Breitwieser has made a longstanding and significant contribution to Australasian systematic botany.

For the 13 years up to June 2017, Ilse led Landcare Research's Portfolio 'Characterising Land Biota'. During this tenure she provided exceptional leadership, professional guidance and scientific vision, for both Landcare staff and partner agencies such as Te Papa. It was an exceedingly difficult period of static funding and changing priorities for Government-funded science.

As Science Leader Ilse was responsible for determining research priorities, maintaining partnerships with other agencies, and attracting funding. She used an Advisory Board of end-user groups to ensure that only the highest priority plant systematic research was undertaken. She also tried to retain capabilities across major plant groups, and to maintain the services of the Allan Herbarium.

It is to her immense credit that in a period when funding declined in real terms, she managed to maintain a functional herbarium, botanical expertise in most plant groups, a range of plant informatics services and a research programme that continues to deliver exceptional outputs.

Her main achievements in plant systematics have been the *Flora of New Zealand* volumes, comprising two volumes on Lichens (2007), the first of four volumes on Liverworts and Hornworts (2008), and the *Flora of the Cook Islands* (2016).

The electronic Flora was launched in 2011 and is available both online and as downloadable pdfs. A huge amount of information on poorly documented plant groups has been made available, and Ilse has regularly promoted the Flora series nationally and internationally.

Ilse ensured that revisions of problematic genera, and checklists of the naturalised flora, were produced. She was the lead author for the chapter on Tracheophyta in the New Zealand Inventory of Biodiversity, listing over 4700 species of native

and naturalised vascular plants. She has provided strong support for the maintenance of Landcare's databases including the NZ Plant Names Database, the Māori Plant Use database, and the Systematics Collections Database. She supported development of the NZ Virtual Herbarium and has been a strong advocate for the NZ Organisms Register, all of

which are widely used in New Zealand and overseas.

In addition to the impressive contributions she has made as a Science Leader, Ilse has also managed to publish important systematic research including over 50 co-authored research papers, many of which are well-cited. Her main focus has been on using multiple methods (morphology, microscopy, palynology, anatomy, genotyping, DNA sequencing, etc.) to clarify systematics, understand patterns of evolution, and



Fig. Ilse with Darren Crayn, President of ASBS at the presentation of the Burbidge Medal.

taxonomically revise several genera in Asteraceae, particularly New Zealand Gnaphalieae.

Ilse has been a strong advocate for the benefits of collaboration with New Zealand and across the Tasman. She was a long-term member of the NZ National Herbarium Network and from 1997 this august Society (ASBS). Ilse was instrumental in bridging the gap across the Tasman and getting New Zealand systematists active in the ASBS, and in getting the 'A' in 'ASBS' changed from 'Australian' to 'Australasian'. She has of course contributed to leadership of the Society, through a Councillor position held from 2012 to 2015. She has been a passionate advocate for adequate funding of taxonomic collections, maintenance of systematics capabilities, and research on priority groups of plants, notably whilst participating in the Royal Society's influential Expert Panel on National Taxonomic Collections in New Zealand.

Ilse was among the group that developed and incubated the idea of a white paper advocating

the value of plant taxonomy and systematics in Australasia, which after a long gestation emerged as the recently launched "Decadal Plan".

She has been an active member of the Council of Heads of Australasian Herbaria (CHAH) where her advocacy helped to establish the Australasian Virtual Herbarium, and to secure funding for imaging of collection specimens. Again she was amongst the advocates for the expansion of CHAH to embrace her nation, recognising the mutual benefits at the institutional level of a second trans-Tasman alliance.

Ilse continues to be very supportive of and committed to the people behind the science. She is an unequalled role model for plant systematists not only in New Zealand, but abroad. She has managed to successfully combine research and leadership in her plant systematics career, to the great benefit of New Zealand systematics. I'm sure you will agree she is a most worthy recipient of the Nancy Burbidge Medal.

The Nancy Burbidge Memorial Lecture Reflections on Trans-Tasman systematic botany connections

Ilse Breitwieser

Allan Herbarium, Lincoln, New Zealand

Tēnā koutou, tēnā koutou, tēnā tatou katoa. I acknowledge with respect the *tangata whenua* of this land – the first people to live in this place and the cultures, languages and systems of knowledge that have developed here over millennia.

Nancy Burbidge, 1912–1977, was a dominant figure in Australian botany. Among her many great achievements was also her fostering Trans-Tasman connections. She was secretary of the systematic botany committee of the Australian and New Zealand Association for the Advancement of Science from 1948 to 1952. I would like to reflect on this part of her work – on our Trans-Tasman systematic botany connections. I personally regard these as so important, and therefore, I have focused on these in many ways during my career.

That these connections have been important for me for a long time was also demonstrated in the theme of the 2010 Australian Systematic Botany Society Conference at Lincoln in Canterbury. The society was still "Australian" at the time. Discussions at the Armidale ASBS conference in 2009 and subsequently at the AGM in Lincoln led to a resolution to make the Australian Botanical Society "Australasian". At the AGM in Lincoln

members voted for a ballot and a second General Meeting. That was held on 15th March 2011 at the National Herbarium of New South Wales.

The name change was successful and became valid on that day. The name change was implemented immediately in the title page of the *ASBS Newsletter* from March 2011. This change aimed at encouraging more New Zealanders, New Caledonians, New Guineans and Fijians to join and become active members of ASBS. I was the first New Zealander on the ASBS Council, in the 2011 and 2012 periods, followed by Leon Perrie, Jen Tate, and now also by Heidi Meudt. I hope most of you perceive it now as completely normal and natural that ASBS is Australasian, and that you regard this development as an enrichment. It is probably even more significant for us in New Zealand, simply because the New Zealand systematic botany community is so small, so finding a home in ASBS makes us much more engaged, gives us enthusiasm, motivation, encouragement, and a lot more. I am aware though that more New Zealand botanists still need to sign up.

I hope though that the Australian botanists don't think that the Kiwis are now taking over, with the Burbidge medal going to Phil Garnock-Jones in 2013, then to Pat Brownsey last year and now to me. Phil and Pat have been great mentors for me, so I feel honoured to follow with this award in their footsteps. I am so glad to be part of this society. For me there are no better meetings and conferences than the ASBS ones, and, it is always a joy when the new newsletter arrives – a big thank you, Robyn and Bill Barker.

We obviously do have quite a range and different kinds of Trans-Tasman systematic botany connections:

- genera and species
- plant systematics projects
- biodiversity informatics projects
- biogeography
- collaborations
- training
- plant systematists
- students
- societies, committees, advisory groups, councils
- strategies
- politics
- inspiration

I would like to reflect on all of them, starting with genera and species, followed by Trans-Tasman collaboration, training, and student supervision in our plant systematics projects (including biogeography), then biodiversity informatics projects, policy collaboration through our societies, committees and councils, then politics, and finally inspiration.

Trans-Tasman genera and species

Australia and New Zealand share a considerable number of genera and species (see Table 1). The number for the bryophytes in Table 1 are very preliminary. We do have many shared genera. Some of these shared genera don't have shared species, such as *Craspedia*, but other genera also have shared species, such as *Argyrotegium*. I am using here examples from the everlasting daisies, because I will get to those later.

Considering that we have in New Zealand, based on our latest *Checklist of the New Zealand flora* (Gibb et al. 2018; Schönberger et al. 2018a, 2018b), 2091 indigenous Spermatophyta species, 1/7 of those are shared with Australia; and the Pteridophyta have even more connections because about half of them are shared with Australia, while of the bryophyte species about 1/6 are shared. So, our ferns have the best Tans-Tasman connections!

I would like to acknowledge Todd McLay and Jessie Prebble for allowing me to use the numbers of shared species and genera they have compiled for a project they recently started – a great Trans-Tasman project on Trans-Tasman plants by two Kiwis with one of them currently based in Australia.

Trans-Tasman plant systematics projects

I have selected a few examples of Trans-Tasman systematic botany connections from our current Characterising Land Biota portfolio work that I would like to introduce now.

These examples are about genera and species we have in common, systematics projects we are doing, and great Trans-Tasman collaborations,

Table. 1. Numbers of New Zealand's native plant genera and species with proportion in each phylum shared with Australia. The remaining number of genera and species are largely endemic. Number of shared species and genera compiled by Todd McLay and Jessie Prebble (pers. com.), number of New Zealand species from *Checklist of the New Zealand flora* (2018).

	Spermatophyta	Pteridophyta	Bryophyta	Total
<i>Genera</i>				
No. shared with Australia	279	52	113	444
No. with species shared with Australia	145	44	85	274
<i>Species</i>				
No. of NZ	2091	201	1152	3444
No. shared with Australia	c. 294	c. 90	c. 193	c. 577
No. shared/no. of NZ	c. 1/7	c. 1/2	c. 1/6	c. 1/5

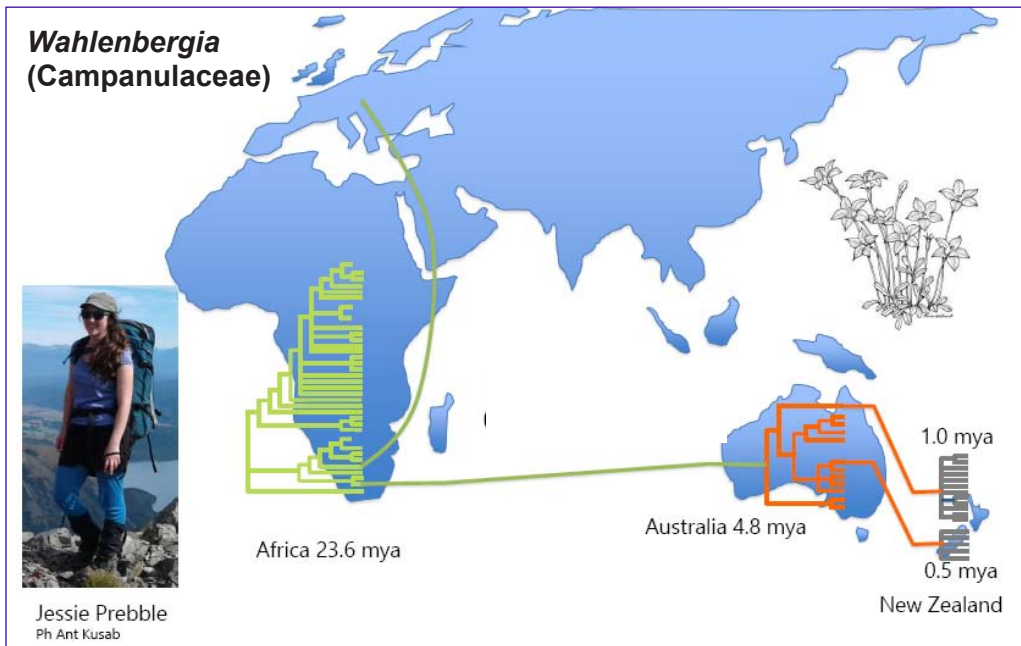


Fig 1. *Wahlenbergia* (Campanulaceae), a Trans-Tasman genus. Phylogenetic and taxonomic information arising from Jessie Prebble's student work, an ongoing project.

including student supervision and training:

Let's stay with Jessie Prebble's work. One of the genera that grow on both sides of the Tasman is *Wahlenbergia* (Fig. 1). The Trans-Tasman systematic botany connection here is not only that we have similar looking *Wahlenbergia* species, but that Jessie has done fieldwork in both countries, and is currently collaborating with Todd McLay in Australia on DNA work. The connection here is that Todd trained Jessie in RADseq work, but he did that when he was still based in Melbourne as a PhD student of Mike Bayly. Mike Bayly is of course a master in Trans-Tasman connections because he and his wife Ali Kellow were based for 10 years (1996–2005) in Wellington working at the Museum of New Zealand Te Papa Tongarewa.

Wahlenbergia, a largely southern hemisphere genus of at least 260 species, has about 30 species in Australia, and about 10 in New Zealand. For Jessie's MSc thesis, supervised by Phil Garnock-Jones and Heidi Meudt in 2010, she travelled to Australia to collect *Wahlenbergia*. She received a lot of help from National Herbarium of New South Wales and National Herbarium of Victoria, and from Mike Bayly. She found that *Wahlenbergia* originated in South Africa, dispersed relatively recently to Australia and from there to New

Zealand. It had two introductions to New Zealand. There is little resolution within these two New Zealand clades. Three papers resulted from this work (Prebble et al. 2011; Prebble et al. 2012a; Prebble et al. 2012b). She returned to *Wahlenbergia* last year and is working with Todd using RADseq to find more resolution within the two clades. The aim is species delimitation within these clades.

The older arrival and radiation is made up of what is known as the "rhizomatous group". There are currently five described species in New Zealand; the most common one being *W. albomarginata* in the South Island, which is known as *W. pygmaea* in the North Island. Both of those species have an excess of described subspecies, and there is a question mark over whether the North Island versus South Island split is real.

The "radicate group" are the more lowland weedy species. Five species are described within the "radicate group", and their relationships with the Australian and Pacific radicate species are unclear. The morphological characters used to differentiate these species are not very convincing. There is a lot of weight on flower colour and the arrangement of flower petals. Therefore, the two areas Jessie is concentrating on in *Wahlenbergia* are the *W. albomarginata* / *W. pygmaea* complex,

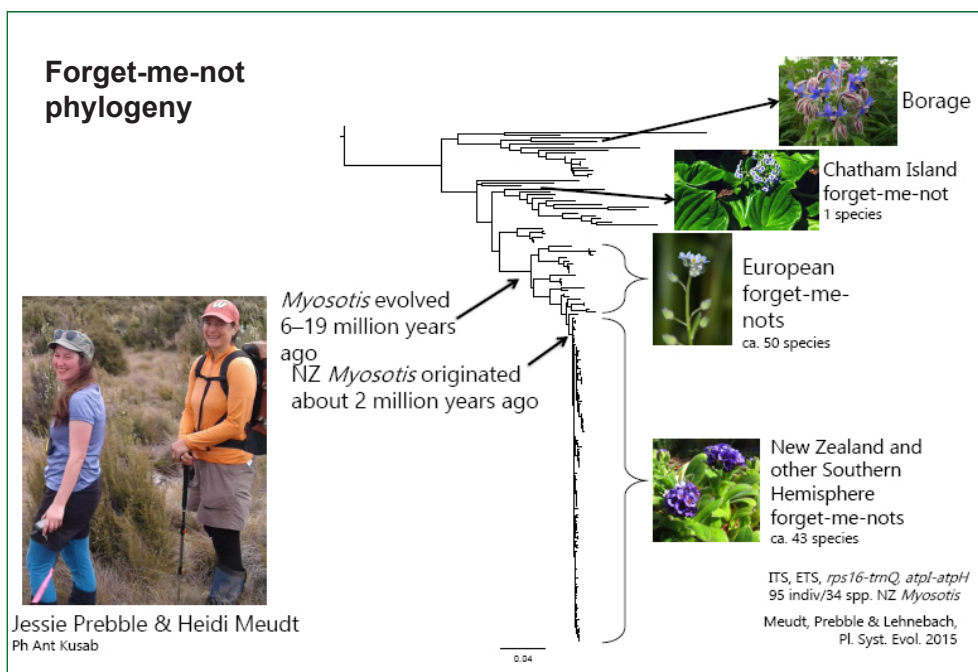


Fig 2. *Myosotis*, a systematics project of high conservation priority in New Zealand, led by Heidi Meudt. Current focus is on the Trans-Tasman *M. australis* group.

as well as all relationships within the radicate clade. In Australia *Wahlenbergia* also had attention. Jeremy Bruhl sent silica samples of their newly described species (Plunkett et al. 2009) to Jessie so that they could be included in their phylogeny.

Another genus we have on both sides of the Tasman is *Myosotis* (Fig. 2). However, it has more than 40 species in New Zealand, and only two in Australia. Heidi Meudt is leading the work revising the New Zealand *Myosotis* (e.g. Meudt & Prebble, 2018), Carlos Lehnebach also has published a couple of new species (Lehnebach 2012), and Jessie Prebble has worked on one of the groups for her PhD (Prebble 2016). Heidi is currently focussing on the *M. australis* group, which includes a species currently circumscribed as being present in both Australia and New Zealand – *M. australis*. Heidi is presenting at this ASBS meeting on this group (Meudt et al. 2018). New Zealand *Myosotis* is of very high priority for systematics research due to high levels of taxonomic uncertainty and high percentage of threatened species.

Trithuria in the Hydatellaceae is a small genus with diminutive aquatic plants. It grows in India, Australia and New Zealand, with most of the 12 species found in Australia and just one, *T.*

inconspicua, in New Zealand. About 10 years ago it was discovered that *Trithuria* is not a monocot but a highly reduced member of the Nymphaeales. This has led to recent interest in the biology of its species. However, this sole New Zealand species presents an interesting taxonomic problem. It occurs in two disjunct areas about 1000 km apart: in the coastal dune lakes in the north of New Zealand's North Island and in the glacial lakes in the south of the South Island. It is classed as threatened, nationally endangered (de Lange et al. 2018). While Kerry Ford and Peter Heenan examined herbarium specimens, they found differences in the stigmatic hairs. The southern populations have greatly shortened stigmatic hairs. Therefore, Rob Smissen, Kerry Ford, Paul Champion from NIWA and Peter Heenan, sought to confirm this difference using fresh material, looked for additional morphological characters, and studied SSR DNA markers, and compared it to that in *Trithuria filamentosa* in Tasmania. Their recent results show that North and South Island *T. inconspicua* populations form two lineages and present some previously overlooked, but reliable morphological differences (Smissen et al., in press). Rob and his team suggest that these allopatric groups be recognised at subspecies rank to reflect their closer relationship to each other

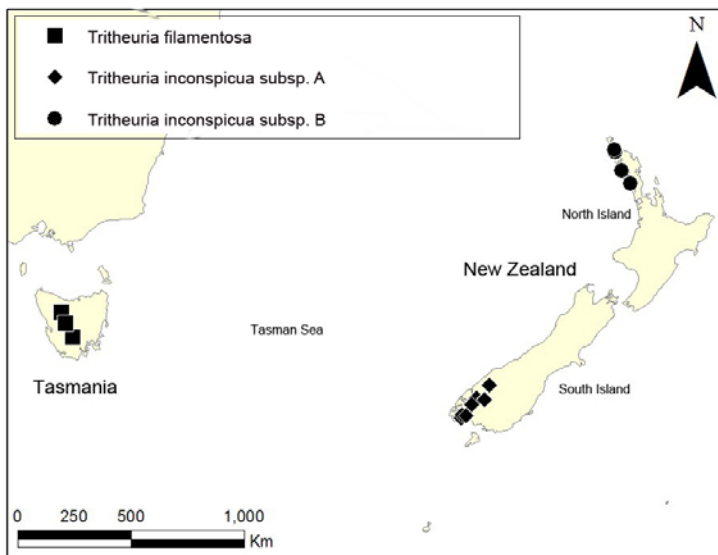


Fig 3. *Tritheuria*, genetic variation in New Zealand and Tasmania studied by Rob Smitsen et al., in press.

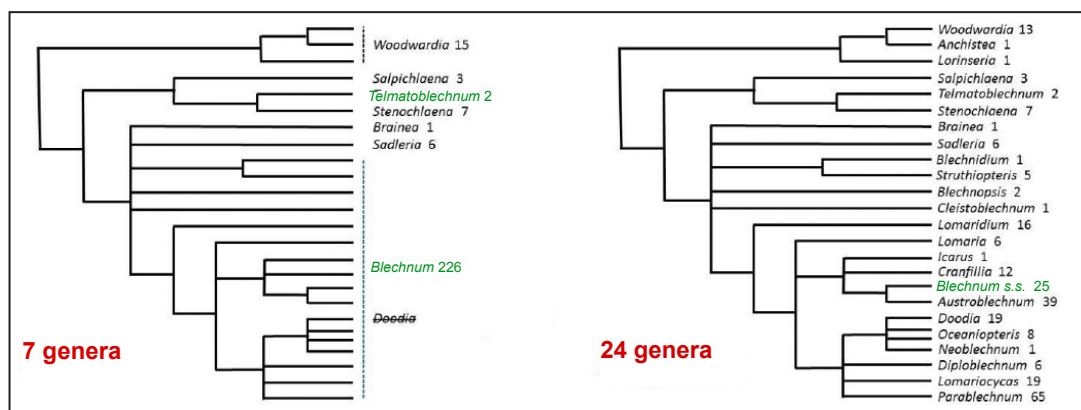
than to *Tritheuria filamentosa* from Tasmania, their allopatry, and their predominantly selfing and / or asexual reproduction (Fig. 3).

The Blechnaceae are a great Trans-Tasman story. After Mike Bayly and Alison Kellow returned to Australia in 2005, following their work on the New Zealand hebes, there was an early opportunity for trans-Tasman collaboration on ferns. Lara Shepherd and collaborators had published in 2007 a preliminary molecular phylogeny of New Zealand Blechnaceae showing, amongst other things, that *Doodia* was nested within *Blechnum* (Fig. 4; Shepherd et al. 2007). But further sampling was needed to test this in Australia and the Pacific. Mike Bayly and Leon Perrie were jointly supervising a postgraduate student, Daniel Ohlsen, and Mike was supervising Ruby Wilson

and Erin Batty in Melbourne, all working on Blechnaceae. Using Bush Blitz funding from ASBS for fieldwork in Australia, and other funding for collecting by Pat Brownsey and Leon Perrie in Fiji and New Caledonia, together with GenBank data from South America, much greater sampling was achieved. The result was a molecular phylogeny and generic taxonomy for the predominantly southern hemisphere family Blechnaceae.

There were eight different options for resolving the generic taxonomy of Blechnaceae. Some were easy to adopt. However, the greatest problem was in the core group of *Blechnum* which included the vast majority of species together with some previously recognised segregate genera such as *Doodia*, *Brainea* and *Sadleria*. Options ranged from including all within one large *Blechnum*, to recognising 13 small genera. In the end a nomenclaturally conservative approach was proposed by Leon Perrie and collaborators in 2014 (Perrie et al. 2014; Fig. 4). They recognised seven genera including a large *Blechnum* and the two segregate genera, *Brainea* and *Sadleria*. *Doodia* was nested within *Blechnum*, and new names were required for those species. This option required only 25 name changes. Just two

Fig. 4 Alternative solutions for taxonomy of Blechnaceae: interpretation with fewer name changes on the left (Perrie et al. 2014), with many name changes on the right (Gasper et al. 2016).



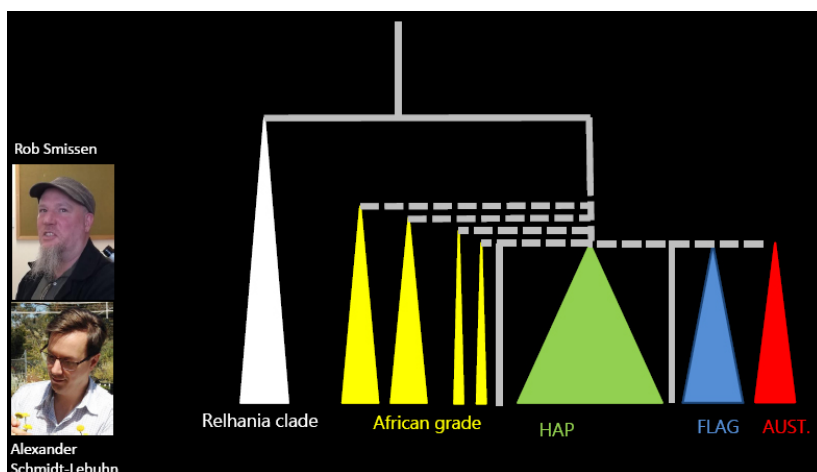
years later a South American group proposed a radically different generic taxonomy (Gasper et al. 2016; also Fig. 4). Using essentially the same data, but with expanded sampling, they recognised 24 genera in Blechnaceae. This choice required 180 name changes and the creation of 7 monotypic genera, and four other genera with five species or less. *Doodia* is one of the genera that are retained in this scheme, which was accepted by PPG – Pteridophyte Phylogeny Group - 1 (2016). Both schemes provide a monophyletic generic treatment consistent with the phylogeny, but there are obvious differences in the amount of splitting required, the number of genera recognised, the morphological criteria required to support them, and the number of disruptive name changes that result. The two schemes have generated debate about the size and number of genera in ferns. Is kiokio, our prominent fern, a *Blechnum* or a *Parablechnum*? Leon Perrie has written a Te Papa blog about this issue, discussing whether we should try to minimise changing the scientific classification while still reflecting evolutionary history (Perrie 2018). I think in this case on both sides of the Tasman we have decided to stick with that (see Perrie and Brownsey 2017)? Or have we?

Another example is the collaboration between Peter Heenan, Ian Telford and Jeremy Bruhl in segregating three new species, one in Australia and two in New Zealand, from *Gingidia montana*: *G. rupicola*, an Australian endemic, and *G. haematitica* and *G. amphistoma* from New Zealand (Heenan et al. 2013).

And, there are of course the daisies! Many of them are quite close to my heart, and I have had research links across the Tasman for exactly 30 years. In 1988 my husband Rainer Vogt and I went to Tasmania to collect everlasting daisies for my PhD work. The everlasting daisy tribe,

the Gnaphalieae, is one of the larger tribes of the Compositae. I started collaborating on the Gnaphalieae with Randy Bayer already before he got a position in Canberra and before I got my position at the Allan Herbarium in New Zealand. While Randy was in Canberra, we collaborated on the Families and Genera of Vascular Plants treatment for the Gnaphalieae, together with Jo Ward and Chris Puttock (Bayer et al. 2007), and then later on the Gnaphalieae chapter in the Compositae book (Ward et al. 2009). However, when the Compositae book (Funk et al. eds. 2009) was published, we didn't have good enough DNA data to re-circumscribe the subtribes in the Gnaphalieae, although we knew that several of the subtribes *sensu* Anderberg were polyphyletic and had numerous issues. We were confident at that stage of the South African Relhaniinae, but apart from that we had to do complicated descriptions of what we were talking about like “rest of Gnaphalieae” or “crown radiation”. Further work with a wider research group let us to discern several large clades in the Gnaphalieae (Fig. 5) that we named after the dominant genera, such as “HAP clade”, which includes *Helichrysum*, *Anaphalis* and *Pseudognaphalium* but relationships among them is subject to conflict, not generally robust, possibly reticulate, many genera not confidently placed, separated by short branches likely to be unstable, and much more closely related to each other than to the Relhaniinae (e.g. Smissen et al. 2011). Rob Smissen, Alexander Schmidt-Lebuhn and myself decided recently that we have to make a pragmatic solution available, so we continued with a trans-Tasman collaboration on the Gnaphalieae. We, together with international

Fig. 5. A conservative summary of the phylogeny of the Gnaphalieae (Compositae).



researchers, are currently developing a new subtribal classification.

We have trans-Tasman research collaboration in the everlasting daisies from subtribe to genera to species. In relation to the genera of the Gnaphalieae in New Zealand, we have five groups in the everlasting daisies: one is *Pseudognaphalium luteoalbum*, a variable species of worldwide distribution, then two small genera of Australasian and Pacific distribution (*Euchiton* and *Argyrotegium*), then the *Raoulia* alliance, a group of New Zealand endemic genera that are difficult to circumscribe but with well defined species, and finally *Craspedia*, a well defined genus, but with species that are difficult to define. Quite a few years ago, we co-supervised a trans-Tasman PhD student, Christina Flann. She worked on the *Euchiton traversii* complex (e.g. Flann et al. 2008), and we also published the new genus *Agyrotegium* together – and *Agyrotegium* is, of course, a trans-Tasman genus (Ward et al. 2003). However, some of the main challenges of her PhD was not botany, but trans-Tasman administration. Getting New Zealand plant material to Australia cost her a lot of nerves and makes trans-Tasman botanical work incredibly difficult. Finally, to *Craspedia*, the genus I am spending now my time with - now that I have stepped back from my leadership roles and Manaaki Whenua gives me time to finish this revision. The interesting feature about *Craspedia* and its close relatives is the unusual inflorescence. They are double composite, so not only an aggregation of florets into a capitulum, as in most daisies, but also aggregation of capitula

as well. There are 26 species of *Craspedia*, 20 in Australia and six in New Zealand. However, New Zealand has probably many more taxa, as there are more than 45 undescribed entities. Most species are found in the temperate area of SE Australia and in New Zealand south of 36 degrees latitude. New Zealand *Craspedia* are found in many small populations. There are only few instances of hybridisation. It is ecologically and morphologically more diverse compared with Australian *Craspedia*. A while ago we investigated phylogenetic relationships in *Craspedia* to test whether NZ *Craspedia* was monophyletic. The results showed a single lineage of NZ *Craspedia* (Fig. 6, coloured green) in both nuclear and chloroplast gene trees and low sequence divergences between Australia and New Zealand (Ford et al. 2007). This is consistent with a recent dispersal event from Australia to NZ across the Tasman Sea. Compared with Australian *Craspedia*, the New Zealand species show extensive morphological divergence but little sequence divergence, suggesting a recent and rapid species radiation. So, the advantage of these results was that I could slowly make progress on New Zealand *Craspedia* without worrying too much about the Australian plants. And, the good thing is that Alexander Schmidt-Lebuhr is now looking at the Australian *craspedias*, and this means we can learn from one another. We have more than 50 tagname entities in New Zealand that need to be tested. Why not just describe them? Already Allan (1960) noted that much of the diversity within the species can be traced to habitat-induced variation, and in those days there

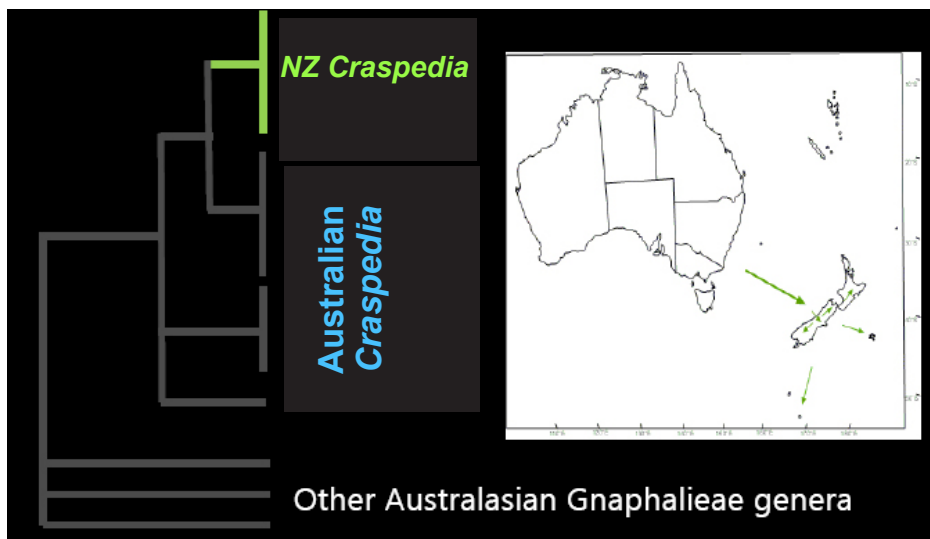


Fig. 6. New Zealand *Craspedia* results from a single dispersal event from Australia, based on Ford et al. 2007

Fig. 7. Variaton in leaf indumentum in New Zealand *Craspedia*.



were only a few specimens in the herbaria. The late Tony Druce, one of New Zealand's excellent field ecologists, collected in the 1970s, 80s and early 90s numerous *craspedias* and gave them tagnames that need to be tested (see Breitwieser et al. 2010, 2015). One of the problems with the tagname entities is that they are mainly based on the hairs on the leaves - because they

make the plants look so different. There are short glandular hairs, long glandular hairs, multicellular hairs, cottony hairs, and other hair types, and they can be different on the abaxial and adaxial sides of the leaves, and there are quantitative and pattern variations and variations of hairs at the leaf margin (Fig. 7). Although our genetics projects have so far shown that they won't solve our taxonomic problems easily (e.g. Breitwieser et al. 2015, Smissen et al., unpub.), we can test whether highly localised tagname entities are distinct from similar or nearby populations and we can test whether widespread entities are genetically cohesive, thereby establishing which are the best morphological characters to discriminate species.

Flora-writing

Now to something different: in Characterising Land Biota portfolio we are also responsible for Flora writing. Pat Brownsey and Leon Perrie are writing the *New Zealand Fern Flora*. But, Pat, with all his fern knowledge, has also contributed to the *Flora of Australia* – and looking at this Flora, the fern people have been the most active in trans-Tasman collaboration! Pat Brownsey contributed two families, Barbara Parris one, and Bob Chinnock many treatments. Bob, who has spent his botanical life in Adelaide, is of course New Zealand born. However, we could not do our *Flora of New Zealand Mosses* (Breitwieser & Wilton eds. 2017) without such generous help from an Australian, Rod Seppelt. Rod is reviewing each of Allan Fife's and Jessica

Beever's Flora treatments and is contributing the most beautiful Pottiaceae illustrations to the Flora. For one illustration (*Calyptopogon mnioides*) he won the Highly Commended award at the Margaret Flockton Art Award exhibition several years back (Seppelt, pers. comm.).

Trans-Tasman biodiversity informatics

However, there are more trans-Tasman connections with Floras than Flora treatments – there is biodiversity informatics, the development of electronic floras. We in New Zealand were inspired in the late 90ies by DELIA, the DELTA Integrator, developed at the WA Herbarium for managing institutional DELTA data. Aaron Wilton developed our eFlora and we launched the system at the ASBS meeting in Lincoln in 2010. Our experience then led Jim Croft to get us together in Canberra to plan a Flora of Australasia. The result of this meeting is now obvious in the eFlora of Australia. Our eFlora of New Zealand has not merged yet with the eFlora of Australia, the different pathways haven't quite got together. However, we are on the eFlora of Australia Advisory Group and were consulted by the ALA in the development. Our two eFloras might or might not merge at some stage, but let's see how it develops, but the joined thinking certainly helped on both sides of the Tasman.

The most significant biodiversity informatics development across the Tasman, however, was the AVH. Australia's Virtual Herbarium (AVH) was created in 2001 and developed between 2001 and 2006 with the databasing of the label data

of specimens from the Australian state herbaria. The success of AVH ultimately led to funding for the Atlas of Living Australia (ALA). In October 2012 AVH was re-launched as part of the ALA infrastructure (Web ref. 1). Since 2012, some university herbaria have also joined AVH.

For us in New Zealand the integration of the AVH with the NZVH was a major achievement. In June 2017, this gave rise to the Australasian Virtual Herbarium. The AVH currently holds almost 6.3 million records from 23 Australian and New Zealand herbaria and comprises over 80 per cent of the vouchered occurrence records of Australian plants, algae and fungi in ALA. At least from the New Zealand perspective the development of the Australian Virtual Herbarium to an Australasian Virtual Herbarium is fantastic, but I have to admit that it cost us a lot of nerves. It took a lot longer than planned for numerous reasons I don't want to get into. The nice thing though was for me that it was launched in the month I stepped back from my leadership roles at Manaaki Whenua - Landcare Research, so it was a nice completion for me. Now I can just search for *Craspedia* and within seconds a map pops up. However, although we do have a combined portal now, NZVH work still has to be finished by the ALA. The New Zealand botanical community is looking forward to when our data get finally routinely updated and we can use the AVH finally efficiently.

Trans-Tasman policy collaborations

So, how did these Australasian things like the AVH and the eFlora come about? The background to this are societies, committees, advisory groups, and councils. Particularly important is CHAH, our Council of Heads of Australasian Herbaria. CHAH started of course also as Council of Heads of Australian Herbaria. I couldn't work out for sure when the first New Zealand observer took part in Council of Heads of Australian Herbaria meetings, but Pat Brownsey's first meeting was in 1982, and we do think that this was the first meeting where New Zealand was represented. New Zealand was represented as an observer for the following 20 years by a representative from either CHR, WELT or AK. Then in 2004 there were intense discussions on the New Zealand membership of CHAH, and in July Jim Ross, Melbourne, sent me an email confirming that members would like to see New Zealand membership. At the same time incorporation and

a new constitution was discussed, particularly driven by AVH business. At the CHAH meeting in Lincoln in 2004 it was agreed that we would have a Council of Heads of Australasian Herbaria, and this was incorporated on 30 May 2006.

Initially the most significant Trans-Tasman collaboration was done in my opinion by HISCOM, the Herbarium Information System Committee, with the development of the Australasian Virtual Herbarium, but also with the eFlora work, and more generally with biodiversity informatics. By the time MAHC, the Managers of Australasian Herbarium Collections Committee, came about, CHAH being Australasian was already no issue anymore. MAHC was formed in 2009. MAHC is in my opinion a very cohesive committee and proved itself by developing a toolkit of resources for best practice herbarium curation. It also supports international initiatives and managed the day to day running of the programmes such as the Global Plants Initiative imaging all vascular type specimens housed in Australasia.

Our invaluable Trans-Tasman collaboration through CHAH has had its not so pleasant moments, for example, when Australian border officials destroyed in 2017 a loan of our New Zealand lichen specimens (Web ref. 2).

Politics

The value of CHAH being Australasian as well as ASBS being Australasian became particularly evident with the development of the *Decadal Plan for Taxonomy and Biosystematics* (Taxonomy Decadal Plan Working Group 2018). This Trans-Tasman movement is relevant for both sides of the Tasman. Five and a half years after the idea was discussed at the ASBS meeting in Perth, this plan was published on 27 April 2018. It promotes systematics across the whole of life in our region. I really regretted that I couldn't be there for the launch in April this year in Australia's Parliament House. However, we can't just reminisce about the launch and what we have achieved, the decade 2018–2027 has begun, and now we need to implement the plan. We need to focus on the key initiatives: Accelerating discovery; Enhancing services for end users; Engaging with indigenous knowledge; Improving our infrastructure; Educating for the future; Supporting our sector.

I will now focus just on the New Zealand side of the Decadal Plan because a dedicated session for the Australian side is covered elsewhere. In New

Zealand, we were asked by the Royal Society in 2015 to examine the state of systematics and taxonomic collections in New Zealand. New Zealand has 29 biological collections with 12 million specimens held in 20 institutions around the country. The report *National Taxonomic Collections in New Zealand* (The Royal Society of New Zealand 2015) provided a detailed account of the state of the sector in New Zealand and made a number of recommendations. One of these was the need for a coherent approach across the sector to provide national coordination and strategic advice. With the support of our Chief Executives we established the National Systematics and Taxonomic Collections Working Group in 2017. The group is responding to major movements in New Zealand such as the Biosecurity 2025 roadmap, and this group is now developing a plan for how to implement the Decadal Plan. The Royal Society held in September a workshop for our government agencies. Kevin Thiele came over for this workshop. The key message was: everything in the Decadal Plan is consistent with their needs! The working group is now developing a communication plan (that should include in my opinion at least a regular update in the ASBS newsletter), a Maori engagement framework, and work plans that are based on the Decadal Plan but also align with New Zealand's Bioheritage Challenge. Also, the first phase of a review of our nationally significant collections by the Ministry of Business, Innovation & Employment is under way (Web ref. 3). However, in my opinion the developments in New Zealand are too slow. We don't even know yet whether this first phase will lead to a full review. Meanwhile our financial situation gets tighter and tighter and future development is hindered. The members of our National Systematics and Taxonomic Collections Working Group are of course in fulltime employment, and we learnt when we wrote the Decadal Plan that real progress can only happen if we have at least one person who can dedicate his / her time fully to the cause. My vision is that we will have Taxonomy Australia and that the New Zealand working group develops into something similar, with both working very closely together. We probably need to have two parallel efforts because of the different political systems, but they need to be connected as closely as possible. This is essential for implementing the Decadal Plan in New Zealand.

Inspiration

I would like to finish my talk with reminding us that this Australasian movement is only possible because of us and the inspiration we get from one another. There are our wonderful Trans-Tasman botanists with Kiwis working or used to work at institutions in Australia and vice versa. Many projects and ideas come about during our ASBS fieldtrips and all this leads to wonderful friendships. Bill and Robyn, happy birthday, it's time that you visit us again at CHR. Lots of greetings from my friends at CHR to everybody here, all of them would have loved to be here today!

References

- Allan HH 1961. *Flora of New Zealand. Vol. 1.* Wellington, Government Printer.
- Bayer R, Breitwieser I, Ward JM and Puttock C 2007. Gnaphalieae. In: Kubitzki K ed. *The families and genera of vascular plants. Flowering plants – Dicotyledons: Compositae.* Springer-Verlag, Berlin.
- Breitwieser I, Ford KA and Smissen RD 2010. A test of reproductive isolation among three sympatric putative species of *Craspedia* (Asteraceae: Gnaphalieae) at Mt Arthur in New Zealand. *New Zealand Journal of Botany* 48: 75–81.
- Breitwieser I, Ford KA and Smissen RD 2015. Characterisation of SSR markers for New Zealand *Craspedia* and their application in Kahurangi National Park. *New Zealand Journal of Botany* 53(1): 60–73.
- Breitwieser I and Wilton AD eds. 2017 *Flora of New Zealand – Mosses.* Lincoln, Manaaki Whenua Press. [37 fascicles]
- De Lange PJ, Rolfe JR, Barkla JW, Courtney SP, Champion PD, Perrie LR, Beadel SM, Ford KA, Breitwieser I, Schönberger I, Hindmarsh-Walls R, Heenan PB and Ladely K 2018 Conservation status of New Zealand indigenous vascular plants, 2017. *New Zealand Threat Classification Series 22*, Department of Conservation, Wellington, 82 p.
- Flann C, Breitwieser I, Ward JM, Walsh NG and Ladiges PY 2008: Morphometric study of *Euchiton traversii* complex (Gnaphalieae: Asteraceae). *Australian Systematic Botany* 21: 178–191
- Ford KA, Ward JM, Smissen RD, Wagstaff SJ and Breitwieser I 2007: Phylogeny and biogeography of *Craspedia* (Asteraceae: Gnaphalieae) based on ITS, ETS and psbA-trnH sequence data. *Taxon*: 783–794
- Gasper AL de, Dittrich VAO, Smith AR and Salino A 2016. A classification for Blechnaceae (Polypodiales: Polypodiopsida): New genera, resurrected names, and combinations. *Phytotaxa* 275: 191–227
- Gibb ES, Wilton AD, Schönberger I, Fife AJ, Glenn DS, Beever JE, Boardman KF, Breitwieser I, Cochrane M, de Pauw B, Ford KA, Heenan PB,

- Korver MA, Novis PM, Prebble JM, Redmond DN, Smissen RD and Tawiri K 2018. *Checklist of the New Zealand flora – Hornworts, Liverworts and Mosses*. Lincoln, Manaaki Whenua-Landcare Research.
- Heenan PB, Telford IRH and Bruhl JJ 2013. Three new species of *Gingidia* (Apiaceae: Apioideae) from Australia and New Zealand segregated from *G. montana*. *Australian Systematic Botany* 26: 196–210.
- Funk V, Susanna A, Stuessy T and Bayer R eds. 2009. *Systematics, evolution, and biogeography of Compositae*. IAPT, Vienna.
- Lehnebach CA 2012. Two new species of forget-me-nots (*Myosotis*, Boraginaceae) from New Zealand. *Phytokeys* 16: 53–64.
- Meudt HM and Prebble JM 2018. Species limits and taxonomic revision of the bracteate-prostrate group of southern hemisphere forget-me-nots (*Myosotis*, Boraginaceae), including description of three new species endemic to New Zealand. *Australian Systematic Botany* 31(1): 48–105. <https://doi.org/10.1071/SB17045>
- Meudt H, Prebble J and Thorsen M 2018. Taxonomic revision of the *Myosotis australis* group (Boraginaceae) in Australia, New Zealand and New Guinea. Abstract, Mind the Gap, Australian Systematic Botany Society 2018, Brisbane.
- Perrie L 2018. Why do scientific names change? Kiokio by any other name.... <https://blog.tepapa.govt.nz/2018/08/31/why-do-scientific-names-change-kiokio-by-any-other-name/>
- Perrie LR and Brownsey PJ 2017. The Pteridophyte Phylogeny Group's recommendations in relation to ferns and lycophytes in the eFloraNZ. *New Zealand Botanical Society Newsletter* 127: 14–17.
- Perrie LR, Wilson RK, Shepherd LD, Ohlsen DJ, Batty EL, Brownsey PJ and Bayly MJ 2014. Molecular phylogenetics and generic taxonomy of Blechnaceae ferns. *Taxon* 63: 745–758.
- Plunkett GT, Bruhl JJ and Telford RH 2009. Two new, sympatric species of *Wahlenbergia* (Campanulaceae) from the New England Tableland escarpment, New South Wales, Australia. *Australian Systematic Botany* 22: 319–331.
- PPG I 2016. A community-derived classification of extant lycophytes and ferns. *Journal of Systematics and Evolution* 54: 563–603.
- Prebble JM 2016. *Species delimitation and the population genetics of rare plants: A case study using the New Zealand native pygmy forget-me-not group (Myosotis; Boraginaceae)*. Unpublished PhD thesis, Massey University, New Zealand.
- Prebble JM, Cupido CN, Meudt HM and Garnock-Jones PJ 2011. First phylogenetic and biogeographical study of the southern bluebells (*Wahlenbergia*, Campanulaceae). *Molecular Phylogenetics and Evolution* 59: 636–648.
- Prebble JM, Meudt HM and Garnock-Jones PJ 2012a. An expanded molecular phylogeny of the southern bluebells (*Wahlenbergia*, Campanulaceae) from Australia and New Zealand. *Australian Systematic Botany* 25:11–30.
- Prebble JM, Meudt HM and Garnock-Jones PJ 2012b. Phylogenetic relationships and species delimitation of New Zealand bluebells (*Wahlenbergia*, Campanulaceae) based on analyses of AFLP data. *New Zealand Journal of Botany* 50: 365–378.
- Royal Society of New Zealand (2015). *National Taxonomic Collections in New Zealand*. December 2015. www.royalsociety.org.nz/national-taxonomic-collections-in-new-zealand/
- Schönberger I, Wilton AD, Boardman KF, Breitwieser I, Cochrane M, de Lange P, de Pauw B, Fife AJ, Ford KA, Gibb ES, Glenny DS, Korver MA, Novis PM, Prebble JM, Redmond DN, Smissen RD and Tawiri K 2018a. *Checklist of the New Zealand flora – Seed Plants*. Lincoln, Manaaki Whenua-Landcare Research.
- Schönberger I, Wilton AD, Brownsey P, Perrie L, Boardman KF, Breitwieser I, Cochrane M, de Pauw B, Fife AJ, Ford KA, Gibb ES, Glenny DS, Korver MA, Novis PM, Prebble JM, Redmond DN, Smissen RD and Tawiri K 2018b. *Checklist of the New Zealand flora – Ferns and Lycophytes*. Lincoln, Manaaki Whenua-Landcare Research.
- Shepherd LD, Perrie LR, Parris BS and Brownsey PJ 2007. A molecular phylogeny of the New Zealand Blechnaceae ferns from analyses of chloroplasts trnL-trnF DNA sequences. *New Zealand Journal of Botany* 45: 67–80.
- Smissen RD, Galbany-Casals M. and Breitwieser I. 2011. Ancient allopolyploidy in the everlasting daisies (Asteraceae: Gnaphalieae) – complex relationships among extant clades. *Taxon* 60: 649–662.
- Smissen R, Ford K, Champion P and Heenan P. In press. Genetic variation in *Trithuria inconspicua* and *T. filamentosa* (Hydatellaceae): a new subspecies and a hypothesis of apomixis arising within a predominantly selfing lineage. *Australian Systematic Botany*.
- Taxonomy Decadal Plan Working Group 2018. *Discovering Biodiversity: A decadal plan for taxonomy and biosystematics in Australia and New Zealand 2018 – 2027*. Australian Academy of Science and Royal Society Te Aparangi, Canberra and Wellington.
- Ward J, Bayer R, Breitwieser I, Smissen R, Galbany-Casals M and Unwin M 2009. Gnaphalieae. In: Funk V, Susanna A, Stuessy T, Bayer R eds. *Systematics, evolution, and biogeography of Compositae*. IAPT, Vienna.
- Web ref. 1. <http://avh.chah.org.au>
- Web ref. 2. <https://www.radionz.co.nz/news/environment/330337/australia-destroys-%27irreplaceable%27-nz-plant-specimens>
- Web ref. 3. <https://www.mbie.govt.nz/science-and-technology/science-and-innovation/funding-information-and-opportunities/investment-funds/strategic-science-investment-fund/funded-infrastructure/review-of-scientific-collections-and-databases/>

Eichler Research Grant reports

Out of place: climatic anomalies in the conifer fossil record

Matilda Brown
University of Tasmania

The botanical fossil record is an invaluable source of information about the past. Comparative study of the nearest living relatives of fossils allows us to estimate various aspects of the palaeoenvironment, including past vegetation, atmospheric and climatic conditions (e.g. Macphail 2007). In particular, the bioclimatic envelopes inhabited by the nearest living relatives of fossils are routinely used to estimate palaeoclimates (Mosbrugger and Utescher 1997). This is based on the assumption that the environmental ranges of the relevant fossil taxa were the same as those of their extant relatives, i.e. they occupy the same bioclimatic envelope. However, this assumption is contradicted by the presence of incongruous combinations of taxa (Jordan 1997); the environmental ranges inhabited by the modern relatives of some co-occurring fossil species do not overlap (see example shown in Figure 1). There are possible artefactual explanations for these anomalies (such as misidentification or transport of the fossils from different habitats), but in many cases there

seems to be a true difference in the bioclimatic envelopes of the fossil and its extant relatives (Jordan 1997). These differences may be due to a change in the physiological climatic tolerances (i.e. evolutionary changes to the fundamental niche), which would suggest that these taxa are more evolutionarily labile than previously assumed. Alternatively, these anomalies could be due to changes in the biotic interactions or availability of certain climatic combinations (i.e. changes in the realised niche without changes in the fundamental niche). If the physiological tolerances of these taxa have not changed, their climatic ranges may be broader than their current distribution suggests, with implications for conservation management. Anomalies in the fossil record have been acknowledged by a number of authors (Hill and Scriven 1997; Jackson and Williams 2004) but contemporary modelling techniques have not yet been applied to these instances.

The southern conifers (Podocarpaceae, Araucariaceae, subfamilies Callitroideae and

Fig. 1. Example of an apparent anomaly in the fossil record. *Microcachrys* (temperate; alpine) and *Acmopyle* (tropical; lowland) appear to be climatically incompatible, but fossils attributable to these genera occur together in Eocene-Oligocene sediments from Tasmania.

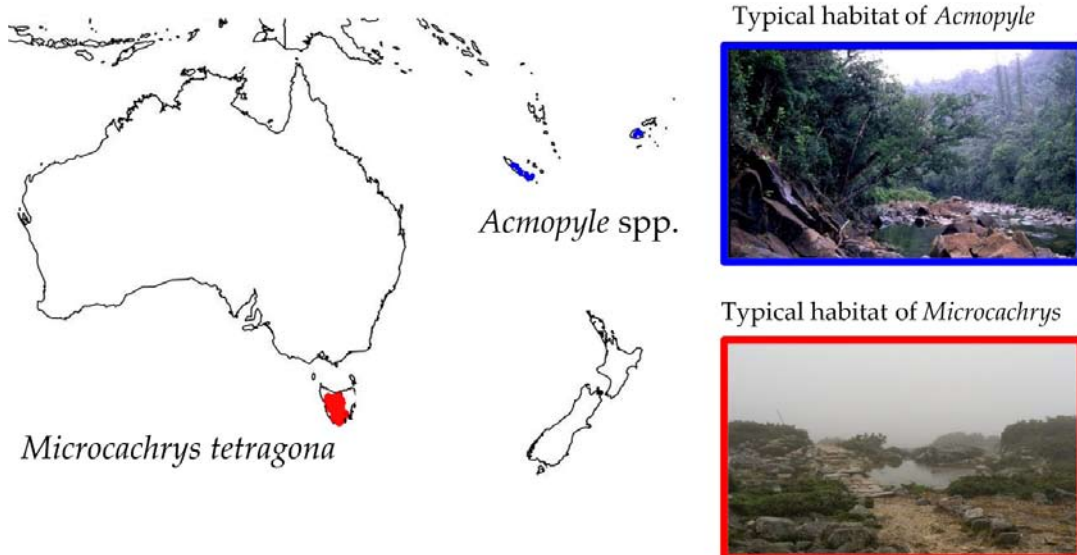


Fig. 2. *Microcachrys tetragona* (Hook.) Hook.f.. *Microcachrys* is now endemic to the highlands of Tasmania, but fossils show that extinct members of the genus occupied a broader range of habitats.

Ph. Greg Jordan



Athrotaxoideae of Cupressaceae, and the genus *Austrotaxus* of Taxaceae) are an ideal group in which to study anomalous fossils. These taxa have a strong fossil record spanning the Cenozoic Era (Hill and Brodribb 1999), are thought to be eco-evolutionarily

stable – some taxa show apparent morphological stasis for tens of millions of years (Bond 1989; Jordan et al. 2011) – and factors affecting their geographic distribution have been studied extensively (Enright and Hill 1995). There is also sufficient climatic and evolutionary variation within the southern conifers to investigate phylogenetic and ecological signals in the patterns of anomalies within this group (Leslie et al. 2012).

To investigate this phenomenon, this project aimed to develop a method for detecting and quantitatively analysing climatic anomalies in the fossil record, with a focus on southern hemisphere conifers. Additionally, this project aimed to describe and include the conifers of the Golden Fleece Rivulet flora, a fossil assemblage from the east coast of Tasmania. Although there has been some work on the Myrtaceae fossils in this assemblage (Tarran et al. 2017), there are no records of the conifer fossils from this site. Fossil assemblages described from several Tasmanian locations show that conifers were previously much more diverse in Tasmania than they are now; several extinct species have been described from genera that are no longer present in Tasmania or, in some cases, Australia (e.g. *Libocedrus*; Paul & Hill 2009). The Golden Fleece fossils also include a number of extinct, undescribed species, the study of which may shed light on the evolutionary history of extant taxa.

Anomaly detection

To identify instances where the bioclimatic

envelope of an extant taxon is different from its fossil relative, we collected occurrence data from the Global Biodiversity Information Facility (GBIF.org 2018) and extracted bioclimatic data for each occurrence from WorldClim V2 (Fick and Hijmans 2017). We then modelled the bioclimatic envelope of each extant taxon using the ‘hypervolume’ suite of algorithms written by Blonder et al. (2017) and identified incidences of non-overlapping climatic ranges.

Preliminary results show that these anomalies can be detected using computational methods, and that certain taxa (e.g. *Microcachrys*, Fig. 2) are more anomalous than others. There also appears to be a strong correlation between palaeoendemism (a measure of geographic range relative to clade age; Jordan et al. 2016) and anomaly frequency in the fossil record, and that older fossil assemblages (particularly those older than 14–20Ma) contain significantly more anomalies than those from more recently. We infer that the bioclimatic tolerances of palaeoendemic conifers have become narrower, perhaps as a result of climate-driven extinctions in the Late Miocene.

Fossil material

There are at least three conifer taxa present in the Golden Fleece fossil assemblage; an imbricate-leaved podocarp, a broad-leaved podocarp and at least one species of callitroid Cupressaceae, represented by both vegetative material and a cone. Angiosperm taxa include *Metrosideros* (Tarran et al. 2017), *Weinmannia* (G.J.Jordan, pers. comm.) and *Nothofagus*.

The imbricate-leaved podocarp shown in Figure 3 is an undescribed, extinct species. Hans Ammitzboll prepared, imaged and diagnosed specimens of this taxon, and found that the cuticular and vegetative morphology shows strong affinities to *Lagarostrobos* and *Manoao*. Many features appear to be intermediate between these two closely related genera; it may represent an early divergence from this lineage before the separation of the two extant genera, as has been suggested for *L. marginatus* P.M.Wells & R.S.Hill (Wells and Hill 1989).

Significant extinctions within this clade (and hence much greater diversity in the fossil record) may account for the disparity between the frequency and abundance of the fossil pollen taxon *Phyllocladidites mawsonii* (aff. *L. franklinii*), and macrofossils of *L. franklinii* (Wells and Hill 1989; Macphail 2007)

There are several vegetative specimens with phyllotaxy characteristic of *Libocedrus*, *Austrocedrus* and *Papuacedrus*. There is also a cone which may possibly be attributed to *Austrocedrus*, but further study of this specimen is required. None of these genera now occur in Australia, but fossils of all three taxa have been found in Tasmania (Hill and Carpenter 1989; Paull and Hill 2009). Despite the taxonomic uncertainty of this fossil, it is clear that the Golden Fleece conifers contribute to the growing body of evidence (see Carpenter et al. 2011)

showing that fossil relatives of many extant taxa existed in places outside their current geographic and climatic ranges.

Two manuscripts are currently in preparation; a research article on anomalies in the palaeobotanical record and a description of the Golden Fleece Rivulet conifer flora.

Acknowledgements

This work – in particular, study of the fossil material – would not have been possible without the time, energy and fine motor skills of Hans Ammitzboll. I would like to thank the Australasian Systematic Botany Society for supporting this work through the Hansjörg Eichler Fund. This allowed me to incorporate direct study of fossil material by providing funding for scanning electron microscopy. For allowing me to continue this research as a HDR (Higher Degree by Research) candidate, I would like to thank the Westpac Bicentennial Foundation for their ongoing support through the Westpac Future Leaders Scholarship. This candidacy is also supported by an Australian Government Research Training Program Stipend and Fee-Offset Scholarship through the University of Tasmania.

References

- Blonder, B, Morrow, CB, Maitner, B, Harris, DJ, Lamanna, C, Violle, C, Enquist, BJ, Kerkhoff, AJ (2017) New approaches for delineating n-dimensional hypervolumes. *Methods in Ecology and Evolution* 9(2), 305–319.

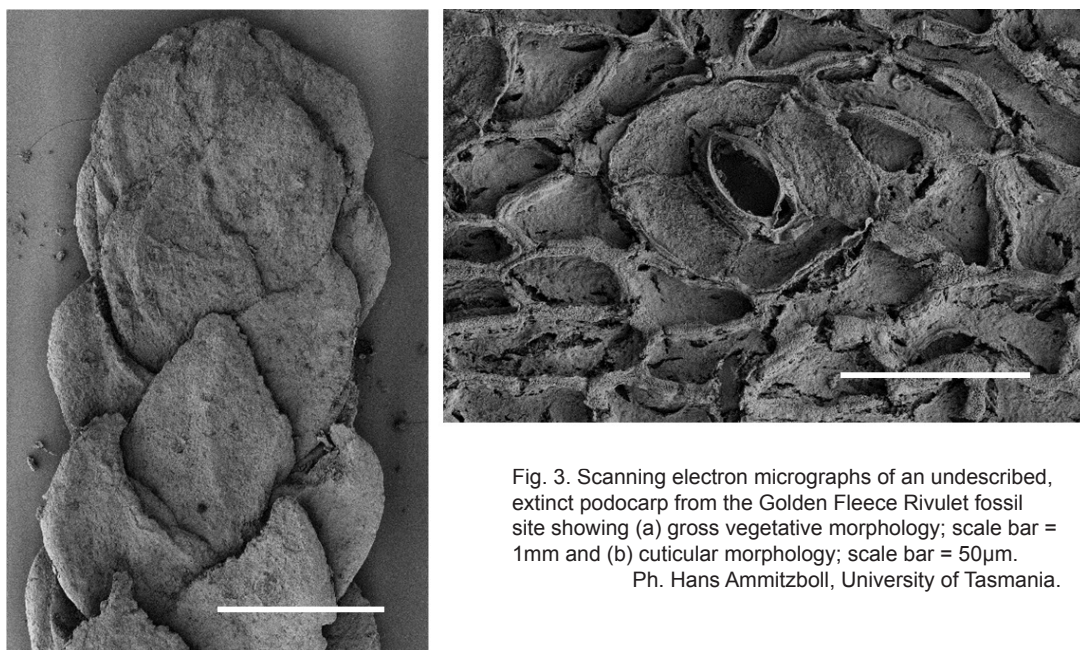


Fig. 3. Scanning electron micrographs of an undescribed, extinct podocarp from the Golden Fleece Rivulet fossil site showing (a) gross vegetative morphology; scale bar = 1mm and (b) cuticular morphology; scale bar = 50µm.

Ph. Hans Ammitzboll, University of Tasmania.

- Bond, WJ (1989) The tortoise and the hare – ecology of Angiosperm dominance and Gymnosperm persistence. *Biological Journal of the Linnean Society* 36, 227–249.
- Carpenter, RJ, Goodwin, MP, Hill, RS, Kanold, K (2011) Silcrete plant fossils from Lightning Ridge, New South Wales: new evidence for climate change and monsoon elements in the Australian Cenozoic. *Australian Journal of Botany* 59, 399–425.
- Enright, NJ, Hill, RS (1995) *Ecology of the southern conifers*. (Melbourne University Press: Carlton)
- Fick, SE, Hijmans, RJ (2017) WorldClim 2: new 1 km spatial resolution climate surfaces for global land areas. *International Journal of Climatology* 37(12), 4302–4315.
- GBIF.org (2018), GBIF Home Page. Available from: <https://www.gbif.org> [13th August 2018].
- Hill, RS, Brodribb, TJ (1999) Turner Review No. 2 – Southern conifers in time and space. *Australian Journal of Botany* 47, 639–696.
- Hill, RS, Carpenter, RJ (1989) Tertiary Gymnosperms from Tasmania – Cupressaceae. *Alcheringa* 13, 89–102.
- Hill, RS, Scriven, LJ (1997) Palaeoclimate across an altitudinal gradient in the Oligocene-Miocene of northern Tasmania: an investigation of nearest living relative analysis. *Australian Journal of Botany* 45, 493–505.
- Jackson, ST, Williams, JW (2004) Modern analogs in Quaternary paleoecology: Here today, gone yesterday, gone tomorrow? *Annual Review of Earth and Planetary Sciences* 32, 495–537.
- Jordan, GJ (1997) Contrasts between the climatic ranges of fossil and extant taxa: causes and consequences for palaeoclimatic estimates. *Australian Journal of Botany* 45, 465–474.
- Jordan, GJ, Carpenter, RJ, Bannister, JM, Lee, DE, Mildenhall, DC, Hill, RS (2011) High conifer diversity in Oligo-Miocene New Zealand. *Australian Systematic Botany* 24, 121–136.
- Jordan, GJ, Harrison, PA, Worth, JRP, Williamson, GJ, Kirkpatrick, JB (2016) Palaeoendemic plants provide evidence for persistence of open, well-watered vegetation since the Cretaceous. *Global Ecology and Biogeography* 25, 127–140.
- Leslie, AB, Beaulieu, JM, Rai, HS, Crane, PR, Donoghue, MJ, Mathews, S (2012) Hemisphere-scale differences in conifer evolutionary dynamics. *Proceedings of the National Academy of Sciences of the United States of America* 109, 16217–21.
- Macphail, M (2007) *Australian palaeoclimates: Cretaceous to Tertiary – a review of palaeobotanical and related evidence to the year 2000*. (CRC LEME: Bentley)
- Mosbrugger, V, Utescher, T (1997) The coexistence approach—a method for quantitative reconstructions of Tertiary terrestrial palaeoclimate data using plant fossils. *Palaeogeography, Palaeoclimatology, Palaeoecology* 134, 61–86.
- Paull, R, Hill, RS (2009) *Libocedrus* macrofossils from Tasmania (Australia). *International Journal of Plant Sciences* 170, 381–399.
- Tarran, M, Wilson, PG, Macphail, MK, Jordan, GJ, Hill, RS (2017) Two fossil species of *Metrosideros* (Myrtaceae) from the Oligo-Miocene Golden Fleece locality in Tasmania, Australia. *American Journal of Botany* 104, 891–904.
- Wells, P, Hill, R (1989) Fossil imbricate-leaved Podocarpaceae from Tertiary sediments in Tasmania. *Australian Systematic Botany* 2, 387–423.

Developing a vouchered DNA reference library for South Australian coastal plant communities

Nicole Foster
University of Adelaide

The identification of plants through DNA evidence is taxonomically important, and in order to conserve species, we need to be able to name them. Using DNA extracted from plant tissues we can sequence DNA markers and compare sequences to those of taxonomically verified specimens lodged in herbaria. Therefore, the development of a reference library from lodged specimens is extremely important. Without assignment of generated sequences to a reference specimen the information gathered has little meaning (Dormontt et al., 2018). A common methodology for generating reference sequences for plants is DNA barcoding. This is where a

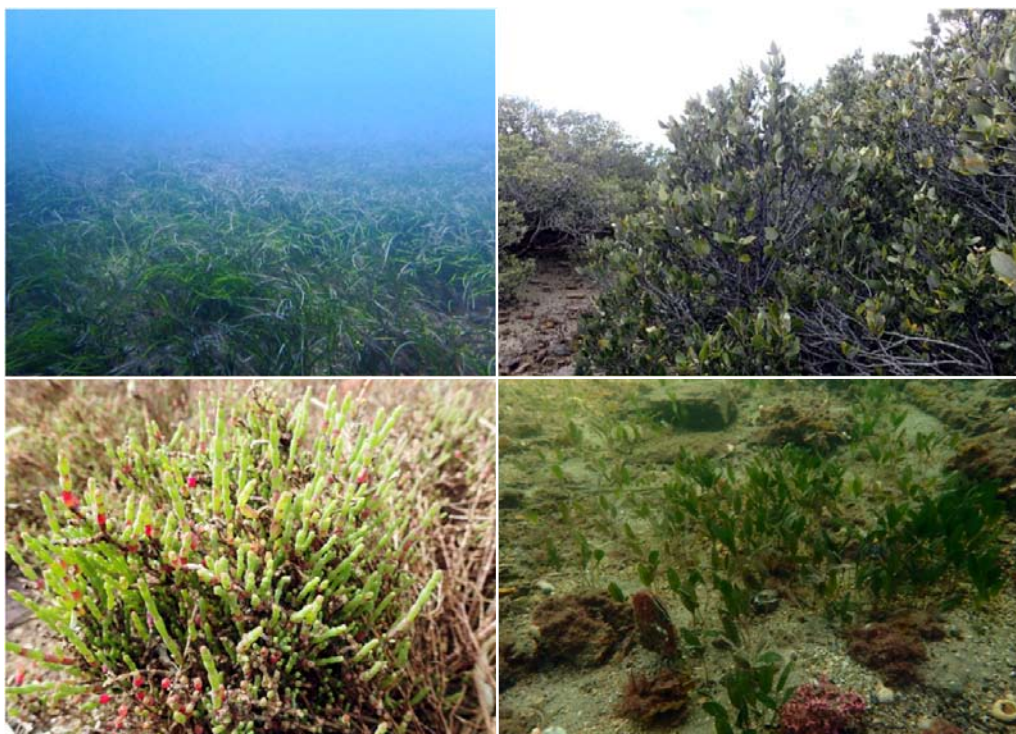
short DNA fragment (barcode) from a plant is sequenced using Sanger Sequencing, generating a single sequence for each species (Bourlat et al., 2013). The choice of the barcode is extremely important as it must be sequenced reliably in different sample sets and generate data that can distinguish between species (Hollingsworth et al., 2011). Unfortunately, this process can be time consuming and costly as only one species can be processed at a time. For taxonomic research to progress, correctly vouchered reference sequences for every species must be generated and made publicly available online.

My PhD work focuses on generating a reference database for southern temperate coastal plant species (Fig. 1). I conducted field collections and sourced herbarium vouchers for the coastal plant species of interest and then implemented a novel DNA analysis approach that differs from the traditional barcoding approach. This method is called hybridization capture and works by using custom designed short RNA probes called ‘baits’ that capture hundreds of target loci in parallel (Hart et al., 2016). To design the probes, target species genomes are selected, and these are used to generate target loci (A. R. Lemmon et al., 2012). The probes need to be designed to successfully capture the model species they were designed for, but also effectively capture across a broad taxonomic group that includes non-model species (E.M. Lemmon and A.R. Lemmon, 2013). Probe design has already been undertaken successfully on vertebrate (A. R. Lemmon et al., 2012) and plant genomes (Nicholls et al., 2015) recovering data for well resolved phylogenies. Hybridisation capture can capture hundreds of loci without the need for time consuming primer development to amplify only a single locus (A. R. Lemmon et al., 2012) as in traditional barcoding. It is also

more cost effective as it uses Next Generation Sequencing as opposed to Sanger Sequencing (E.M. Lemmon and A.R. Lemmon, 2013) which means many species can be processed at once.

With help from the Hansjörg Eichler award funding I applied a hybridisation capture approach and generated sequences for 82 coastal plant species which included 21 seagrass, 21 saltmarsh and one mangrove species (Table 1). Replicate samples for many species have also been included with a maximum of 4 replicates per species. I am currently in the process of analysing the dataset which is incredibly large. By using closely related existing genomes I have been blasting the recovered data to these genomes in order to resolve consensus sequences for the major chloroplast genes. For many species whole chloroplast genomes were generated and on average, ~25 chloroplast loci and ~30 nuclear loci were recovered for each species. This work contributes to a global reference library project compiling 300 species references. I will continue to analyse these datasets and additional species will be added where required to complete the database. I am hopeful the data will become publicly available early to mid 2019.

Fig. 1. Coastal plants included in this study. Clockwise from top left: *Posidonia sinuosa*, *Avicennia marina*, *Halophila australis*, *Tecticornia arbuscula*.



Thus far results have shown a hybridization approach is successful in generating sequencing data for both chloroplast and nuclear gene regions in coastal plant species. I have been able to confidently generate reference sequences for the major Chloroplast genes (i.e. matK, rbcL) for each coastal plant group. I have begun to undertake analysis of the nuclear data which is more difficult

than the chloroplast data due to the presence of paralogs. Especially interesting was the successful sequencing and in some cases the identification of paralogs in the saltmarsh groups as these are known to be a difficult group to sequence in the past. Further work is required in this area, but the results are promising for hybridization capture to be a method to conduct genetic studies on these groups where in the past it has been difficult using Sanger Sequencing.

Along with taxonomically driven projects, this southern temperate reference database has additional applications. For the rest of my PhD I plan to use the data for environmental DNA assignment. I will be extracting environmental DNA from coastal sediment cores and through assigning the sequences recovered to the coastal reference database I will be able to observe changes in coastal plant communities through time. This serves to highlight the importance of generating reference sequences for plant species as the utility of the data is far reaching.

Acknowledgements

I would like to thank the Australasian Systematic Botany Society for supporting this work through the Hansjörg Eichler Fund.

References

Bourlat, S. J., Borja, A., Gilbert, J., Taylor, M. I., Davies, N., Weisberg, S. B., Griffith, J. F., Lettieri, T., Field, D., Benzie, J., Glockner, F. O., Rodriguez-Ezpeleta, N., Faith, D. P., Bean,

Table 1. Species and number of replicates sampled in study.

Species	No.				
		<i>Parapholis incurva</i>	1	<i>Suaeda australis</i>	2
<i>Amphibolis antarctica</i>	2	<i>Posidonia angustifolia</i>	1	<i>Syringodium isoetifolium</i>	2
<i>Amphibolis griffithii</i>	1	<i>Posidonia australis</i>	4	<i>Tecticornia arbuscula</i>	2
<i>Atriplex paludosa</i>	1	<i>Posidonia coriacea</i>	1	<i>Tecticornia flabelliformis</i>	1
<i>Avicennia marina</i>	1	<i>Posidonia ostenfeldii</i>	1	<i>Tecticornia halocnemoides</i>	3
<i>Carpobrotus rossii</i>	3	<i>Posidonia robertsoniae</i>	1	<i>Tecticornia indica</i>	1
<i>Disphyma crassifolium</i>	2	<i>Posidonia sinuosa</i>	2	<i>Tecticornia pergranulata</i>	2
<i>Enchylaena tomentosa</i>	1	<i>Potamogeton tricarinatus</i>	2	<i>Tecticornia pruinosa</i>	1
<i>Frankenia pauciflora</i>	1	<i>Ruppia maritima</i>	2	<i>Tecticornia syncarpa</i>	1
<i>Halophila australis</i>	2	<i>Ruppia megacarpa</i>	2	<i>Tecticornia syncarpa</i>	1
<i>Halophila decipiens</i>	4	<i>Ruppia polycarpa</i>	1	<i>Thalassodendron pachyrhizum</i>	1
<i>Halophila minor</i>	1	<i>Ruppia tuberosa</i>	3	<i>Triglochin striatum</i>	2
<i>Halophila ovalis</i>	4	<i>Samolus repens</i>	2	<i>Wilsonia humilis</i>	2
<i>Lepilaena australis</i>	4	<i>Sarcocornia blackiana</i>	2	<i>Zostera muelleri</i>	4
<i>Maireana oppositifolia</i>	2	<i>Sarcocornia quinqueflora</i>	3		

T. P. and Obst, M. (2013) Genomics in marine monitoring: new opportunities for assessing marine health status, *Maine Pollution Bulletin* 74(1), 9–31.

Dormont, E. E., Van Dijk, K.-j., Bell, K. L., Biffin, E., Breed, M. F., Byrne, M., Caddy-Retalic, S., Encinas-Viso, F., Neville, P. and Shapcott, A. (2018) Advancing DNA metabarcoding applications for plants requires systematic analysis of herbarium collections—an Australian perspective, *Frontiers in Ecology and Evolution* 6, 134.

Hart, M. L., Forrest, L. L., Nicholls, J. A. and Kidner, C. A. (2016) Retrieval of hundreds of nuclear loci from herbarium specimens, *Taxon* 65(5), 1081–1092.

Hollingsworth, P. M., Graham, S. W. and Little, D. P. (2011) Choosing and using a plant DNA barcode, *PLoS One* 6(5), e19254.

Lemmon, A. R., Emme, S. A. and Lemmon, E. M. (2012) Anchored hybrid enrichment for massively high-throughput phylogenomics, *Systematic Biology* 61(5), 727–744.

Lemmon, E. M. and Lemmon, A. R. (2013) High-throughput genomic data in systematics and phylogenetics, *Annual Review of Ecology, Evolution, and Systematics* 44, 99–121.

Nicholls, J. A., Pennington, R. T., Koenen, E. J., Hughes, C. E., Hearn, J., Bunnefeld, L., Dexter, K. G., Stone, G. N. and Kidner, C. A. (2015) Using targeted enrichment of nuclear genes to increase phylogenetic resolution in the neotropical rain forest genus *Inga* (Leguminosae: Mimosoideae), *Frontiers in Plant Science* 6, 710.

Articles

The Nagoya Protocol on access and benefit-sharing: implications for herbaria and systematics research

Shelley James¹; Gillian Brown², Karina Knight³, Antony Kusabs⁴, Josephine Milne⁵, Dhahara Ranatunga⁶, Adrienne Stanton⁷

¹National Herbarium of NSW, Royal Botanic Gardens and Domain Trust;

²Queensland Herbarium; ³Western Australian Herbarium;

⁴Museum of New Zealand Te Papa Tongarewa; ⁵Royal Botanic Gardens Victoria;

⁶Auckland War Memorial Museum; ⁷Manaaki Whenua – Landcare Research

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) is an international supplementary agreement to the Convention on Biological Diversity which came into effect on 12 October 2014. The agreement is alternatively referred to as: the Nagoya Protocol; the Protocol, Access and Benefit-Sharing; or ABS. It aims to ensure the sharing of benefits arising from the utilization of non-human genetic resources, biological material, and associated data in a fair and equitable way. Genetic resources include any object containing genetic material and is not restricted to DNA or RNA. It includes living and dead organisms, soil, and even paleontological materials. As of December 2018, 111 countries have ratified the agreement and become a party to the Protocol (Web ref.) which has a strong legal framework. The Nagoya Protocol sets out the core obligations associated with restrictions on the use of biological materials and associated data, third-party transfer, and the documentation of compliance with domestic legislation and regulatory requirements.

The Nagoya Protocol impacts both commercial and non-commercial use of genetic resources, including biodiversity, conservation and systematic research. Benefit-sharing includes monetary and non-monetary benefits ranging from salary and research funding to collaboration and capacity building.

How does the Nagoya Protocol impact science in Australasia? Australia became a signatory to the Nagoya Protocol in 2012, but as yet has not yet ratified nor provided country-specific advice on interpretation and implementation of the Protocol. The New Zealand Parliament is unlikely to become a signatory to the Nagoya Protocol due to a Treaty of Waitangi Claim (WAI 262) and subsequent 2011 Waitangi Tribunal Report Kō Aotearoa tēnei: a report into claims

concerning New Zealand law and policy affecting Māori culture and identity. WAI 262 is a more robust form of the Nagoya Protocol and addresses the ownership and use of Māori knowledge, language, cultural expressions, indigenous biota and any derived inventions and products. While the impacts of the Nagoya Protocol and WAI262 on Australasian herbaria and botanical research as a whole are as yet unclear, what is certain is that herbarium specimens and associated biological materials collected after 12 October 2014 fall under Nagoya Protocol regulations, particularly those specimens collected in countries party to the Protocol. For those countries not yet party to Nagoya, all collections back to the 2014 date would also fall under the regulations of the Protocol should they sign in the future. Therefore, the Managers of Australasian Herbarium Collections (MAHC) encourage the systematic botany and collections communities to take a proactive approach to the Nagoya Protocol and WAI 262 as responsible partners.

Australian and NZ herbaria are beginning to implement procedures to document the legal acquisition and use of herbarium specimens and their associated genetic resources and data. This includes documenting the provenance and use of collection items within collection management systems and developing standardized specimen repository agreement forms. The necessary documentation consists of Prior Informed Consent (PIC) and Mutually Agreed Terms (MAT). PIC provides evidence of permission to access land, take, keep and use biological materials, and may consist of a permit or email, letter or phone record, depending on the land tenure and traditional owner permissions. MATs provide documented proof of agreement to terms with the resource provider or land-owner, and how benefits arising from the use of biological resources will be shared, regardless of the immediate use of specimens for genetic research or other non-commercial use. In some

cases, this would consist of a Material Transfer Agreement (MTA) indicating the benefits and agreeing to restricted third-party transfer without gaining appropriate permissions. Compliance to the Protocol consists of maintaining these documents, reporting on changes in intent of use, possession of the materials or derivatives, and documenting whether the biological resources have been destroyed or deaccessioned. Data standards for the exchange of information relating to the provenance of biological collections items are needed, especially by herbaria for herbarium specimen and botanical tissue exchange and donation programs.

The documentation of PIC and MAT is a necessary undertaking to become 'Nagoya compliant collections', creating an administrative and bureaucratic burden on herbaria. Community support in supplying such information with botanical specimens is therefore greatly appreciated. Documentation is also necessary for the development of a rating system for the downstream use of collection items, providing information for researchers to choose, request, and use specimens with terms and conditions appropriate for study. Many international communities are working towards a simplified and harmonized access to and transfer of specimens and data for non-commercial scientific purposes in an attempt to prevent the decline of basic biodiversity research. The Global Genome Biodiversity Network (GGBN), Consortium of European Taxonomic Facilities (CETAF) and Botanical Gardens Conservation International (BGCI) are developing standards for the collections and genomics communities and working towards the development of digitally integrated data portals to enable tracking of benefit sharing and compliance with the Protocol.

Whether a collector of biological material

or a researcher using genetic resources, it is recommended that voucher specimens, along with appropriate documentation, are deposited in Nagoya compliant herbaria to meet collecting and Nagoya reporting requirements. Due diligence is recommended to ensure compliance before undertaking a research program utilizing genetic resources or their data. As an interface between collections, science and legislation, the members of Managers of Australasian Herbarium Collections (MAHC) are open to sharing their knowledge, the guidelines being developed, and community needs so as to help with understanding and complying with the Nagoya Protocol and WAI 262 recommendations, in a consistent way. MAHC recommend having a conversation with one of these member herbaria before beginning your collecting or research projects to ensure downstream compliance. As scientists, best practice is to obtain and link specimen accession numbers to GenBank sequences, share your data and publications openly, and educate the next generation of researchers as to the role and importance of compliance to local, state, national and foreign laws and regulations.

Web reference

<https://absch.cbd.int/>

Further reading:

Neumann, D., Borisenko, A.V., Coddington, J.A. et

al. (2018). Global biodiversity research tied up by juridical interpretations of access and benefit sharing. *Organisms Diversity & Evolution* 18:

1-12. <https://doi.org/10.1007/s13127-017-0347-1>

Smith, D., Hinz, H., Mulema, J., Weyl, P. & Ryan, M.J. (2018). Biological control and the Nagoya Protocol on access and benefit sharing – a case of effective due diligence. *Biocontrol Science and Technology* 28:10, 914-926, <https://doi.org/10.1080/09583157.2018.1460317>

Watanabe, M.E. (2017). The Nagoya Protocol: Big Steps, New Problems. *BioScience*, 67 (4): 400.

<https://doi.org/10.1093/biosci/bix019>

Further to Nagoya

Brazilian regulations for biological materials

Following the Brisbane conference we are all still trying to get our heads around the Nagoya Protocol and what it means for us with respect to making plant collections in Australia and New Zealand in the future, but here is another link to regulations governing foreign use of Brazilian herbarium material (Web ref. 1). Clearly it will impact on those who do research in Brazil and also those who exchange herbarium specimens with Brazil. However some herbaria in Australia

have fairly extensive holdings of 19th Century Brazilian collections and it would appear that while the material may be safely loaned to Brazil and be returned, there may be some obligations needing to be met if this material is to be loaned to a third party.

Maori Research Guidelines released

Chrissen Gemmill drew attention on ASBS Facebook to the release of a set of Maori research guidelines (Web ref. 2) and they may go some way in helping to explain why the New Zealanders are

unlikely to sign the Nagoya Protocol.

On 11 December at the University of Auckland, Ngā Pae o te Māramatanga – New Zealand's Māori Centre of Research Excellence and Whakauae Research for Māori Health & Development presented the results of the 2017 project - Cultural, Ethical, Research, Legal & Scientific (CERLS) Issues of Rongoā Māori Research.

The output of this research project is a set of Rongoā Māori research guidelines.

These guidelines challenge the research community to have an understanding of Te Ao Māori values and the practice of Rongoā Māori before engaging with future Rongoā study participants. They encourage researchers to address Māori concerns about the exploitation of traditional knowledge which is shared in studies for commercial gain, or the assumption of intellectual property rights beyond those traditionally charged with carrying such knowledge. The CERLS guidelines also draw researchers' attention to a duty of care to attend to not only their legal health and safety responsibilities, but also to the cultural health and safety aspects of their studies.

It is hoped that these CERLS guidelines will also help inform Māori communities about their rights and provide assurance that researchers who use them will be inclusive and collaborating, giving care and attention not to reframe the scope or practice of Rongoā Māori either by omission or misrepresentation. Most importantly however, the guidelines acknowledge the importance of tikanga Māori and Māori ways of knowing and sharing information. [From the introduction page]

Web references

1. <https://aspt.net/news-blog/2018/faq-about-new-brazilian-regulations-governing-biological-materials>
2. www.scoop.co.nz/stories/CU1812/S00084/rongoa-maori-research-project-presents-guidelines.htm?fbclid=IwAR2E4xogPmQPnMQAEyM2-1eh4QR0WTCUET3gzCWqNINU3AUPdrwZ0K0pXs

Robyn Barker

At the Brisbane ASBS conference

The opening session at the Brisbane ASBS conference in December featured not only the MAHC talk presented by Shelley James (included above), but also the keynote presentation by

Julia Playford of the Queensland Department of Environment and Science on reviewing the state's Biodiscovery Act (2004). The review is required to bring it into line with the Nagoya Protocol, necessary for international collaboration and trade in the biodiscovery industry. One concern raised by Julia was a hope that legislation did not entail intervention that might frustrate valuable pure research until commercial development had become a factor.

Subsequent discussion revealed significant frustration already in our taxonomic community with obtaining collecting permits, particularly outside the researcher's state of residence. Occasionally there may be no response to early applications (in one instance collecting essential specimens had to be abandoned on the field trip). While understanding the perennial issue of "too few people for too much work" problems with collecting permits have persisted over many years. We and other researchers recognise the need for best practice in field work, but permit requirements and questions may conflict with the realities and needs taxonomic research; for example, one has often to list the species to be collected, implying that the taxonomy and species distributions are already known, when a prime purpose of the trip is to establish a new or revised taxonomy. Tim Collins recounted his positive experiences in dealing with traditional owners to ensure informed and sensitive field work. In our own work we have been careful to interact with local Indigenous land owners when protocols required it, but to do this in anticipation for all the traditional lands traversed in wide-ranging field trips can only be overwhelming without a way to facilitate this for the taxonomic community. It would likely kill off many trips before or early in the planning. Some state's herbaria and museums have found a way to organise annual permits for staff and associates in their jurisdiction. Is there a way, while requiring best practice, that such permits can be organised Australia-wide across the taxonomic community?

As referenced above, Neumann et al. (2018) indicate some of the complexities required for adherence to the Nagoya Protocol for those with commercial interests, but for most taxonomists this is just an additional layer on already existing requirements for the collection of natural history items for natural history institutions. Do we risk curtailment of collecting that is essential for advancing beneficial, but non-commercial,

knowledge, by imposition of impractical regulation?

Also: <https://www.getinvolved.qld.gov.au/gi/consultation/5504/view.html>

Bill and Robyn Barker

References

Web ref. <https://cabinet.qld.gov.au/documents/2018/Apr/RevBio/Attachments/Response.PDF>

Genomics for Australian Plants (GAP)

www.bioplatforms.com/australian-plants

¹About 18 months ago, discussions led by David Cantrill (MEL, Director of Science) began with Bioplatforms Australia (a Federally funded body that supports research and innovation in life sciences, particularly in the 'omics [genomics, metabolomics, proteomics and bioinformatics]) about the impact of next generation DNA sequencing technologies on herbarium core business such as systematics and collections management. These discussions resulted in Bioplatforms exploring with the plant community whether there was any desire for a collaborative project between Bioplatforms and the plant collections community. Bioplatforms have a successful consortium model that they have used for working with communities to create genomic resources. Anyone is able to join consortia at anytime and Bioplatforms Australia's experience

¹ This article comprises the content of a letter circulated to members of ASBS prior to the launch of GAP at the ASBS conference. It has been upgraded where the conference was mentioned and includes the selection there of three Australian plant species for the pilot genomic project mentioned in the letter..

in this space has been once a program is up and running more and more people want to come onboard. Projects are not grants but rather co-investment between the partners with Bioplatforms Australia putting in sequencing and some project management and bioinformatics support to develop an accessible resource of broad value to Australia. Consortium partners contribute what they are capable of and this ranges from in kind access to material, lab support costs in terms of supply of DNA for sequencing, and cash. The successful OZ Mammals consortium, a similar project for the faunal collections community (Web ref. 1), runs in this way with those museums that are able putting in cash and in-kind support for the project.

Using this approach, invitations were sent out to Australian herbaria that currently have, or desire to have, molecular research capability and 11 accepted the invitation. In addition members of Botanic Gardens, the University sector and subject matter experts were also invited. A draft proposal was circulated as a discussion starter

Aims and activities of *Genomics for Australian Plants*

Genomics for Australian Plants aims to:

- Sequence and assemble representative Australian plant genomes across the plant tree of life to enable better conservation, utilisation and understanding of Australia's unique plant diversity;
- Build genomic capacity across Australian Botanic Gardens and Herbaria to create networks collaborating in the collection, management, dissemination and application of genomic data for Australian plants;
- Provide tools to enable genetic data to be used to identify and classify biodiversity at a range of scales and to use these tools to inform conservation management and enable better decision making.

Activities will include the generation of data and development of workflows under three broad areas:

1. reference genomes,
2. phylogenomics, and
3. conservation genomics.



and representatives from the Herbarium, Botanic Gardens and University communities participated in a workshop in Melbourne in August 2017. The workshop confirmed a desire to work together to develop genomic resources for the community. A follow-up meeting was held in conjunction with the ASBS Meeting in Adelaide in November 2017. Further discussions were held over the next few months followed by a third meeting with additional participants that had critical expertise (e.g. data handling, genome assembly etc.). This resulted in the setting up of two working groups (Wet Lab and Computational) to provide recommendations to a steering committee (Anna Fitzgerald Bioplatforms Australia; Linda Broadhurst CANB; David Cantrill MEL; Darren Crayn CNS, Graham King PHARM, Jen Taylor CSIRO, Margaret Byrne DBAWA) on how to proceed.

This project is aligned with and will help deliver on strategic actions identified in the recently released *Discovering biodiversity: a decadal plan for taxonomy and biosystematics in Australia and New Zealand 2018–2027* (Web ref. 2).

The GAP initiative will be driven by the plant research collections community and brings together researchers, data specialists, state governments, commonwealth government agencies, and plant conservation and research agencies with the aim of using genomics approaches to enable the community to better understand, utilise and conserve Australia's unique plant diversity.

Launch

The GAP initiative was launched at the ASBS meeting in Brisbane (Dec 3-6) (Web ref. 3). A presentation and discussion session introduced the project to the community and provided an opportunity for questions to be addressed to steering committee members.

Call for candidate species

A call was made in the letter circulated to members by the secretary of ASBS in November 2018 for candidate species to consider for a pilot project in activity stream 1 (reference genomes). Final nominations were made at the Brisbane Conference.

In the first stream of activity, the Genomics for Australian Plants Initiative aims to sequence and assemble genomes of representative Australian plant taxa. These reference genomes will be important for identifying universal markers that

can be used in phylogenomic approaches to assemble a tree of life for Australian vascular plant genera and develop markers for use in conservation genetics and other applications. Experience with the Oz Mammals project shows that running initial pilot projects to sort out protocols and better understand cost and resourcing implications has great value in helping determine how many genomes can be assembled with project resources. Based on the recommendations from the two working groups a suite of criteria was developed to enable selection of taxa for reference genome assembly. with suggestions from the community for candidate species to be returned to by 16 Nov.

Questions reflecting the criteria were:

1. Is the species currently being worked on so that the initiative can add value to it?
2. How much additional research can this genome leverage e.g. opening up new areas or research or leverage new funding (local and international)? Quantify, if possible and provide evidence.
3. Does the genus lack a reference genome such that a genome of this species will contribute to furthering plant research in Australia?
4. Does the species resonate with the public or have political value in addition to scientific value?
5. Is the species phylogenetically representative of the genus?
6. Does the species have commercial or conservation value?
7. Is the species of a genome ploidy and size that makes a 'reference' genome feasible?
8. Is there access to a sample of required quality and quantity for 'reference' genome analysis and that can be vouchered?
9. Are these samples available from an accessioned collection and an institution that has a commitment to maintain and clonally propagate if necessary?
10. Is there a group that is willing to undertake the sample preparation of this species (high quality DNA and RNA)?
11. Are there groups that are willing to contribute to genome assembly?
12. Are there any other factors to be considered for this species?

At the conference the Steering Committee selected the three most appropriate candidate species for the pilot from those that had been nominated. They were:

- *Acacia pycnantha*
- *Telopea speciosissima*
- *Areocleome oxalidea*

The sequencing will be undertaken by Bioplatforms Australia genomics facilities through their Framework Initiative strategic investments (Web ref. 4), while the data assembly is to be supported by research community co-investment.

Web references

1. www.bioplatforms.com/oz-mammals/

2. www.science.org.au/support/analysis/decadal-plans-science/discovering-biodiversity-decadal-plan-taxonomy
3. <https://www.genomicsforaustralianplants.com/2018/12/18/dec-2018-plants-launch/>
4. www.bioplatforms.com/projects/

News

Article on herbarium specimen destruction short-listed for Bragg Prize

Short-listed for the Bragg Prize this year (Web ref. 1) was Nick O'Malley's piece in the *Sydney Morning Herald* earlier this year on the destruction of herbarium specimens, "Would you burn the Mona Lisa if it was sent? Our horror bureaucratic bungle" (Web ref. 2). The Bragg UNSW Press Prize for Science Writing, to give it its formal title, is "an annual prize for the best short non-fiction piece on science written for a general audience" and all short-listed articles are included in the annually produced collection of *The Best Australian Science Writing*. This year's book has just been released (see p. 66). Find out how you too might be able to submit an entry for next year's prize at Web ref. 3.

Web references

1. www.science.unsw.edu.au/news/bragg-unsw-press-prize-science-writing-2018-shortlist-announced
2. <https://www.smh.com.au/lifestyle/would-you-burn-the-mona-lisa-if-it-was-sent-our-horror-bureaucratic-bungle-20180213-h0w0w3.html>
3. www.newspublishing.com/scienceprize

Membership drive by the Society of Herbarium Curators (SHC)

If you are listed in *Index Herbariorum*, chances are that you will recently have received an invitation to join the international body, the Society of Herbarium Curators (SHC). Since 2005, the Society's aim has been to promote and strengthen the vital roles of herbaria in science and society. Presently they number 300 members across 15 countries, although most information would suggest that this is predominantly an American association. Resources available to members include

- Professional development opportunities for everyone from students to curators. Applications for 2019 student research awards

will open in January 2019. There will be a 7-week Strategic Planning for Herbaria course offered in April/May 2019 and they also have a new Early Career Section.

- Access to a network of expertise via the SHC website, the Herbaria listserv (co-sponsored by ASPT), or their newsletter, *The Vasculum*. Examples of the newsletter and the type of articles can be seen on their website; the most recent issues are available only to members.
- Support from the Herbarium Assistance Committee. In the past year, natural history collections have experienced a number of challenges, from fires to threats of civil unrest, leaving the Society ever more committed to providing emergency support for herbaria worldwide.

The information above has been compiled from their web-site and more information is available there.

Web site. www.herbariumcurators.org/about/

New newsletter from Parks Australia

The first issue of a new quarterly newsletter highlighting scientific research in Commonwealth reserves has been published by Parks Australia (Web ref.). Each newsletter will include a feature project plus research snippets from around the parks. The feature project in the first issue is an analysis of the most cost effective way to control buffel grass in Uluru-Kata Tjuta National Park with smaller items on the return of Eastern quolls to Booderee NP at Jervis Bay on the NSW south coast and a Kakadu fire study investigating the importance of retaining unburnt patches of savannah.

Web ref. <https://mailchi.mp/parksaustralia.gov.au/parks-australia-science-news-issue-1-october-2018>

Botanic Endeavour 250

As we already know due to the timing of our next

conferences, the years 2019 and 2020 mark the 250th anniversary of Cook and the *Endeavour* in New Zealand and Australia respectively. Botanic Gardens and arboreta are heavily involved in an event called *Botanic Endeavour 250* whereby gardens along the route travelled 250 years ago will be involved in the development of new displays and events to commemorate the occasion. Information about the events involved can be found on the BGANZ website.

Web-site. <https://www.bganz.org.au/assets/uploads/2018/03/Botanic-Endeavour-250-2019-2020.pdf>

A new taxonomic scheme

Biologists worldwide have unveiled a new taxonomic system for classifying species by hotness (Web ref. 1). This new sorting method would revolutionize our understanding of all life on Earth. Stanford biologist Dr. Julian Tran said

We've discovered that hotness is a far more robust and useful way to organize animals, plants, and microbes than shared traits, common ancestors, or even DNA. [Posted on ASB FB by Chrissen Gemmill]

In case you are concerned, *The Onion* is a satirical American weekly news magazine with an associated web site. Apparently it sometimes gets mistaken for the real thing! You can see some of their better contributions at Web ref. 2-5.

Web references

1. https://www.theonion.com/biologists-unveil-new-taxonomic-system-classifying-spec-1830690494?fbclid=IwAR2GZ7EVMkmf3rX9U-Qxm7e_oNkNgBf1DfjtEZvRN7MxdYACYAHsU-cJE
2. <https://politics.theonion.com/white-house-ficus-to-leave-for-virginia-arboretum-after-1830989844>
3. <https://www.theonion.com/researchers-publish-list-of-ways-animals-can-help-fight-1830855901>
4. <https://www.theonion.com/departments-of-interior-reopens-national-parks-after-fil-1830319620>
5. <https://www.theonion.com/moon-now-overrun-with-cane-toads-after-species-accident-1830745531>

Te Papa restructured and reviewed

Te Papa, the site for the next ASBS meeting at the end of 2019, has been undergoing restructures and reviews of its natural history collections team lately. These have featured in the New Zealand press (Web ref. 1) and one of the main concerns has been loss of jobs and expertise, particularly that associated with the role of collection managers. There was such an outcry when the restructure was first mooted earlier this

year that an external review was put in place and this has now reported back; discussions of the recommendations are available on-line (Web ref. 2, 3). Nic Rawlence, Lecturer in Ancient DNA at the University of Otago, voiced his concerns in *The Conversation* (Web ref. 4) and other outlets. Whatever the future outcome it remains fairly clear that the staffing level is inadequate to totally care for the collections, a state repeated in so many of today's museums and herbaria. And this is despite the increasing recognition and use by non-taxonomic scientists of the information held within these very collections.

Web references

1. <https://camd.org.au/te-papa-restructure/>
2. <https://www.stuff.co.nz/national/108186997/te-papa-lacking-enough-internal-staff-to-look-after-entire-collection-experts-say>
3. <https://www.radionz.co.nz/national/programmes/ninetonoon/audio/2018675420/does-te-papa-s-new-look-restructure-answer-its-critics> (podcast, 13th Dec 2018)
4. <http://theconversation.com/taxonomy-the-science-of-naming-things-is-under-threat-106691>

Postscript! (Jan 26th update): <https://www.stuff.co.nz/science/110078786/te-papa-restructure-risks-loss-of-irreplaceable-science-expertise--critics>

GLOVAP response to ASPT

Earlier this year (see *ASBS Newsletter* 174) Plant Gateway Ltd. released their publication, *The Global Flora Special Edition, GLOVAP Nomenclature Part 1: Vol. 4 (GLOVAP)*. The issue contained some 3000 new combinations, 400 new [replacement] species names, 2 new genera and 4 new species and generated global comment. One of the responses to the work, mentioned in the last newsletter, was by the leadership group of the American Society of Plant Systematists (Web ref. 1). Since then the GLOVAP authors, Maarten Christenhusz, Mike Fay and James Byng, have provided an undated response to the criticisms raised in the ASPT article on their own Plant Gateway website (Web ref. 2).

Web references

1. <https://aspt.net/news-blog/2018/letter-re-glovap-from-aspt-leadership-to-society#.XBnmXmd2dMw>
2. www.plantgateway.com/aspt-response/

Cathy Offord wins NSW Premier's Prize

Dr Cathy Offord, one of the editors and an author of the new edition of *Guidelines for the Translocation of Threatened Plants in Australia* (see p. 68), is also the recipient of the 2018 NSW

Premier's Prize for Innovation in the NSW Public Sector Science and Engineering (Web ref.).

Cathy is a Principal Research Scientist at the Australian PlantBank at the Australian Botanic Garden, Mount Annan and a globally recognised conservation biologist. The NSW Premier's Prizes acknowledges excellence in science and engineering and she has been recognised as a leading researcher for her cutting-edge work that has generated environmental benefits on a global scale.

Over her 30-year career with the Botanic Gardens & Centennial Parklands Cathy has made major innovative contributions to the science and management of threatened plant species in NSW, and has published more than 130 peer-reviewed and edited publications. Her research has been vital in establishing the iconic Wollemi Pine (*Wollemia nobilis*) as a global model for threatened species management [adapted from Web ref.].

Web ref. <https://www.rbgsyd.nsw.gov.au/stories/2018/dr-cathy-offord-wins-nsw-premier%E2%80%99s-prize-for-scienc>

Retirements

As a result of attending the IUCN workshop in Perth we learnt that Neil Gibson and Paul Gioa, both of them associated with the PERTH Herbarium, are in the process of retirement from DBCA. Peter Canty of AD is in a similar position and the BGANZ News reported that Dale Dixon has retired from his position as curator, RBG Sydney.

On the move

Tanya Scharaschkin has made a drastic move, both figuratively and literally. She has retired from QUT and has moved to Tasmania. She will continue to work but as a freelance botanist and an artist. She is keen to collaborate on projects involving plant anatomy and grass systematics. Tanya plans on spending more time on botanical art and illustration than in the past and will be running workshops and classes. If anyone needs a hand with fieldwork in Tasmania or elsewhere, or would like to discuss the possibility of botanical art/illustration workshops, please contact Tanya. Her details are:

Dr Tanya Scharaschkin
Botanical Research, Art and Training,
54 Mill Road, Collinsvale, Tas 7012 Australia
Tel: +61 (0)3 6200 0543
Email: scharasc@gmail.com

Website presence: Art, Designs, Photography (CraftyTiger)

The NSW Herbarium on the move

The NSW Herbarium is also on the move from its present location in the heart of Sydney to the Mt Annan Botanic Garden in south-western Sydney (Web ref.).

Web ref. <https://www.wollondillyadvertiser.com.au/story/5447769/60-million-herbarium-coming-to-botanic-garden/>

New plans for RBG Edinburgh

There is also planning for a major refurbishment of the Edinburgh Botanic Gardens, in particular of the Victorian glasshouses.

Web ref. <https://www.bbc.com/news/uk-scotland-edinburgh-east-fife-46059973>

PM's pledge to help native species

Speaking to ABC News Breakfast on Monday, the prime minister cited "environmental legislation ... [that] is important for native species" as among the government's priorities for the new year, second only to national security. (Web ref.)

Sounded promising for a while but...

Five hours later, a spokesman for Morrison told Guardian Australia the prime minister was "referring to the agricultural and veterinary chemicals legislation amendment. (Web ref. 1 & 2)

Perhaps an opportunity to educate the Prime Minister. [Posted on ASBS FaceBook by Peter Neish]

Web references

- 1: <https://www.theguardian.com/australia-news/2019/jan/14/pms-pledge-to-help-native-species-was-about-cutting-red-tape-for-farm-chemicals-his-office-says>
- 2: https://www.aph.gov.au/Parliamentary_Business/Bills_Legislation/Bills_Search_Results/Result?bld=r6204

SBS News features taxonomists

Profiles of two taxonomists from the Australian Museum and why we need taxonomy have appeared on SBS News.

Web ref. <https://www.sbs.com.au/news/what-is-a-taxonomist-and-why-are-they-crying-out-for-more-funding>

Baking bread with kangaroo grass (*Themeda*) seeds – back to beginnings

Peter Neish (ASBS FaceBook) pointed to this interesting article on the use of kangaroo grass as

a source of flour in the baking industry. The baker concerned was sent seed by Bruce Pascoe, author of *Dark Emu*, who explored the use of native grains and flour by Indigenous communities for the past 65,000 years.

Web ref. <https://www.smh.com.au/national/bakers-rise-to-use-of-native-grains-as-kangaroo-grass-hops-into-recipes-20181006-p50855.html?sf199778815=1>

Trees of Papua New Guinea on the way

The three volume manuscript of the *Trees of Papua New Guinea* has been accepted for publication and is now in the production phase. This has been a 15 year project, a collaboration between Barry Conn and PNG botanists from the PNG Forest Research Institute in Lae, Kipiro Damas, in particular (Web ref. 1).

One of the major concerns facing the people of Papua New Guinea is the capacity for them to document and identify the rich biodiversity of their country. Even with many world experts studying the plants of this region, the documentation of the vascular plants remains very

incomplete. Furthermore, Papua New Guinean researchers do not have access to a comprehensive account of their forest trees.

The aim of this publication is to provide a simple, and yet, comprehensive account of the trees of Papua New Guinea so that the important species of the dense, widespread forests can be identified by local botanists, foresters, environmentalists and conservationists.

Publication is expected by September 2019.

You can read more about the project, with further background information, on the Kickstarter site (Web ref. 2) where funding has been sought for a small marketing campaign. Responses were needed by the end of January closing date.

Web reference

1. www.pngplants.org/PNGtrees/
2. <https://www.kickstarter.com/projects/365473141/trees-of-papua-new-guinea>

Coming conferences

ASBS 2019 Wellington:

Taxonomy for Plant Conservation – Ruia mai i Rangīātea

Tihe mauri ora!

E ngā mana, e ngā reo, e rau rangatira mā

Tēnā koutou, tēnā koutou, tēnā koutou katoa

Behold the breath of life!

To all authorities, all voices, to the many chiefs (important people) gathered here
Greetings, greetings, greetings to everyone

¹It is my great pleasure to welcome you to the 2019 ASBS conference which will be held the last week in November in Wellington, New Zealand.

We are excited to announce that our annual conference will be held jointly with the biannual conference of the New Zealand Plant Conservation Network. The ASBS and NZPCN have signed a Memorandum of Understanding to hold a joint conference, the title of which, “*Taxonomy for Plant Conservation – Ruia mai i Rangīātea*”, highlights the important and close relationship of taxonomy and conservation, which links our two societies.

¹ This article is Heidi Meudt’s invitation to the Brisbane ASBS conference attendees.

The New Zealand Plant Conservation Network

The NZPCN was established in April 2003 and has since grown to more than 800 members worldwide. The Network’s vision is that “the rich, diverse and unique native plant life of New Zealand is recognised, cherished and restored”. They facilitate and advocate for plant conservation and provide information and support to plant conservation practitioners, landowners and managers via their website (Web ref. 1), monthly newsletter, biennial conference, and workshops. For more information, have a look at their website.

The venue

The conference will be hosted by the Museum of New Zealand Te Papa Tongarewa, the national museum of New Zealand, or Te Papa for short (Web ref. 2). The museum is not only home to six storeys of exhibitions (most of which are free) and collections (including WELT herbarium), but also it is the premier conference venue in Wellington.



NZPCN

The Australasian Systematic Botany Society and
the **NEW ZEALAND PLANT CONSERVATION NETWORK**

Invite you to



Taxonomy for Plant Conservation – Ruia mai i Rangiaētea

24–28 November 2019, Wellington, New Zealand

*A must do for anyone who is passionate
about science and conservation of native plants in New Zealand and Australia.*

**To be held at Wellington's premier venue
the Museum of New Zealand Te Papa Tongarewa.**

- *Get up to date* with our stimulating and comprehensive range of speaker presentations
- *Explore* Wellington's forests and rugged coastlines on our field trips
- *Network* with people involved in a wide variety of plant conservation work
- *Discuss and learn* about a range of issues at our workshops
- *Take up the opportunities* to tour the Te Papa herbarium and Otari Native Botanic Gardens

Our programme

- *Sunday 24 November:* Workshops; Welcome reception; after-hours access to the new Taiao-Nature exhibition;
- *Monday, Tuesday, Thursday:* days of presentations,
- *Monday and Thursday evening:* Public lecture; and
- *Wednesday:* a choice of Field trips.

A more detailed programme, calls for abstracts and registration fees will be available in early 2019.

Conference Sponsorship

Several sponsorship packages are available, providing sponsors with a choice of exposure related to financial commitment.

The 2019 ASBS-NZPCN joint conference can provide your organisation with:

- Exposure at a premier conference devoted to leaders in plant conservation work and scientific research.
- Time to network with industry colleagues and key decision makers.
- A cost-effective way to reinforce your organisation's brand to a relevant audience.
- Access to a broad network of potential partners from the public and private sectors.
- Marketing opportunities including online visibility and associated conference material.

We therefore invite you to discuss with us options available to tailor-make a sponsorship package that best suits your organisation.

Conference contacts and information

- *Key conference organisers:* Rewi Elliot (NZPCN) and Heidi Meudt (ASBS)
To contact the conference organisers, email: plants2019nz@gmail.com
- *Updates:* follow us on our Facebook page: ASBS NZPCN Wellington 2019
- *Conference website:* https://systematics.ourplants.org/asbs_2019/

We will be making use of the museum's extensive experience in hosting and catering international conferences for next year's meeting.

A programme overview

The meeting will take place over five days. As we

are combining the conferences of two societies who do some things differently, this meeting will be a little bit different!

To start off, we will have several half day or full day pre-conference workshop options. One that

I can confirm with you now will be a full day science-themed Wikipedia-a-thon with a crew of local wikipedians. Other half day workshops will focus on honing your plant identification skills.

At the welcome event, there will be a private showing of our new natural history exhibition.

We will have three full days of talks, each with a keynote speaker to start the day.

After the second day of talks and the conference dinner, we will take a break to head outside. We plan to offer several field trips to local botanical hot spots. These field trips will be smaller groups to allow intimate discovery of the local flora with local expertise. We will then return, refreshed, for our third full day of talks!

Finally, to reach out to the public and take advantage of all the botanical expertise that will be descending upon the museum, we are also planning a couple of evening public lectures with the museum's Public Programming team.

Our host city

Wellington is located on the south end of the North Island. There are direct flights to Wellington from Brisbane, Gold Coast, Sydney and Melbourne, and there are many other flights across the Tasman to Auckland (northern North Island), Christchurch and Queenstown (South Island). So, we hope to see many of you from the "West Island" (Australia) at the 2019 conference!

Te Papa is centrally located on the beautiful Wellington waterfront near the CBD. For those who have not been there before, Wellington is New Zealand's vibrant capital city, and it is cool in more ways than one. Wellington offers the best of both worlds: cafes, ethnic restaurants, museums for those seeking the city experience, as well as rugged coastlines, hilly walks, and urban green spaces.

Check out the video on Wellington (Web ref. 3).

Wellington's natural environs

Although Wellington is home to about 300,000 human inhabitants, its growing population of native birds which thrive in our urban parks with native bush, is a big drawcard. Zealandia Ecosanctuary, Otari-Wilton's Bush, Te Papa's own Bush City, and even the Wellington Zoo are all places you can go to see native plants and wildlife and are all easily accessible via public transport.

Otari-Wilton's Bush in particular, which is NZ's only public botanic garden dedicated solely to

the native flora and is registered as a Garden of International Significance by the Royal New Zealand Institute of Horticulture. Rewi Elliot, who is the co-organiser of the conference is not only NZPCN president but also the manager here.

Otari is just 5 km from the Wellington CBD, easily accessible by public transportation and has 14 km of walking trails. It comprises both the Botanic garden with 5 hectares and Wilton's bush reserve, with 100 hectares of ancient and regenerating native forest, including an 800-year-old rimu tree.

Otari will be a venue for several workshops, and there will be opportunities for you to explore on your own or on a guided botanical tour. NZ has no nasty creepy crawlies, poisonous snakes or crocodiles, meaning you can wander through our wild areas relaxed and peacefully.

Check out this short video on Otari (Web ref. 4).

Conference themes

The conference will have ten different themes under which you can submit your talk or poster.

- Celebrating 250 years of advances in botanical science & conservation since Banks & Solander
- Aligning western science with Mātauranga Māori for better conservation outcomes
- Conservation in response to environmental change
- The Decadal Plan and the future of taxonomy in Australasia
- Making the most of e-resources
- Recovery of threatened plants: success stories?
- The contribution of citizen science
- Hybridization: an ongoing dilemma for conservation
- Decoding the green: Combating plant blindness
- Biodiversity and the built environment

We hope the varied topics shown here, which reflect our overall conference theme, will be stimulating and of interest to members of both societies. Of these I will just mention the first two. Of course we are about to celebrate the 250th anniversary of the *Endeavour* coming to NZ, and there are several other initiatives that will be happening in NZ and Wellington in particular simultaneously with our conference at the end of next year. We also want to recognise this significant anniversary from a botanical perspective.

The second main theme is “Aligning western science with Mātauranga Māori for better conservation outcomes”. Mātauranga Māori is about a Māori way of being and engaging in the world – including knowledge, understanding and experience. We are dedicated to incorporating Mātauranga Māori including language and protocol tikanga throughout the conference, including a meaningful conference title in te reo Māori language.

Planning a visit to New Zealand

I’ve focused on Wellington so far but of course there are many other amazing areas to botanise and visit in NZ and I would encourage you to take advantage of coming to this conference to explore them, the campervan is optional, it is a popular way to get around. I highly recommend using the Department of Conservation webpage for help planning trips into the NZ native bush (Web ref. 5).

Welcome and updates

Once again and together with co-organiser Rewi Elliot, we wish to extend to each of you a warm welcome to come to next year’s conference in Wellington.

So save the dates, start planning and booking now! The conference website is now live for 2019 and already has a lot of information there (thank you Ainsley Calladine!). And make sure you follow our conference facebook page for conference updates over the next year.

*Nō reiria, tenā koutou, tenā koutou, tenā koutou
katoa*

Web references

1. www.nzpcn.org.nz
2. www.tepapa.govt.nz
3. <https://www.wellingtonnz.com/discover>
4. <https://wellington.govt.nz/recreation/enjoy-the-outdoors/gardens/otariwiltons-bush>
5. www.doc.govt.nz

Heidi Meudt & Rewi Elliot
2019 ASBS-NZPCN Conference co-organisers

Websites of interest

Conservation Bytes

You may not always agree with Corey Bradshaw’s take on conservation but that should not stop you from investigating his website for some refreshing views. And if you don’t happen to agree or you find the whole thing a bit too depressing, then you can always just catch up on the conservation cartoons he has collected on the site. A warning though that too many may make you depressed for the state of the world. Incidentally Bradshaw is one of the key members mentioned in the next website.

Web ref. <http://conservationbytes.com/about/>

Alliance of Leading Environmental Researchers & Thinkers – ALERT

I came across this site when drawing attention to the article on which activities in Parks by humans are OK in *The Conversation* (p. 39). Professor Professor Bill Laurance was listed as founder and director of ALERT. Their website explains their goals which are primarily about communicating environmental science effectively and globally and a list of key people is available on the site. Issues treated in the last couple of months include

- Conservation Psychology,
- Is climate change killing off Earth’s little creatures (this one, based on a recent paper, is

interesting in the light of the Insect Apocalypse article referred to on p. 36),

- Learning to say no to risky mega-projects,
- Surging development dangers in Indonesian New Guinea
- The trouble with Environmental Impact Assessments.

An interesting link, amongst a plethora of them, is to the National Geographic’s running list of changes being made to environmental policy by Donald Trump

Web references

- <http://alert-conservation.org/about-us/>
<https://news.nationalgeographic.com/2017/03/how-trump-is-changing-science-environment/>

Mushroom magic videos

Three videos with more or less the same content of time-lapse mushroom magic are available online (Web refs.). The middle reference has had 41 million viewers. Is there a message here?

Web references

- <http://earthporm.com/8-hypnotic-timelapse-gifs-show-mushrooms-grow/> (no music, some text)
<https://www.youtube.com/watch?v=b-nJ0ROGD14>
(music background)
<https://www.theatlantic.com/video/index/252456/an-amazing-time-lapse-video-of-mushrooms-growing/>
(the original 2012 video with mycologist Paul Stamets giving a commentary)

ABRS report

Staff updates

Peri Bolton has re-joined the ABRS on a short-term contract until March 2019. Peri is assisting to develop a *Bryophytes of Australia* project, to sit alongside the *Flora of Australia* (FoA, Web ref. 1) on the new digital platform. The Bryophytes project will include content from the Australian Mosses Online (Web ref. 2). The taxonomy will be drawn from the National Species List (Web ref. 3). Peri is also assisting with establishing governance and workflow processes for managing digital FoA content.

Flora of Australia

In early December 2018, Zoe Knapp and Phillip Kodela presented a workshop on writing and reviewing digital FoA treatments, as part of the 2018 Australasian Systematic Botany Society Mind the Gap conference. The workshop included a live demonstration of the new digital FoA, with participants adding and reviewing taxon profiles not previously treated for the FoA. The ABRS is grateful for the engagement and active involvement of workshop participants. During the workshop, we were able to load a treatment of Lentibulariaceae (Peter G. Taylor, Web ref. 4) in draft mode. The ABRS, with assistance from Tony Orchard, is now working to edit and release the taxon profiles. The ABRS is also grateful to Betsy Jackes, Ian Thompson and Neville Walsh for their treatments of Myrsinaceae (now in Primulaceae), *Hovea* and *Pomaderris*, respectively. These treatments have been loaded on the FoA in draft form and will be edited and released in 2019.

Recently published treatments include: Tropaeolaceae; Calophyllaceae; Clusiaceae; Ochnaceae, Theaceae; *Avicennia* (Acanthaceae); Verbenaceae; a revision of Berberidaceae; several new family-level profiles (including Calycanthaceae and Campynemataceae completing new family treatments) contributed by the Royal Botanic Gardens Victoria; and ongoing updates in Acacia and related genera.

Please note, the FoA platform will be rolling over to a new version in early 2019. The platform will not be available for any editing from 3 January 2019 for an estimated 2–3 weeks. The FoA will be available for general viewing during this time.

Please contact the ABRS by email (address below) with any feedback about the FoA content

and platform functionality, or if you would like to contribute new taxon profiles or update existing descriptions.

Contributions to the World Flora Online

The World Flora Online (WFO, Web ref. 5) project was established in 2012 in response to Target 1 of the Global Strategy for Plant Conservation, which aims to achieve ‘an online flora of all known plants’ by 2020. The first public, but as yet incomplete, version of the WFO was launched in July 2017. WFO data managers are now in the early stages of importing taxonomic and descriptive plant biodiversity data from country and regional floras. The ABRS is a participating member of the WFO consortium, with representatives on the WFO Council and the WFO Taxonomic Working Group. The ABRS is currently exploring ways of contributing FoA content to the WFO. To support these discussions, Anne Fuchs (Manager Bioinformatics, Australian National Botanic Gardens) attended the biannual meeting of the WFO Council in Dublin, Ireland, from 3–7 December 2018. Anne also met with bioinformatics experts at the Royal Botanic Gardens Kew, London, UK, to discuss data sharing and collaboration including between the Australian Plant Name Index (APNI) and International Plant Name Index (IPNI). Outcomes of these meetings will be noted in future ABRS reports in the ASBS Newsletter.

Bush Blitz

The first expedition for Bush Blitz III was held in the ACT from 26 November to 6 December. The botanical team included a strong non-vascular plant focus with the team lead by Cecile Gueidan. Team members included Chris Cargill, Simone Louwoff, Nimal Karunajeewa and Dave Albrecht. Dave worked alongside ACT Parks and Conservation staff and horticulturists from the Australian National Botanic Gardens sharing his expertise with land managers. The Blitz included a strong educational and promotional focus with teachers being part of the expedition through Bush Blitz TeachLive assisting botanists and zoologists in the field. Outreach events included a teacher workshop for local teachers and a community day held at the Australian National Botanic Gardens.

Expeditions for 2019 will include Cape Range, WA in May/June (dates TBC) and Little Desert,

Victoria in November (dates TBC). Botanical teams for these expeditions will be coordinated with the assistance of WA Herbarium and National Herbarium of Victoria respectively.

Grants

The 2019–20 National Taxonomy Research Grant Program (NTRGP) Research Grants and Capacity-Building Grants rounds closed to submissions on 29 November 2018. Successful applications will be announced in late February 2019. More information on the NTRGP is available at the ABRIS website (Web ref. 7).

Web references

- 1: www.ausflora.org.au
- 2: www.anbg.gov.au/abrs/Mosses_online/index.html
- 3: <https://biodiversity.org.au/nsl/>
- 4: <https://profiles.ala.org.au/opus/foa/profile/Lentibulariaceae>
- 5: <http://worldfloraonline.org/>
- 6: www.instagram.com/bushblitz/
- 7: www.environment.gov.au/science/abrs/grants/

Zoe Knapp & Anthony Whalen
ABRS
abrs@environment.gov.au,
January 2019

Items of interest

Critical collections: preserving collections for future generations

Look for this special issue of the *Philosophical Transactions of the Royal Society B* which explores the creative ways in which researchers have made use of biological collections around the world and advocates for their continued preservation simply because we cannot predict just how valuable they will be into the future (Web ref. 1).

The title of the issue is *Biological collections for understanding biodiversity in the Anthropocene* and it has been compiled and edited by Emily K. Meineke and Charles C. Davis of Harvard University Herbaria, Barnabas H. Daru from Texas A&M University and T. Jonathan Davies of the University of British Columbia (Web ref. 2 & 3). The titles of the papers in the issue are reproduced below and review papers are indicated.

- Botanic gardens are an untapped resource for studying the functional ecology of tropical plants (Review)
- Using museum specimens to track morphological shifts through climate change
- Fossil Atmospheres: a case study of citizen science in question-driven palaeontological research
- Museum specimens of terrestrial vertebrates are sensitive indicators of environmental change in the Anthropocene (Review)
- Fungarium specimens: a largely untapped source in global change biology and beyond (Review)
- Facets of phylodiversity: evolutionary

diversification, divergence and survival as conservation targets

- The use and misuse of herbarium specimens in evaluating plant extinction risks (Review). See IUCN workshop report, p. 40.
- Using insect natural history collections to study global change impacts: challenges and opportunities (Review)
- Historical collections as a tool for assessing the global pollination crisis
- Museum specimens provide novel insights into changing plant–herbivore interactions (Review).
- Bookkeeping of insect herbivory trends in herbarium specimens of purple loosestrife (*Lythrum salicaria*)
- A novel proof of concept for capturing the diversity of endophytic fungi preserved in herbarium specimens
- The history and impact of digitization and digital data mobilization on biodiversity research (Review)
- Specimen-based analysis of morphology and the environment in ecologically dominant grasses: the power of the herbarium
- Herbarium specimens reveal substantial and unexpected variation in phenological sensitivity across the eastern United States

Web ref.

- 1: <https://news.harvard.edu/gazette/story/2018/11/a-special-journal-explains-the-critical-importance-of-biological-collections/>
- 2: <http://rstb.royalsocietypublishing.org/content/374/1763> (contents)
- 3: <http://rstb.royalsocietypublishing.org/content/roytpb/374/1763/20170386.full.pdf> (intro)

DNA Barcoding of Australian plants using herbarium collections

Dormontt et al. review the present state of barcoding for Australian plants and “urge that large-scale and coordinated analysis of herbarium collections be undertaken to realize the promise of DNA barcoding and metabarcoding, and propose that the generation and curation of reference data should become a national investment priority”.

Reference

Dormontt, E.E.; Dijk, K. van; Bell, K.L.; Biffin, E.; Breed, M.F.; Byrne, M.; Caddy-Retalic, S.; Encinas-Viso, F.; Neville, P.; Shapcott, A.; Young, J.M.; Waycott, M. & Lowe, A.J. (2018). Advancing DNA Barcoding and Metabarcoding Applications for Plants Requires Systematic Analysis of Herbarium Collections—An Australian Perspective. *Frontiers in Ecology and Evolution* 6. Article 134. <https://doi.org/10.3389/fevo.2018.00134>

Going to the source: a need to question database outputs?

The paper below was published recently and a paragraph has been reproduced here since it demonstrates some of the difficulties of dealing with Australian orchids, the general confusion surrounding their names, and even misconceptions about taxonomy. Inconsistencies in AVH database records exposed here might be attributed to the group involved, but a listing of 1538 species with 174,591 collections in 2014 reducing to 212 species and 25,344 collections in 2017 must surely raise some questions, even if it is just about the considerably reduced number of collections. Where did those 150,000 collections go? And you cannot blame the reduction in the number of species from 1538 to 212 on the APC since a consensus orchid taxonomy was still being developed in 2017, and even now has, I understand, still to be projected on the APC website.

From the text (references not copied over): Use of herbarium records for orchid studies is hindered by taxonomic uncertainty, often due to orchids' capacity to readily hybridize and speciate. Many Australian orchid groups have undergone revisions, sometimes involving controversial splitting of genera (Hopper, 2009; Jones, 2006) and strict taxonomic rules may underrepresent true orchid species richness. For example, in 2014, the Australian Virtual Herbarium listed 1,538 Australian orchid species and

174,591 collection records, whereas in 2017, this dropped to only 212 species and 25,334 records. This is largely because the Australian Virtual Herbarium is now taxonomically aligned to the APC and its very conservative nomenclatural rules. In 2017, the APC listed 795 orchid species, but only 333 were APC concept names (confirmed taxonomic entities; CANBR, 2017). The APC also draws from the *Flora of Australia*, for which the Orchidaceae are yet to be treated (ABRS, 2017). The 2017 AVH data are inconsistent with orchid species richness data from the *Kew Botanic Gardens World Checklist of Selected Plant Families* (1,529 spp. in 2014, 1,628 spp. in 2017; WCSP, 2016), and the checklist used and developed by Australian orchid researchers and taxonomists (1,872 spp. including tagnames; Backhouse, Bates, Brown, & Copeland, 2016). Therefore, in our analyses, we use the 2014 Australian Virtual Herbarium data and aim to explore general patterns in orchid distributions, diversity, and herbarium collection.

Reference

Gaskett, A.C. & Gallagher, R.V. (2018). Orchid diversity: Spatial and climatic patterns from herbarium records. *Ecology and Evolution* <https://doi.org/10.1002/ece3.4598>

Using DNA to identify old apple types

Despite the fact that the number of apple varieties is usually quoted at about 7500, today there are probably less than 20 varieties which constitute the major global production of apples. Compare this with the 192 apple varieties suggested for cultivation in South Australia alone in the late 1800s (Kanellos 2013) and it is easy to see a huge loss in genetic diversity. Interesting to read therefore of the use of DNA profiling to characterise apple varieties collected from derelict orchards in Wales (Web ref.). Identities are established by comparison with the National Fruit Collection in Britain and some unique profiles have been recognised. Perhaps there's another Granny Smith out there waiting to be discovered, or maybe that should be re-discovered.

References

Kanellos, T. (2013). *Imitation of life: a visual catalogue of the 19th century fruit models at the Santos Museum of Economic Botany in the Adelaide Botanic Garden: a collection of papier mâché models made by Heinrich Arnoldi & Co. Gotha, Germany (1856-1899)*. (Board of the

Botanic Gardens and State Herbarium: Adelaide).
Web ref.: <https://theconversation.com/how-forensic-science-has-helped-rediscover-forgotten-apples-105003>

Fingerprinting to discern the origin of nuts

No longer do you need to rely on taste or flavour. A technique involving the use of proton nuclear magnetic resonance (NMR) spectroscopy, already used for wine, has been developed for working out the origin of your supply of hazelnuts.

Web ref. <https://www.botany.one/2018/11/reading-the-fingerprints-on-your-nuts/>

First fossil species of *Syzygium* from Snowy Mountains named for David Christophel

Newly discovered fossilised *Syzygium* leaves found in early Miocene (21.5–21.7 Ma) sediments in old gold mining pits near Kiandra in the Snowy Mountains indicate that the area was likely to have been temperate rain-forest at that time (Tarran et al. 2018). The new fossil taxon has been named *Syzygium christophelii* sp. nov., in honor of the late David Christophel. A summary of the paper can be seen in *Australasian Science* (Web ref.).

References

Tarran, M., Wilson, Peter G., Paull, R. Biffin, E. & Hill, R.S. (01 October 2018). Identifying fossil Myrtaceae leaves: the first described fossils of *Syzygium* from Australia. *American Journal of Botany* 105(10): 1748-1759. <https://doi.org/10.1002/ajb2.1163> [Abstract only]
Web ref. www.australasianscience.com.au/article/issue-novdec-2018/lilly-pilly-fossils-reveal-snowless-snowy-mountains.html

Development of a daisy flower

For the daisy fans amongst us, Bob Parsons has drawn attention to this article on the role that auxin plays in the formation of the distinctive flower heads of Asteraceae.

Reference

Zoulias, N., Duttke, S.H., Garcês, H.M.P., Spencer, V.M.R., Kim, M. (November 2018). Auxin and pattern formation of the Asteraceae flower head (capitulum). *Plant Physiology* <https://doi.org/10.1104/pp.18.01119>

The insect apocalypse

Further to the earlier items in *ASBS Newsletter* issue 175 re the disappearance of flying insects as evidenced by the observations of a German entomological group over the past 27 years, there is another good review of this topic and what it means for the rest of life on Earth in the *New York Times Magazine* (Web ref. 1). These signs

of decline had also been noticed and documented in England in a now out of print book published in 2010. Jennifer Owen's *Wildlife of a Garden. A thirty year study* (Web ref. 2) was published by the Royal Horticultural Society. An account of the book and its author and her 30 year study can be found at Web ref. 3. Can the findings of such long term studies (and the commitment required) be entirely replaced by modelling?

Web references

- 1: <https://www.nytimes.com/2018/11/27/magazine/insect-apocalypse.html>
- 2: <https://www.summerfieldbooks.com/wildlife-of-a-garden.-a-thirty-year-study.-2959>
- 3: <https://www.independent.co.uk/environment/nature/me-and-my-garden-how-jennifer-owen-became-an-unlikely-champion-of-british-wildlife-2131712.html>

New Caledonia biogeography

Just published is Michael Heads's updated review of New Caledonia biogeography which I am unable to access.

The biota of New Caledonia is one of the most unusual in the world. It displays high diversity and endemism, many peculiar absences, and far-flung biogeographic affinities. For example, New Caledonia is the only place on Earth with both main clades of flowering plants – the endemic *Amborella* and 'all the rest', and it also has the highest concentration of diversity in conifers. The discovery of *Amborella*'s phylogenetic position led to a surge of interest in New Caledonian biogeography, and new studies are appearing at a rapid rate. This paper [Heads 2018] reviews work on the topic (mainly molecular studies) published since 2013. [From the abstract]

Presumably papers by Nattier et al (2017) and Grandcolas (2016), which were also seen in an unsuccessful search for a review of Head's paper are included in the review; both of these are freely available.

References

- Grandcolas, Philippe. (2016). Ten false ideas about New Caledonia biogeography. *Cladistics* <https://doi.org/10.1111/cla.12176>.
- Heads, M. (2018). Recent advances in New Caledonia biogeography. *Biological Reviews*. <https://doi.org/10.1111/brv.12485>
- Nattier, R., Pellens, R., Robillard, T., Jourdan, H., Legendre, F., Caesar, M., Nel, A. & Grandcolas, P. (2017). Updating the phylogenetic dating of New

Caledonian biodiversity with a meta-analysis of the available evidence. *Scientific Reports* 7: 3705. <https://doi.org/10.1038/s41598-017-02964-x>

Diuris species pollinated by same insect species as Daviesia species it mimics

In southwest Western Australia *Diuris brumalis* shares the same pollinator species as the co-flowering *Daviesia* species it resembles. Despite the lack of any reward, the pollinators, two species of *Trichocolletes*, exhibit the same foraging and mate-patrolling behaviour in *Diuris* as that on the *Daviesia* which does offer a reward. Fruit-set and pollen removal of the *Diuris* was highest where there were greater numbers of *Daviesia* flowers.

Reference

Scaccabarozzi, D., Cozzolino, S., Guzzetti, L., Galimberti, A., Milne, L., Dixon, K.W. & Phillips, R.D. (2018). Masquerading as pea plants: behavioural and morphological evidence for mimicry of multiple models in an Australian orchid. *Annals of Botany* 122(6): 1061–1073. <https://doi.org/10.1093/aob/mcy166>. [Abstract].

Overcoming barriers to siring success in the plant-pollinator world

A fascinating review of the phases involved in successfully transferring pollen to achieve paternity and the barriers which may prevent this.

Reference

Minnaar, C., Anderson, B., de Jager, M.L. & Karron, J.D. (2018). Plant–pollinator interactions along the pathway to paternity. *Annals of Botany* 123: 1–21. <https://doi.org/10.1093/aob/mcy167>

Thiamine possibly leading to declines in wildlife and other emerging issues in global conservation

Thiamine is an essential micronutrient, meaning that animals, including us, must obtain it through our diet. It is not normally a problem acquiring sufficient quantities through our food, although in Australia (but not NZ) it is a mandatory addition to wheat flour for making bread (Web ref. 1).

In 2018 *Trends in Ecology & Evolution* produced their yearly list of emerging issues for global conservation (Web ref. 2). Included in their list was the suggestion that thiamine deficiencies in marine bird and fish populations in the northern hemisphere were leading to population crashes. While there is still debate over whether or not the lack of thiamine is the actual cause there is also consideration being given to why thiamine might be declining in marine areas. Suggestions

range from shifts in thiamine producing algae to environmental pollutants. A review article on the topic is at Web ref. 3.

Interestingly thiamine does not feature in the 2019 list of emerging issues which has just been released (Web ref. 4). Many of the topics which do feature are concerning. They include:

- the release of mercury from thawing permafrost,
- options for reducing plastic pollution,
- the development of salt-tolerant strains of rice, the development of insurance products to protect natural assets,
- development of commercial fisheries in the largely unexplored Mesopelagic zone (200–1000 m),
- clearance of species-rich Indo-Malay islands,
- manipulation of plant biomes,
- transgenic oilseed crops that produce Omega-3 fatty acids, and
- their effects on insects and the effects that cloud-seeding of the Tibetan plateau by China might have on the weather.

Web references

- 1: <https://www.nrv.gov.au/nutrients/thiamin>
- 2: [https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347\(17\)30289-6](https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347(17)30289-6)
- 3: www.pnas.org/content/115/42/10532
- 4: <https://www.sciencedirect.com/science/article/pii/S0169534718302714>

Sounding the resistance alarm

A concerning review (Web ref. 1) in *Nature Sustainability* by the Living with Resistance Project (Web ref. 2) provides the first global assessment of how the increase in the numbers of resistant antibiotics and pesticides may have already reached tipping point leading to crises in medicine and agriculture. A summary of the paper can be seen at Web ref. 3. Furthermore there is also news of the development of fungicide resistance to the antifungal triazole (Web ref. 4) used to combat invasive aspergillosis, caused by *Aspergillus fumigatus*, in humans. When resistance to triazole was found in humans, it was eventually realised that not only were pharmacists prescribing triazole for humans but many other industries, more particularly agriculture, were also making use of triazole's antifungal properties. Flower-growing areas, tea-fields and rice paddies, barley, wheat and corn fields, as well as flower beds and public gardens all over the world have now been found to have azole-resistant *Aspergillus*. For

those with compromised immune systems this is definitely not good news.

Web references

- 1: <https://www.nature.com/articles/s41893-018-0164-3>
- 2: <https://www.sesync.org/project/living-with-resistance>
- 3: <https://www.stockholmresilience.org/research/research-news/2018-11-13-gambling-with-antibiotics-and-pesticides.html>
- 4: <https://www.theatlantic.com/science/archive/2018/11/when-tulips-kill/574489/>

The mysteries of *Sargassum*

A relatively succinct article on *Sargassum* and the previous mysteries surrounding it and its distribution. Blooms of *Sargassum*, apparently a product of the Brazilian rainforest clearing, are probably here to stay, and the problems and potential of these blooms are considered.

Web ref. <https://daily.jstor.org/great-seaweed-invasion/>

Night-flowering cacti

Crazy Rich Asians the book by Kevin Kwan, now made into a film of the same name, features a party to celebrate the rare blooming of Tan hua flowers, which according to Flora of China is *Epiphyllum oxypetalum* (Web ref. 1). A native of Mexico and Guatemala the species was first introduced to China in 1645, and was first recorded as naturalised in Jinghong, Yunnan, in 1936. Apparently the mucilaginous flower is often eaten in a vegetable soup.

Presumably it is the use of other common names for this species such as the Dutchman's pipe cactus, Queen of the night, Orchid cactus and Night blooming cereus (Web ref. 2) which has led to a mixture of these night blooming cactus species being depicted in accounts on the web, although the nomenclature of this family shares some of the same problems as orchids (Web ref. 3). A search for the common name, Queen of the night, returned 13 different species in 7 genera.

There can be no doubt that there are people who are passionate about these plants. M.H.G. Bongard (1835) wrote in his account of Russian botany at the time that the magnificent garden established by Count Razumovsky¹ at Gorenki², near Moscow in 1786 "first originated in the admiration that its owner felt for a flowering specimen of the Night-

¹ Alexey Kirillovich Razumovsky (1748 – 1822) <https://um.mos.ru/en/personalities/razumovsky/>

² Now part of the city of Balashikha

blowing *Cereus (Cactus grandiflorus)*." This plant is now usually referred to as *Selenicereus grandiflorus*, but, as with *E. oxypetalum*, is also commonly referred to as Queen of the night (Web ref. 4). The garden established because of this passion would eventually be mostly destroyed in 1812 in the sacking of Moscow by Napoleon, but many of its legacies live on in the garden and herbarium in St. Petersburg.

References

- Bongard, M.H.G. (1835). Historical sketch of the progress of botany in Russia, from the time of Peter the Great to the present day and on the part which the Academy has borne in the advancement of science. *Companion to the Botanical Magazine* 1: 181. <https://www.biodiversitylibrary.org/item/106697#page/180/mode/1up>
- Web ref. 1: http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=200014503
- Web ref. 2: <https://awkwardbotany.com/2018/10/10/botany-in-popular-culture-the-tan-hua-flowers-in-crazy-rich-asians/>
- Web ref. 3: <https://cactiguide.com/nomenclature/>
- Web ref. 4: <https://www.nybg.org/poetic-botany/selenicereus/>

The changing face of museums

Caroline Wilson-Barnao's article in *The Conversation* earlier this year (Web ref. 1) touched on a number of the ways in which museums are changing and cited several examples such as the recently opened University of South Australia's Museum of Discovery (MOD; Web ref. 2) and the coming 2020 Science Gallery Melbourne (Web ref. 3). Another take on museums is *Micropia*, the world's first museum for microbes which opened in Amsterdam in 2014. Tim Entwisle's interview with biology educator, Jasper Buikx, of the museum featured on the ABC's *Blueprint for Living* on the 5th January 2019, and made interesting listening even though it was a summer repeat of an earlier interview recorded in July 2017. The *Micropia* website (Web ref. 5) maintains a News section reporting on outcomes from research papers in the field and if you have some time to browse, it contains some fascinating facts.

Web references

- 1: <https://theconversation.com/museum-or-not-the-changing-face-of-curated-science-tech-art-and-culture-95507>
- 2: <https://mod.org.au/>
- 3: <https://melbourne.sciencegallery.com/about-science-gallery-melbourne>

- 4: <https://www.abc.net.au/radionational/programs/blueprintforliving/micropia/10376814>
- 5: <https://www.micropia.nl/en/footer/about-micropia/>

What is a disgusting food?

Sweden's Disgusting Food Museum in Malmo (Web ref. 1) opened at the end of October with lots of publicity, no doubt because we all hold fairly firm views of what we would and wouldn't eat. The idea behind the museum, where people can taste and smell 80 polarising foods judged as disgusting or delicacy, is a serious one and this is an attempt to change people's preconceptions about what is actually disgusting and perhaps persuade the acceptance of alternative foods which are more sustainable in the future. Australia features (Web ref. 3) with Vegemite, Witchetty grubs and somewhat unbelievably, musk sticks (but see Web ref. 2 and be surprised). These choices seem particularly bland in the light of competition from maggot-infested cheese from Sardinia and century eggs and baby mouse wine from China (Web ref. 3, also with other "different" drinks from around the world) and perhaps the curators might have been more interested in the 19th century fare in Sydney (web ref. 5) which included kangaroo, wombat and echidnas, although it would presumably only be the first which would be sustainable. Most of the foods listed are animal-based but exceptions include the durian and Stinky tofu, a pungent bean curd from China. The museum is open for three months and it is then planned that it will tour to Germany, Japan, China and the U.S. Perhaps some enterprising museum in Australia will also embrace the idea.

Web references

- 1: <https://disgustingfoodmuseum.com/>
- 2: <https://www.sbs.com.au/food/article/2017/11/23/musk-sticks-lolly-divides-nation>
- 3: <https://www.abc.net.au/news/2018-10-31/disgusting-food-museum-to-challenge-perception-of-disgust/10425446>
- 4: <https://www.independent.co.uk/travel/news-and-advice/terrifying-booze-camel-milk-scorpion-vodka-snake-wine-a7543101.html>
- 5: <https://www.abc.net.au/news/2018-07-29/what-did-sydneys-early-settlers-eat/10038296>

Which human uses are acceptable in parks?

With the increasing pressure being placed on national parks for nature-based tourism (Web ref. 1) this is a timely cautionary article (Web ref. 2) by Professor Bill Laurance of James Cook

University and David Salt of ANU. Both are key members of ALERT, the Alliance for Leading Environmental Researchers & Thinkers (Web ref. 3; see also p. 22).

Web references

- 1: <https://www.theguardian.com/environment/2018/dec/19/turning-wilderness-into-theme-parks-the-great-national-parks-debate>
- 2: <https://theconversation.com/trails-on-trial-which-human-uses-are-ok-for-protected-areas-105742>
- 3: <http://alert-conservation.org/about-us/>

Cities need to incorporate nature in their planning

With the increasing urbanisation of the globe, there are more and more articles on the need for urban dwellers to be able to interact with nature for their well-being. The three articles listed here address different aspects of the need to green our cities. The first is on the design of cities to incorporate both people and nature (Garrard et al. 2018)) and the second on overcoming the notion that urban environments have little to offer in the way of conservation value (Soanes et al. 2018). Both of these are Melbourne studies while the last is a global review of the need for urban-dwellers to live in close enough proximity with nature to maintain mental health (McDonald et al. 2018).

References

- Garrard, G., Williams, N. & Bekessy, S. (2018). Here's how to design cities where people and nature can both flourish. <https://theconversation.com/heres-how-to-design-cities-where-people-and-nature-can-both-flourish-102849>
- Soanes, K. et al. (2018). Correcting common misconceptions to inspire conservation action in urban environments. *Conservation Biology*. <https://doi.org/10.1111/cobi.13193>
- McDonald, R.I., Beatley, T. & Elmqvist, T. (2018). The green soul of the concrete jungle: the urban century, the urban psychological penalty, and the role of nature. *Sustainable Earth* 1: 3. <https://doi.org/10.1186/s42055-018-0002-5>

Don't use modal verbs?

What is a modal verb and why does it make the difference between the deliveries of politicians and scientists? Politicians use surety to get their message across – while scientists tend to introduce modal verbs like *can*, *may*, *must*, *will*, *shall*, *could*, *might*, *ought to*, *would* and *should*, all of which add varying measures of uncertainty to any message and arguably weaken its impact.

Web ref. <https://daily.jstor.org/the-hidden-life-of-modal-verbs/>

Reviewing a manuscript for a scientific journal

Further to the workshop just held in Brisbane and other sites already pointed to, such as the British Ecological Society in the last newsletter, Karen Wilson has recommended the Springer tutorial on this subject. [From ASBS Facebook pages].

Web ref. <https://www.springer.com/gp/authors-editors/authorandreviewertutorials>

Rectangular icebergs! What next?

Heather Cunningham, one of our volunteers in AD, drew attention to this amazing image.

Web ref. <https://www.sciencealert.com/tabular-iceberg-nasa-photo-antarctica-larsen-c-ice-shelf-operation-icebridge>

The-most-abundant-creature-you've-never-heard-of

An intriguing title in a recent JSTOR Daily. Have you heard of conodonts? They are not plants.

Web ref. <https://daily.jstor.org/the-most-abundant-creature-youve-never-heard-of/>

Houseplant genetically modified to remove chloroform and benzene

Removing small molecules which are possibly carcinogenic from the home using air filters is not possible. Here a common houseplant, *Pothos*, has been genetically modified to remove chloroform and benzene from the air in the home and convert it for its own use.

References

Long Zhang, L., Routsong, R. & Strand, S.E. (2018).

Greatly enhanced removal of volatile organic carcinogens by a genetically modified houseplant, *Pothos* ivy (*Epipremnum aureum*) expressing the mammalian cytochrome P450 2e1 gene. *Environmental Science & Technology*, 2018; <https://doi.org/10.1021/acs.est.8b04811>

University of Washington. "New houseplant can clean your home's air." *ScienceDaily*. 19 December 2018. www.sciencedaily.com/releases/2018/12/181219093911.htm.

Models show global warming causes greater extinction rate due to web of life

A paper by Strona & Bradshaw (2018) published recently in *Nature Scientific Reports* examines how co-extinctions annihilate planetary life during extreme environmental change. The outcomes of this paper have been summarised in a more readable account in *ScienceDaily*, but basically modelling by Strona and Bradshaw has shown that the numbers of species facing extinction as the globe warms is much higher than first thought because of the interdependencies of species.

References

Strona, G. & Bradshaw, C. (2018). Co-extinctions annihilate planetary life during extreme environmental change. *Nature Scientific Reports* 8(1). <https://doi.org/10.1038/s41598-018-35068-1>

European Commission Joint Research Centre. "Global warming increases the risk of an extinction domino effect." *ScienceDaily*. <http://www.sciencedaily.com/releases/2018/11/181128114954.htm> (accessed January 14, 2019).

Meeting and workshop reports

IUCN Proteaceae workshop

Some of us experienced our first taste of an International Union for Conservation of Nature (IUCN) Red List workshop in Perth in October 2018. The workshop focussed on Australia's Proteaceae was hosted by WA's DBCA department through Margaret Byrne, and was held in the same building as that which houses the PERTH herbarium (this would probably be the only time that we have visited Perth and not looked at collections in the herbarium). This was apparently the first land plants workshop to be held in Australia, although there have been workshops on lizards (outcomes reported at Web ref. 1) and one is due on fresh-water fish the week after the second Proteaceae workshop

in Melbourne in early February. Because of the number of Australian Proteaceae species this first workshop dealt only with the Western Australian species while the second one will cover the eastern species.

Participants and their roles were:

- IUCN representatives - Neil Cox, Janice Chanson, Eren Delgado and Jing Zhan representatives of IUCN. Organisation and running of the workshop. Recorders of information supplied by the participants.
- Systematists: Bob Makinson, Bill & Robyn Barker, Alex George, Ryonen Butcher, Peter Weston

- On the ground information: Sarah Barrett, Leonie Monks, Neil Gibson, Greg Keighery. These were the people, along with Alex George, with the invaluable local knowledge. Even so, there were still assumptions that needed to be made, with respect to a number of aspects of a species biology.
- Advisory: David Keith of the University of New South Wales, and Ken Atkins, DBCA. David is one of the team which developed the criteria that underpin the IUCN Red List of Ecosystems, the first comprehensive and quantitative method for assessing risks to ecosystems. Ken has long been involved in the development and implementation of the WA regulations for the protection of threatened species and threatened ecological communities.

Alignment between Australian (state and national bodies) and IUCN regulations has apparently been agreed to in principle by all states but there would appear to be quite a lot more work needed before such an alignment is achieved. From our perspective, as outsiders looking in, the IUCN method seems to rely heavily on herbarium distribution maps, which is how our first rare and threatened lists were put together from the 1980s (various printed editions of *Rare or Threatened Australian Plants* between 1981–1996), albeit without the digital mapping of today. Recently there has been a timely review of the IUCN process (Lughadha et al. 2018) (see p. 34).

We enjoyed the workshop for the people involved and for what we learned but couldn't help feeling that information already gathered to inform Commonwealth EPBC lists (Web ref. 2) and

the various state lists had usually involved field observations of the species concerned. However, that said, the IUCN process did identify a smallish number of species which had not previously been considered for priority listing in WA and these have now been added to their list for consideration.

By the end of the February workshop IUCN team members should have an understanding of Australia's now more advanced processes for rating threatened species in each jurisdiction and how they work together. Will Australian representatives have an appetite, or the finances, for repeating evaluation processes for the global Red List for plants? Rather there seems a need for the IUCN to build on the efforts already in train to rationalise the Australian schemes in terms of consistency and efficiency.

References

- Briggs, J.D. & Leigh, J.H. (1988, 1996). *Rare or threatened Australian plants*. (Australian National Parks and Wildlife Service: Canberra). (Two editions).
- Keith, D.A. et al. (2013). Scientific Foundations for an IUCN Red List of Ecosystems. *Plos One*. <https://doi.org/10.1371/journal.pone.0062111>
- Lughadha, E.N. et al. (2018). The use and misuse of herbarium specimens in evaluating plant extinction risks. *Philosophical Transactions of the Royal Society B: Biological Sciences* 374, Issue 1763. <https://royalsocietypublishing.org/doi/full/10.1098/rstb.2017.0402>
- Web ref. 1: <https://www.iucn.org/news/species/201807/australias-reptiles-threatened-invasive-species-climate-change-iucn-red-list>
- Web ref. 2: www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=flora

Robyn and Bill Barker

The State of the World's Fungi.

Symposium at the Royal Botanic Gardens, Kew, September 2018.

In September 2018 a two-day symposium on the state of the world's fungi was held at the Jodrell Laboratory, Royal Botanic Gardens, Kew, UK. More than 260 mycologists, botanists, plant breeders and plant pathologists, industrial chemists, those working in bioinformatics and systematics, conservationists, lichenologists, growers of fungi – anyone with a serious interest in fungi – gathered to learn about, mull over and review the current state of knowledge of all aspects of fungi.

At the symposium a report, the '*State of the World's Fungi*' was launched which covered fungal diversity, the fungal tree of life, new discoveries, useful fungi, plant-fungal interactions, fungal genomes, fungal conservation, threats posed by fungal pathogens and climate change.

Professor Kathy Willis, Director of Science at the Royal Botanic Gardens, opened the conference with a rationale for the symposium and report, and an overview of current knowledge of fungi. She observed that, in spite of fungi being essential for life on earth, knowledge of fungi is scant when compared with that of animals and plants. With

an approximate number of 3 million species and only 144,000 or 5% named, fungi are the poor relations.

There were four speakers in each session, each selected on the basis of their expertise in their area of mycology or fungal-related industry. At the end of the presentations, the four speakers formed a panel to discuss the situation pertinent to their field and answer questions from the audience. This effectively brought together the points raised in the talks.

The first session of the conference, on conservation of fungi, looked at global red listing and how it is practiced in Europe and Nordic countries. From South America Giuliana Furci of the Fungi Foundation, Chile explained how the Foundation had lobbied politicians over a two year period with the result that now in Chile fungi must be classified in a national inventory using scientific, ethical and IUCN red-listed criteria. Fungi must be included in environmental impact assessments. Resulting from Chile's Environmental Law, more mycologists and taxonomists are being employed. In other talks, the importance of IUCN red-listing was emphasized, with the recognition that fungi are poorly represented when compared with animals and plants: world-wide only 56 fungi are on the IUCN Red List, compared with 25,452 plants and 68,054 animals.

A session on plant-fungal interdependence explored the roles of mycorrhizal and saprotrophic fungi. Other talks discussed the probable co-evolution of fungi and land plants. It is thought that, around 450 million years ago, land plants evolved from green algae and were without roots, that fungi 'invaded' the plants and contributed nutrients and water, the plant provided energy-giving sugars from photosynthesis. Without fungi plants may never have successfully colonized the land. Another session was devoted to lichens: their diversity, importance and evolution.

The second day's presentations included the uses of fungi and the problems they may cause. There are 350 or so edible species including the well-known *Tuber melanosporum*, the black truffle. Fungi are also used extensively in the food and beverage industries. The roles of fungal endophytes are being increasingly recognized. They are thought to occur in all plants, living within root, stem and leaf tissue. Though some may be harmful, many confer advantages to their

host such as resistance to drought, heat, salinity and pests. Trials have been conducted with a seed treatment containing fungal endophytes with a view to improving crop production and mitigating the effects of climate change.

Medicinally, anticancer drugs such as cyclosporine and the cholesterol-lowering drug lovastatin have been in use for some time and 15% of all vaccines and therapeutic proteins are made from yeast. Some vitamin supplements are the result of fungal fermentations. The industrial use of fungal metabolites is increasing. Enzymes from fungi are used in washing detergents and in cotton and leather processing. Fungi are used in the making of plastics, including Lego, the production of biofuels, in paper manufacturing and even in the making of biodegradable, synthetic leather. They are important in bioremediation, cleaning up polluted soils and waterways.

On the downside, fungal diseases can have devastating effects. In spite of increased biosecurity, there has been an increase in imported fungal diseases. Examples of ways in which to manage crop pathogens were presented. The conference report looks at examples of pathogens and their effects. In Australia, myrtle rust, *Austropuccinia psidii*, was introduced from its native South America. In the early 1900s Chestnut blight, *Cryphonectria parasitica*, all but wiped out chestnut trees in North America. Dutch Elm Disease caused by *Ophiostoma novo-ulmi* and more recently *Phytophthora ramorum* the pathogen causing Sudden Oak Death and *Hymenoscyphus fraxineus* (Sudden Ash Dieback) have changed woodland and urban environments across Europe. Human fungal diseases caused by *Cryptococcus neoformans* and *C. gattii* also on the increase. There is also the wastage of crops caused by mildews, rusts and smut fungi.

The final session of the conference was devoted to 'the dark taxa', those with only a molecular signature and no voucher specimen. The session included discussion of some of the problems involved in naming and classifying fungal species and with dealing with the huge amount of knowledge being accumulated.

Probably over 90%, of the estimated 3 million species of fungi are not described, most discoveries of new species come from molecular sequencing of soils and other environmental sources. World-wide, the present rate of naming and classifying

new fungal species is around 2000 per year. At this rate it would take 1000 to 1800 years to describe all species! In addition only between 5% and 7% of all species presently described have been sequenced. Next-generation sequencing and other technologies have unleashed a wealth of data but these data need to be interpreted, a problem in itself. These problems were not resolved in the discussions, though recognition is an important first step. On the positive side, there are whole genomes for over 1,500 species of fungi, more than the number sequenced for plant and animal species combined (326 plant, 868 animal species with whole genome sequences). Knowledge of the genes and metabolic pathways is helping the design of effective therapies against pathogenic fungi. Genome sequencing of mycorrhizal fungi is providing insights into how to manage ecosystems more effectively and to deal with problems facing humanity such as climate change.

The conference concluded with a lightning poster session. Each of the 67 presenters had to advertise and explain their poster in 45 seconds. The whole ‘performance’ was accomplished most impressively in one hour!

Summarizing the state of the world’s fungi in a conference lasting two days was, I think, a remarkable achievement. There was also an increasing buzz of excitement. Organisation was superb from impeccable time-keeping in all sessions to cheerful management of the audience, including shepherding us all around the pond behind the Jodrell Laboratory for a group photo.

The many problems involved in increasing knowledge and understanding of this vast kingdom could not be solved during the conference. Nor could further methods be developed to ‘harness’ fungi for the betterment of humans and the environment. Nonetheless, delegates left satisfied and stimulated by the discussions of what had been achieved and excitement about the future of mycology.

Web references

1. https://stateoftheworldsfungi.org/2018/reports/SOTWFungi_2018_Full_Report.pdf
2. <https://www.kew.org/state-of-the-world%E2%80%99s-fungi-symposium-programme>
3. <https://www.kew.org/sites/default/files/SOTWF%20Symposium%20Booklet%202018.pdf>

Pam Catcheside
State Herbarium of South Australia

Victorian Goodeniaceae workshop

Australian Plants Society (Victoria) 12th FJC Rogers Seminar, Horsham, Victoria 20th – 21st October 2018

In late October 2018, the Australian Plants Society (Victoria) held a two day seminar as part of the FJC Rogers seminar series (Web ref. 1), on the family Goodeniaceae, at the Holy Trinity Lutheran College in Horsham in western Victoria.

The main program included a day of presentations, garden viewings and plant sales, with over 200 registered participants (a huge turnout!). Along with horticultural presentations by living legends Hazel Dempster (Perth) and Rodger and Gwen Elliott (Melbourne), colleagues Kelly Shepherd (PERTH), Neville Walsh (MEL) and I presented on Goodeniaceae systematics, Victorian Goodeniaceae, and nomenclature and scientific plant names in the family, respectively.

Hazel Dempster’s presentation on the propagation of Goodeniaceae from leaf material was particularly fascinating: many (all?) members of the family appear to strike readily from

vegetative (leaf) material, often with remarkable vigour. As well as the keynote presentation on her systematics research in *Goodenia*, Kelly also gave a thoroughly entertaining and inspiring after-dinner presentation on her early life and career as a systematist, “From the farmyard to fan-flowers and forensics”, taking a near-catastrophic equipment failure midway through proceedings in her stride.

The seminar organisers worked incredibly hard, and their efforts were amply demonstrated in a very interesting and extremely well run program, and the excellent support and hospitality provided to speakers and participants alike. Even if (like me) growing plants of any kind is not your thing, these events are highly recommended.

For further information on the FJC Rogers seminar series, and other APS Victoria activities, visit the Society’s web site (Web ref. 2).

Web references

1. <https://apsvic.org.au/fjc-rogers-seminars>
2. <https://apsvic.org.au/>

Brendan Lepschi
Canberra

Miscellanea

Using torch light to non-invasively examine hidden flower parts in herbarium specimens

Transmitted light is commonly used in microscopy, but I've not come across its use in examining herbarium specimens. This efficient approach is not at all sophisticated and applies only for viewing through thin corolla tissue, but it might prompt others to improve on it, find another accessible solution, or communicate one already established.

In 1985 I remember looking at the type of *Limosella diandra* L. from the Cape of Good Hope, housed in the Linnean Herbarium and still the only record of *Glossostigma diandrum* (L.) O.Kuntze from the south of Africa. Similar plants in *G. drummondii* F.Muell. have four stamens. The only hope of checking on stamen number seemed to be by photography using X-rays and there was little likelihood of gaining permission and organising to undertake such a process. X-rays have been used since in morphological work, e.g. in the studies of leaf venation (Christophel & Hyland 1994).

Similar issues have continued in my work on the fragile dried flowers of the families that, until

recently, were encompassed by the traditional circumscription of the Scrophulariaceae. An example is the need to examine the morphology of stamens and abaxial staminal spurs and staminodes of the Linderniaceae. While within a population the shape of the staminodes can vary from plant to plant, there are often few flowers on each dried specimen. One is continually confronted with deciding whether carefully slitting the corolla to examine the staminodes or anther spurs is warranted and which corolla will provide the best chance of rendering the information.

Purchase a couple of years ago of a flat-faced torch in which the LED bulbs produce an intense cold light provided a solution. Intensity of each bulb (only one shone through the flower) was sufficient to transcend the thin mounting sheets used for most herbarium specimens and show the outline of these features under the stereo dissection microscope.

Since then it was suggested I use the torch of my smart phone, providing the best light intensity so far. The increase in clarity of the variation between individuals of staminode shape enabled sufficient detail to separate two Kimberley look-

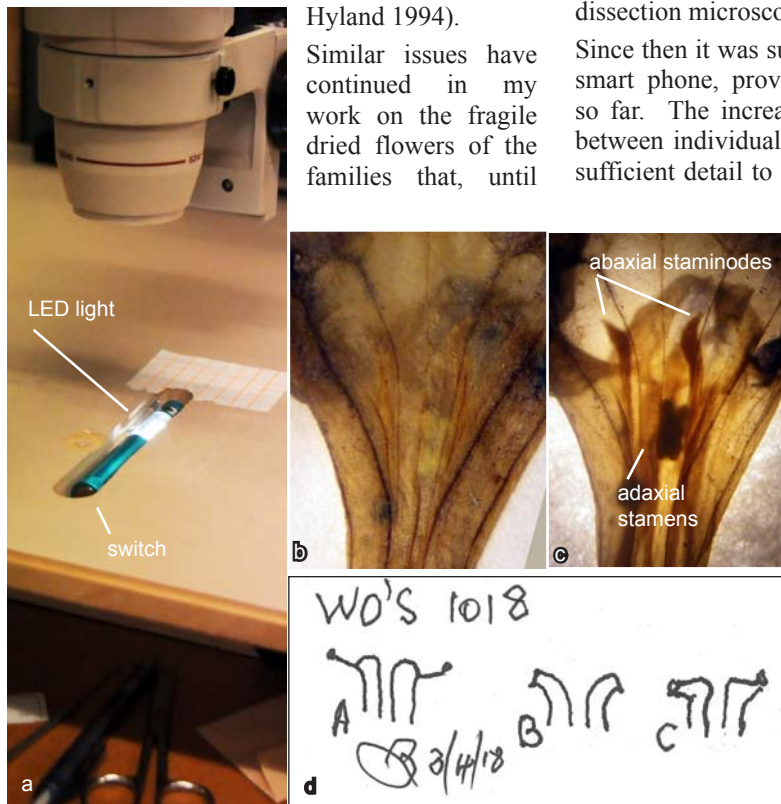


Fig.1. a, bench top with the torch in a cavity designed for ease of switching it on and off and moving microscope into the exact position for viewing. b-c, flower of *Lindernia tectanthera* (Barker 8074) on herbarium sheet; b, viewed with reflected light; c, viewed with torch light from my Oppo smart phone transmitted through the herbarium sheet and flower. d, label annotation on *W. O'Sullivan 1018* in PERTH showing staminode variation in three plants of *Lindernia lobelioides* marked A to C on the sheet detected by transmitted torch light.

alikes, *Lindernia tectanthera* W.R.Barker and *L. lobelioides* (F.Muell.) F.Muell. (Fig. 1 b-d)).

Most recently I have built a bench out of timber and laminated custom wood off-cuts, with a cavity cut out for a torch permanently placed at the level of the bench (Fig. 1a). The torch, which I purchased for around AUS\$6, runs on a single AA battery. While the more intense light of the smart phone is needed on occasions, the LED torch makes examining flowers while working through herbarium specimens more efficient. One only has to press the button on the end of the torch, already in place, return the herbarium sheet to position the flower in the torch light and turn down the normal reflective light source.

My approach with each *Lindernia* where I am aware of variability is to sketch the relevant hidden organ on a label on the herbarium specimen, allowing continued reference and others to benefit in the future (Fig. 1d).

To produce an image at my workplace I have an

efficient process using a popular camera (Pentax Optio WG-1) placed on the eyepiece of the stereo dissecting microscope (it has been used in the flower images here)¹. This provides rapid capture for use in compiling descriptions, but for serious publication I would use a dedicated photography system.

If someone has a better approach for quick viewing of specimens it would be good to hear about it. For example, I am on the lookout for a more intense LED source, which is safe and efficient to operate, that can be placed in a custom-routed bench top cavity.

Reference

Christophel DC, Hyland B. 1994. *Leaf atlas of Australian tropical rainforest trees*. Canberra: CSIRO.

Bill Barker

¹ Settings (courtesy Peter Hunt): Focus infinity, manual; 2 second Self timer (fingers removed to steady the camera); Flash off; "Program" [basic] Shooting Mode allowing for a choice of settings, e.g. White Balance.

Novel ways of encouraging weed removal

Community action can sometimes be mobilised to remove some pernicious weeds. Here are three events in which environmental groups have involved the greater community in helping with weed removal.

Tallest weed competition

Country shows have changed since my day. At the Penola Show in the South-East of SA the SE Natural Resources Management Board sponsored a tallest weed (identified by common name) and a collection of common and agricultural weeds (also identified by common name) competition for children, which, if you think about it, is probably an interesting way of drawing attention to them. Also a sign of the times, the 77 entries in the "Blokes chocolate cake" competition!

Web references

<https://www.facebook.com/yournrse/>

<https://www.facebook.com/sophiethomsonpublicfigure/photos/pcb.2205415479713968/2205414079714108/?type=3&theater>

Boise Goatshead Fest

Likewise the inaugural Boise Goatshead Fest in the USA and its aim to reduce the Goatshead Monster, alias *Tribulus terrestris* (Web ref. 1 & 2). Also known as puncture vine or caltrop, this species is a global problem when associated with

bike tyres, bare feet and thongs. The festival follows a month of community removal of the species in nominated areas and in return for a pound of properly collected, bagged plants (see video on both websites) the collector receives tokens to be used at the festival. The festival is appropriately associated with the Boise Bicycle Project a nonprofit bicycle cooperative which returns used bikes to the community and educates the recipients, usually low income, on their maintenance (Web ref. 3), particularly how to mend a puncture caused by the *Tribulus*.

Similar events, offering various incentives to the community for the collection of weeds, but particularly caltrop, have been run by the Kalgoorlie-Boulder Landcare group, since at least 2011 (Web ref. 4 & 5).

Web reference

1: <https://www.boisegoatheadfest.com/>

2: <https://www.idahostatesman.com/outdoors/playing-outdoors/article214747435.html> (also with video)

3: <https://www.boisebicycleproject.org/about/mission/>

4: www.kbulg.org.au/wp-content/uploads/2013/05/Weed-Competition-2005.pdf

5: www.kbulg.org.au/wp-content/uploads/2018/01/caltrop-eradication-comp-Kalminer-10x7.png

Robyn Barker

Deaths

Elizabeth Edgar (1929–2019)

New Zealand plant taxonomist Dr Elizabeth Edgar passed away at age 89 on 1st Jan 2019 in Christchurch.

Elizabeth was one of New Zealand's most esteemed taxonomists, author of three monoco volumes of the *Flora of New Zealand* series and of numerous generic revisions and monographs particularly in Poaceae.

With a degree in classics, Elizabeth's career started as a librarian at the DSIR, but her association with Dr Lucy Moore set her on a course to plant taxonomy. She completed a B.Sc. in Botany while at the DSIR. On leave of absence she completed a M.Sc. on *Cotula* and a Ph.D. on cell division in *Lonicera nitida* at the University of Canterbury and returned to Botany Division DSIR to work with Dr Moore on volume 2 (1970) of the *Flora of New Zealand* series, tackling large and difficult genera such as *Carex* and *Juncus*. With Arthur Healy, she published volume 3 (1980). Notably, this was the first *Flora of New Zealand* volume including

both native and naturalised species where they occurred in the same genus. Also notable is her revision of Australasian *Luzula* and a revision of New Zealand's largest grass genus *Poa*. Elizabeth then tackled the *Flora of New Zealand Grasses* with her colleague Henry Connor, completing a draft before her retirement in 1988. The *Flora of New Zealand Grasses*, volume 5 of the *Flora of New Zealand* series, was published in retirement when Elizabeth was a research associate of the Allan Herbarium (Landcare Research); it was the first of two editions (2000, 2010).

Elizabeth had a thorough knowledge of the rules of nomenclature and of the botanical literature and her excellence in this area led to her recognition

as New Zealand's foremost authority on naming and describing plants. The *Annals of Taxonomic Research* published in each of the *Flora* volumes are one result of this work. Always of a kindly disposition and most generous with her time to help all colleagues, Elizabeth exemplified the true spirit of science. A mighty *Poa* has fallen.

Obituaries have already been written celebrating her achievements (Web ref. 2, 3) and Thompson's (2000) celebration of her life is an earlier splendid tribute to her achievements.

References

Thomson, A. D. (2000) Tribute to Dr Elizabeth Edgar, leading plant taxonomist and flora-writer. *New Zealand Botanical Society Newsletter* 60 (June): 29–31. <https://web.archive.org/web/20170406031503/http://www.nzbotanicalsociety.org.nz/newsletter/NZBotSoc-2000-60.pdf>

Web ref. 1. <http://deaths.press.co.nz/obituaries/the-press-nz/obituary.aspx?page=lifestory&pid=191233719>

Web ref. 2. <https://www.stuff.co.nz/the-press/news/109804769/life-story-dr-elizabeth-edgar-celebrated-as-one-of-new-zealands-leading-botanists>

Web ref. 3. <https://royalsociety.org.nz/150th-anniversary/150-women-in-150-words/1918-1967/elizabeth-edgar/>

Kerry Ford
Allan Herbarium, Lincoln

Elizabeth Edgars's death notice in *The Press* (Web ref. 1) describes her as

“An esteemed Botanist, author, musician and cat lover”...

A memorial service celebrating Elizabeth's life will be held at Plant and Food Research, Gerald Street, Lincoln, on Sunday, February 24, at 2.00pm.

Eds



Elizabeth Edgar in 1993 at Lincoln, cutting a cake celebrating New Zealand Women in Science.

Joy Thompson obituary: a postscript

Many thanks to Karen Wilson and Barbara Briggs for giving us a well-researched and rounded account and celebration of Joy Thompson's life. Also for reprinting Joy's talk to the NSW staff in 2003; I could almost hear her speaking!

I corresponded with and collected for Joy from the 1980s until well into the 2000s. When this exactly started and stopped I cannot remember, but soon after sending a parcel of *Swainsona* specimens I would always receive a letter with the identifications. I am privileged to possess an autographed copy of her 1993 *Swainsona* revision.

As I have always collected in WA and the NT and

was a very rare visitor to NSW, I never met Joy until 2000 when I attended the *Flora Malesiana* conference in Sydney. Somehow Joy learnt I was going to be at the NSW Herbarium and she made a special effort to come to see me that day. I didn't realise what a privilege this was until I read her obituary and learnt that she lived a 2.5 hours train trip out of Sydney.

Thanks for your hard work Joy. It was a pleasure knowing you.

Andrew Mitchell
Perth

Les Pedley (1930-2018)

Les was a long-time botanist at the Queensland Herbarium. He died on 27th November, 2018, aged 88 and his funeral was held in Brisbane during the ASBS conference week. He is mostly known for his work in *Acacia*, but his interests were much wider than this. We hope to bring

you more in another Newsletter or will point to the publication of a full obituary elsewhere documenting his botanical life.

Margaret Stones (1920-2018)

Renowned Australian botanical illustrator, Margaret Stones AM, MBE, GM passed away on 26th December in Epworth, Richmond, Australia. She was born in Colac.

Tributes to Margaret Stones and her work have already been produced by the Botanical Art and Artists Society (Web ref. 1) and by the Special Collections section of the Louisiana State University Libraries (Web ref. 2) while a summary of her life with further references can be found on the Australian Women's Register (Web ref. 3).

Briefly, after training in Melbourne where she also forged associations with the School of Botany at Melbourne University she moved to Britain in 1951. Here she was able to support herself on commissions from a number of botanical institutions, one of the main ones being her role as principal artist for Kew Gardens' *Curtis's Botanical Magazine* from 1958-1983, producing more than 400 watercolours. She also did work for George Taylor, then Keeper of Botany at the Natural History Museum, and it was he who named the African genus, *Stonesia*

(Podostemonaceae), in her honour (Taylor 1953). Another well-known commission was her work from 1967 to 1978 with Tasmanian botanist, Winifred Curtis, with funding from Lord Talbot Malahide and his sister, Rose Talbot, to produce the six volumes of *Endemic Flora of Tasmania*. The monotypic genus *Stonesiella* (Fabaceae) was named in her honour because of her illustration of it in this "monumental work" (Crisp et al. 1999).

From an initial commission to produce 6 watercolours to celebrate the 50th year of Louisiana State University and the American bicentenary in 1976, Margaret Stones and Lowell Urbatsch, Professor of Botany at Louisiana State University eventually published the *Native Flora of Louisiana* in 1991 with 200 illustrations. An updated limited edition of this book was released by the University in November last year. Works from another commission to illustrate Himalayan plants for friends, George and Betty Sherriff are now housed in the Royal Botanic Gardens, Edinburgh (Web ref. 4).

She returned to live in Melbourne in 2002. Her

life's work was the subject of a biography by friend Irena Zdanowicz (Zdanowicz 1996) and she held honorary degrees from the University of Melbourne, Louisiana State University, the University of Tasmania and the Swinburne University of Technology, Melbourne.

She was a friend of long-time ASBS member and botanist David Symon and his wife Judy, finding accommodation for them in London in 1963 and occupying and using their granny flat in Adelaide as a studio for some months. David supplied her with plants for illustrating at times when it was too cold for there to be anything flowering in Britain (Judy Symon, pers. comm.). Her painting of *Solanum semiarmatum* F.Muell., owned by David, was used on the cover of the first descriptive volume of the *Flora of Australia*, volume 29, published in 1982.

References

Crisp, M.D., Gilmore, S.R. & Weston, P.H. (1999), Phylogenetic relationships of two anomalous species of *Pultenaea* (Fabaceae: Mirbelieae), and description of a new genus. *Taxon* 48(4): 711.

David Thomas Moore (1936–2018)

David was born in Battersea, London, in February 1936 and passed away on 1st November 2018. He obtained a degree in Botany and Geology from London University in 1965 and joined the British Museum (Natural History) in 1968. His name is most familiar to Australian botanists for his association with the history of the participants in Matthew Flinders voyage on the *Investigator*, particularly the scientist, Robert Brown, the artist, Ferdinand Bauer, and the gardener, Peter Good. David was involved with others in the cataloguing of all of their materials held in the BM.

His most recognised output here is certainly as part of the team which compiled Robert Brown's diary (Vallance, Moore & Groves 2001), released just as celebrations to mark the bicentenary of the Flinders' voyage began in Australia. David and fellow author, Eric Groves, spent time in Australia visiting a number of herbaria and significant sites associated with Flinders as well as attending the 2001 Albany conference, *Investigator 200*, where they both gave papers and the book was launched by David Mabberley (*ASBS Newsletter* 109, p. 23, with a photo of the authors) The authors received the 2002 Thackray Medal of the Society for the History of Natural History for this publication (Web ref.).

Taylor, G. (1953). Notes on Podostemaceae for the revision of Flora of West Tropical Africa. *Bulletin of the British Museum (Natural History)* 1(3): 53–79.

Zdanowicz, Irena (1996). *Beauty in truth: the botanical art of Margaret Stones*. (National Gallery of Victoria: Victoria.

Web ref. 1: <https://www.botanicalartandartists.com/news/rip-margaret-stones-and-jessica-tcherepnine>

Web ref. 2: <https://news.blogs.lib.lsu.edu/2019/01/11/remembering-margaret-stones/> (Louisiana State University Libraries Special Collections tribute)

Web ref. 3: www.womenaustralia.info/biogs/IMP0295b.htm (links to further background on her work).

Web ref. 4: https://www.rbge.org.uk/media/4039/stones_margaret_150215.pdf

Robyn Barker

David had for some time been involved with two other projects which are just about to come to fruition. The first of these, with David Mabberley, is the Robert Brown Handbook, an account of Brown's names and associated herbarium collections. The second is a new and updated journal of Peter Good, co-authored with Alex George. What a great legacy.

David Mabberley has informed us that an obituary will be prepared by the Natural History Museum. Some of the detail included above is from the notes on the compilers in Vallance et al. 2001.

References

Vallance, T.G., Moore, D.T. & E.W. Groves, E.W. (2001). *Nature's Investigator: the diary of Robert Brown in Australia, 1801-1805*. (ABRS Publications: Canberra).

Web ref. <https://www.smh.com.au/entertainment/books/natures-investigator-the-diary-of-robert-brown-in-australia-1801-1805-20020622-gdfdx2.html>

Robyn Barker

Book reviews

Aspects of Kimberley history

Review by Philip Short

Kimberley history: people, exploration and development.
Edited & compiled by Cathie Clement, Jeffrey Gresham & Hamish McGlashan
Kimberley Society, Perth, 2012, reprinted 2016. Softcover, i–xi, 1–247 pp., illustrated (mostly colour), maps, 240 x 170 mm, ISBN 978-0-9587130-2-3. RRP \$49.50 plus postage at <http://shop.broommuseum.org.au/Kimberley-History-by-Kimberley-Society-Inc>

This book is the result of a seminar held in 2010 at the University of Western Australia by the Kimberley Society, and is a well-produced work containing much of interest to anyone looking for well-referenced, approachable accounts of some of the activities of the indigenous and non-indigenous peoples who trod the Kimberley. Sixteen authors contributed to the book, which commences with the “Introduction” by Jeffrey Gresham in which we are reminded, among other things, of the size of the Kimberley and the long occupation of Aboriginal people (commencing at least 55,000 BP), and usefully outlines the content of forthcoming chapters. The first of these, “My Home the Kimberley: An Aboriginal perspective of Kimberley history” by Mark Bin Bakar, is what I assume to have been the opening address of the symposium and one, I trust, was well-received;

it clearly came from the heart and highlights the strong affinity of the Aboriginal people with their land. A far from major part of that address – but one which took my eye – is a brief mention of skin grouping in Aboriginal society. Mark noted that “An example of explaining skin grouping that I use is ‘Who I am to marry in a traditional society is already determined before my grandmother is born.’” Among other things, recognition of skin groupings prevents inbreeding and is also why later in the same chapter Mark could refer to three grandfathers! The last two paragraphs of this chapter left me somewhat flummoxed, with reference to “Mary G. ... queen of the Kimberley”¹. You may know better, but I was not

enlightened until I thought to consult pp. ix–xi of the book, where all contributors are listed, along with a paragraph outlining their relevant backgrounds. I suggest many other books containing multiple authors would benefit by inclusion of such information.

Archaeologist Michael Morwood follows with “Archaeology of the Kimberley, Northwest Australia”, summarising the movement of modern man to northern Australia, including discussion of changing sea levels, and among other things noting that “Cultural contact, exchange and movement of people between

Northwest Australia and Asia probably occurred for the whole duration of human presence in this part of the world”, and citing the introduction of the dingo about 4,000 years ago as one piece of

¹ “Mary G.” is also known as Mary Geddardryu and is a television character created by Mark Bin Bakar.



Kimberley History

People, Exploration and Development



Edited and compiled by
Cathie Clement, Jeffrey Gresham and Hamish McGlashan



evidence for this. Several pages are devoted to the splendid rock art which is found in the Kimberley, with a page of illustrations displaying the range of styles which occur, including animal paintings and the Gwion Gwion (also known as the Bradshaw) paintings and the Wandjina paintings, the latter portraying human-like individuals but with peculiarly rounded head coverings and lacking an obvious mouth. The oldest known art is at Carpenter's Gap and has a minimal age of 42,700 BP.

Very brief mention is made in Morwood's chapter to European and Indonesian visits (the latter visiting to collect trepang from at least 1667) but the next chapter, "Maritime exploration on the Kimberley coast" by Cathie Clement, deals with the observations of Aboriginal people by European mariners, commencing with some by John Lort Stokes in 1838, and then moving backwards in time to observations by Phillip Parker King (1818–1822), Nicolas Baudin (1801 & 1803), William Dampier (1688, 1699) and Abel Tasman (1644), before concluding by mentioning some of the more speculative claims (and some ridiculous ones) of earlier visits by non-aboriginal people to the Kimberley.

While Stokes was busy mapping the Kimberley coastline, some land-based exploration was also taking place, an account of which is given by Hamish McGlashan in his chapter "George Grey's expedition 1837–1838; first European penetration of the Kimberley interior", during which the Wandjina paintings were discovered. Grey, incidentally, had an amazing career – among other things being governor of several British colonies – and was buried in St Paul's Cathedral. A side-wound from an Aboriginal spear received in the Kimberley was also to trouble him for the rest of his life and led to an addiction to laudanum.

Tony Quinlan's "1865 – Camden Harbour –the Quinlan connection" comes next and primarily details an attempt to establish grazing properties at Camden Bay, where more than 100 men, women and children landed in December 1864. The would-be-settlers, all from Victoria and seemingly expecting good, all-year round, grazing country, and a supply of good drinking water were to find that they had been misled. The hot and humid conditions at the time of landing didn't help their frame of mind, and relationships with the traditional owners of the land were not cordial, the latter understandably resenting their

encroachment, albeit finding the livestock a welcome addition to their menu. Given these conditions, and the presence of blowflies (and perhaps the presence of poisonous plants, on this I'm not certain but the possibility is mentioned by Kevin Kenneally on p. 146), it was not particularly surprising to read that within two months of landing, a flock of 4,500 sheep had slumped to 1,354! The settlement was abandoned in October 1865, but not before the authors great grandfather drowned near the settlement during an altercation with Aborigines.

"Guano Mining: Kimberley's first extensive industry" by Tim Willing and Alison Spencer comes next and is an interesting account of mining guano from Browse and other islands off the Kimberley coast. A rather trifling 70,000 tons were mined, and this at huge cost to the workers. Conditions were often harsh, and many lives were lost because of poor anchorages and, amazingly, the loading of guano during the cyclone season.

In "Alexander Forrest's expedition 1879 and early development of the cattle industry" Geoffrey Bolton recounts how, in February 1879, Alexander Forrest and the seven other men of his party, disembarked at Nickol Bay and overlanded to Roebuck Bay, from where they rode to the Fitzroy River and skirted the foot of the King Leopold Ranges before arriving at Walcott Inlet. They then returned to the Fitzroy River and struck out to the north-east, reaching and naming the Ord River on 25 July and shortly thereafter followed the Negri River before entering what is now the Northern Territory, ending their journey at Port Darwin. Forrest "estimated that he had discovered at least ten million hectares of good pastoral country, confidently predicted that gold would be discovered, sketched the possibilities of tropical agriculture" and decided that "The district ... would be named after the Earl of Kimberley." His findings resulted in many applications for pastoral leases and before long cattlemen became entrenched in the East Kimberley, in some cases having overlanded their cattle from far afield, including Goulburn, NSW. Within this broad account of the cattlemen there are several "asides" which took my attention. Thus, with the recent (December) tsunami caused by Anak Krakatoa, I couldn't help but note the reference to the stocking of sheep at Yeeda Station and how the year's clip, a total of 21 bales stacked on the edge of the mangroves, was lost as a tsunami, the result

of the eruption of Krakatoa, swept up King Sound in 1883. Another “aside” was the comment by the patriarch of the Durack family, M.P. Durack, that on watching the 1949 film “The Overlanders” he was puzzled by how the drovers set out with Herefords but ended up with Shorthorns!

In “The Kimberley gold rush of 1885–1886”, Phillip Playford talks about this short-lived event which was centred at Halls Creek. It failed to lead to local prosperity, but some experienced prospectors initially drawn to Halls Creek subsequently roamed south, making major discoveries (including Coolgardie and Kalgoorlie) which made Western Australia a prosperous State. Much of the paper concerns the activities of Edward T. Hardman of the Irish Geological Society who was appointed as a temporary Government Geologist and carried out two expeditions in the Kimberley. An account of how Hardman’s notebooks from that time came to be discovered about a century later makes for interesting reading.

“Joseph Bradshaw – Getting lost in the Kimberley and the art he found” by Michael Cusack is an account of Bradshaw confusing his rivers when travelling overland (from Wyndham and back in March/April 1891) to his, as yet to be seen, lease of land along the Prince Regent River. He initially thought that what we now call the Moran River was the Prince Regent River, and subsequently used the name Western Regent for what is known as the Roe River and Eastern Regent for the Moran. It was during this same trip that he encountered the Gwion Gwion paintings in a secluded gorge.

“Under a Regent Moon. Part 1. Pioneer pastoralists, plant collecting and botanical patronage” by Kevin Kenneally comes next. It covers some of the material first published in Willing & Kenneally (2002) but with additional information discovered since that publication. It suitably follows the previous chapter as it concerns the white settlement of Marigui established on the Prince Regent River by Bradshaw in November 1891, his companions including Mary (his newly-wed wife), Aeneas Gunn (whose splendid articles about the settlement are published in Willing & Kenneally, 2002), and a Victorian sheep farmer, William Tucker Allen. In early 1894 Bradshaw, disaffected with stock taxes imposed by Western Australia, abandoned the station and established

himself on the Victoria River in the NT I could add more about the settlement but presumably of most interest to readers of this newsletter will be the accounts regarding the botanical collections made by Bradshaw and Allen during the expedition in March/April 1891, the correspondence between Ferdinand Mueller and Bradshaw, and the published account of the specimens by Mueller (1891). Unsurprisingly, the majority of their specimens, covering 161 species, are housed at MEL. There are also some in NSW; a visit to the Australian Virtual Herbarium website in November last year indicated that these had been erroneously attributed to Bradshaw and C.E.F. Allen (i.e. Charles Ernest Frank Allen, 1876–1938), but a more recent check (16 Feb. 2019) suggests this has been rectified.

One of the figures (Fig. 10, p. 140) in “Under a Regent Moon. Part 1” is reflective of the contents of the chapter which follows. The figure’s caption reads “The ‘Target Tree’, a boab ... near the homestead site that bears the bullet scars resulting from target practice by the Bradshaw party.” The chapter, also by Kevin Kenneally, is titled “Under a Regent Moon. Part 2. Frontier conflict at Marigui” and has a well-chosen epigraph: “There are many humorous things in the world; among them the white man’s notion that he is less savage than the other savages” (from Mark Twain’s *Travels Around the Equator* (1897). We all know that frontier killings, by both sides, were a fact of life and Kevin’s outline of the conflict at Marigui is well presented.

Two further chapters “The Kimberley exploration expedition of Frank Hann in 1898” and Brockman’s “North-West Kimberley Expedition, 1901”, both excellent chapters by Mike Donaldson and Ian Elliot, complete those concerning exploration of the Kimberley. They are followed by a detailed account, by Christine Choo, of both Catholic and Protestant missions in the region. It is aptly titled “Mixed blessings: establishment of Christian missions in the Kimberley”. The final chapter, “Impacts of settlement and development in the Kimberley 1965–2010” by Bill Bunbury, particularly focuses on changes to the pastoral industry, including the introduction of proper wages for Aboriginal stockmen and the methods of cattle mustering, from horse to helicopter.

I have only visited the Kimberley on two occasions, both times before publication of this

book. The trips were enjoyable but, had it been available, this publication would have given me an even greater appreciation of the people and places of the Kimberley. I highly recommend it.

References

Mueller, F. (1891). Observations on plants, collected

during Mr. Joseph Bradshaw's expedition to the Prince Regent's River. Proceedings of the Linnean Society of New South Wales 6(3) (2nd series): 457–478.

Willing, T. & Kenneally, K. (2002). Under a Regent Moon. (Department of Conservation and Land Management: Perth).

Insights into nature and science in the Kimberley

Reviewed by Bill Barker
State Herbarium of South Australia

The natural world of the Kimberley
*Compiled by Hamish McGlashan,
Kevin Coate, Jeffrey Gresham and
Roz Hart. 2018*
Published by Kimberley Society Inc.
ISBN 9780646984421. Soft cover, 298
pp., + 14.
AU\$55 plus \$15 postage and packing
from [www.kimberleysociety.org/about_](http://www.kimberleysociety.org/about_the_society/publications.phtml)
[the_society/publications.phtml](http://www.kimberleysociety.org/about_the_society/publications.phtml)

The Kimberley is an area that relatively few Australians have experienced, but in recent decades, with the huge growth in the popularity of the four-wheel drive and in nature and recreational tourism, there has been a large increase in visitors to the region. It is a huge region, surely Australia's least known botanically: we know there are many unknowns still to be discovered on the basis of the continuing high rate of species discovery and large tracts little surveyed by general and specialist plant collectors.

Here is a book about the Kimberley's natural environment, home to Australia's first people, as it has been for millenia. With an abundance of appealing and relevant photographs it contains accounts by specialist scientists on the region's landscapes, ecology, and flora and fauna.

The compilers do not claim a comprehensive coverage, but provide insights into the area of speciality of the 34 authors. This variety in coverage reflects the origin of the book, a one day seminar hosted by the Kimberley Society in 2016.

My review of the book reflects the perspective of an occasional visitor, on three forays via the few points of access by vehicle into this remote corner of Australia. I have but a smattering of the knowledge of these areas of specialisation, the highly diverse flora included, and suspect I would be one of those to whom the book is directed.

The 25 chapters are distributed across seven

major sections, although in some cases a chapter may also relate to another section; for example animals of rainforest are covered under "Plants and fungi" and plant data is presented in dealing with biosurveys under the "animal" section. Generally, however, the breakdown works.

After a short section introducing Kimberley's natural world, the first main section "Land" provides in its first chapter a useful description with broad-scale maps of the region's geology. Following are two two-page accounts, one dealing all too briefly with the practice of the long-time Aboriginal residents of recording important plants and animals in their rock art, the other highlighting the innumerable scattered rock pools that harbour unique biodiversity, much still to be discerned and documented.

The following section, "Plants and fungi", opens with a short chapter by Kingsley Dixon and company on how the secret to germinating Australia's boab was unlocked – the African baobabs are much easier to germinate. Chapters on the fungi, sandstone flora, and monsoon rainforests provide welcome detail. The macrofungi are very diverse: Matt Barrett has found over 800 species of fungi himself of the estimated 2–4000 species; this compares with 3000 [vascular] plants in the region. Indications are that many species are widespread across the region; intensive surveys have recorded high local diversity, with as many as 200 macrofungi species in patches of around four square km. On global experience, it is anticipated that microfungi will be as many as tenfold in number. Clearly this is a rich region for mycologists to document.

Matt Barrett also covers the plants, pointing out that, against a backdrop of the widespread savannas, other common but restricted sandstone habitats – cliffs, pavements, rockholes and overhangs – provide distinct niches that harbour many local endemics, which have evolved

perhaps because they are less prone to being engulfed by fire. He describes the diversity and endemism of each habitat along with examples of endemics, and discusses environmental and life history factors that should be accounted for in developing conservation strategies for the many rare and threatened species in the region.

Kevin Kenneally provides a diverse account of the widespread, species-rich, but extremely restricted monsoon rainforests - there are over 1500 patches covering a tiny total of 70 square km of this vast region¹. He discusses calling them “jungle” or “rainforest”, and their physiognomy in a diversity of substrate and habitats. He further covers the diversity and endemism of associated animal and plant species, the Aboriginal use of the plants and their potential wider use, and aspects of conservation.

In the last two plant chapters Emma Dalziell deals focuses on the the taxonomy and diversity of the water lilies (Nymphaeaceae), with the seven species, described in detail, placed in a global and Australian familial context. The Australia-wide view of naturalised relatives or look-alikes and conservation issues is perhaps an indulgence in this volume. However, water bodies with lilies are a common attraction welcomed by visitors to this comparatively harsh region, and these aspects along with accounts of the diagnostic features, ecology, distribution, and taxonomy of the seven resident species will no doubt make the book attractive to potential purchasers. A short chapter on seed conservation of waterlilies by the same author rounds off the plant section.

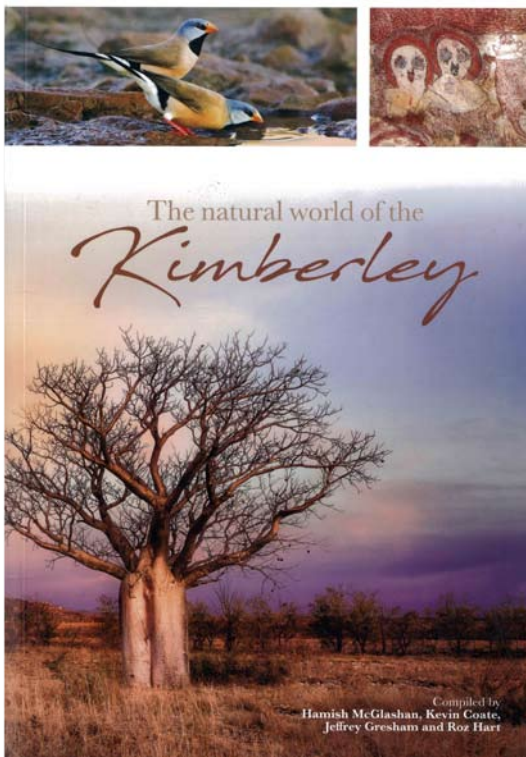
¹ This chapter is a modification for a popular audience of a paper on the Kimberley rainforests (Kenneally 2018).

The “Animals” section is an interesting and informative read, but is disappointingly limited in its organismic coverage. It includes two great chapters on the birds. The first describes the “epic” journeys of the 635,000 shorebirds (40 species) during the Kimberley summer and associated scientific activities and conservation issues.

Another group of shorebirds, 14 of Australia’s 17 permanently resident species, also occurs in the Kimberley.

The second bird chapter details the 11 of Australia’s 18 species of finch that spread into the Kimberley. Their habitats are summarised and each species is described and provided with a photograph and distribution map. Of interest in this chapter is a history of 90 years of legal trapping and sale of over a million live birds. A great decline in numbers from the 1970s suffered by the Gouldian Finch seems to have been reversed in recent times; licensed trapping was halted in 1981 and the IUCN’s “Endangered” rating of 1994 downgraded to “Near Threatened” in

2012. In 1926 flocks of 2–3000 were observed. The high year for captures was 1958 when 11 thousand Gouldian Finches were taken of nearly 40 thousand finches overall. Nevertheless, despite these numbers, it is considered that the Gouldian Finch’s decline is attributed more plausibly to changes in the fire regimes affecting their seed sources and nesting hollows. (I have similarly heard of debates in the Top End of the Northern Territory as to whether increasingly early season fire management practices prevents sustainable seed set of annual herbs). Remarkably, despite this pillaging of finches, we are told, “there is no evidence for any long-term decline in populations attributable to trapping” [apart from the Gouldian Finch?], but it is pointed out that there was no



monitoring that would substantiate this claim.

The other big chapter in this section is on the 2007–10 biodiversity survey of the region's 2500 islands, connected most recently with a drop in sea level 8–10 thousand years ago. Twenty-four islands were sampled between Derby and Kalumburu along the north-west coast. Of the few north-east coast islands, only Adolphus Island, which is more a riverine island, was covered. Focus in the survey was on the groups known to have threatened species, namely mammal, reptiles, birds, land snails, frogs and the plants. Does this also reflect a poorer taxonomic and distributional knowledge at the species level in the Kimberley of other, less conspicuous, groups? The islands proved rich in species, with 49% of the plant species of the adjacent broader Northern Kimberley region represented; percentages were higher in other groups, 74% of mammals being the high. As would be expected from the recent and presumably recurring links of the islands with the mainland, groups generally show no or limited endemism; ten reptiles and six of 273 plants species were found to be confined there. Many of the endemics of the neighbouring mainland extend onto the islands. In stark contrast, however, the survey brought to light 74 new species of land snail, "probably our most significant finding", with 62 endemic to the one island!. The sampled islands were remarkably free of alien species, most with no more than three species. However, in a key message, the only island with prolonged human settlement had accumulated 22 weed species. Since the survey the islands have been declared Indigenous Protected areas and Indigenous ranger groups have been formed to participate in the conservation activities.

The "Sea and coast" section has chapters on: turtle research; the different reef types and their corals (whether these are early-warning "reef canaries" or adaptable "cockroaches" is discussed in view of the region's geologically rapid-changing sea levels and shorelines); the Kimberley Indigenous Saltwater Science Project (seeking positive interactive and beneficial ways of advancing knowledge); and the sea grasses (seven species coping with tidal ranges of 2–10 metres).

The final main section, entitled "Environment" starts with two chapters focused on fire. Fire regimes have changed from the pre-European "fine-grained mosaic of burnt and unburnt areas" caused by frequent introduction of fire. Now

"high-intensity fires burn vast areas of land, thus reducing the diversity of localised fire histories and habitat". The specific needs of pastoralists, nature conservation managers and traditional owners are in competition. Current practices, lessons learnt and the future are discussed, with the Aboriginal people recognised as playing a key role in seeking a fire regime more appropriate to all. Winding up the section are: the example of management of fire and feral animals to conserve small mammals; the nature and importance of the region's parks for conserving wilderness; and the importance of science in conservation.

Kevin Kenneally concludes the book with his "Summary" about science and conservation in the North Kimberley. His loud appeal is that this, the most remote and, in biodiversity terms, least known of Australia's 15 Biodiversity Hotspots, be served much better than now by the establishment of a dedicated local regional research centre, a quest begun as long ago as 1983. Attention has been drawn to the contrast between rapid development of Australia's tropical north and the concentration of herbaria and museums on the south and south-east of the continent in the recent Australasian Decadal Plan for taxonomy and biosystematics (Decadal Plan Working Group 2018).

By the end of the book I have concluded that, instead of meeting my ideal and unrealistic hope for a comprehensive and catchy account of Kimberley natural history, here is a volume with a variety of approaches to coverage and perspective of the many subject areas addressed. There is plenty for every interest: taxonomic detail where an interesting organismic group has a small number of species (finches, sea grasses); larger narratives encompassing ecology and taxonomic diversity in large major groups (plants, fungi, coral reef types) or biodiversity overall (rainforests, coastal islands); history (the trapping of finches, fire management); aspects of Aborigines in their environment (paintings of the wildlife and plants, useful plants, fire as a tool, Indigenous Ranger groups); and other insights into the feral biota, the wilderness areas less impacted by them, and current environmental practices and approaches to conservation.

It would be impossible to give detail on each of these in a comprehensive way since this volume is probably at its optimum in size and number of pages. I look forward to a follow-up

volume that brings further insights, for example, exploring other organismic groups passed over (spiders, bees, Lepidoptera, termites, mosses) or mentioned only briefly (ants); perhaps looking at plant and animal groups that have diversified into the different niches, as has for example my specialist group *Lindernia*; and learning more of Aborigines in their land.

One major deficiency in this work is the absence of one or a small number of indices to scientific and common names, place names, geology, ecology and landscapes and the plethora of other matter dealt with here. No one chapter deals with a single topic and so subject matter is spread across the volume. Such indices are a great service to the reader and increase the usefulness of a book as

a source of information. Compiling them should not be an impossible task with today's word processing tools.

I recommend this highly informative, attractively designed, and copiously and well illustrated book to anyone with an interest in the Kimberley.

Reference

- Decadal Plan Working Group 2018. Discovering Biodiversity: *A decadal plan for taxonomy and biosystematics in Australia and New Zealand 2018 – 2027*. Australian Academy of Science and Royal Society Te Aparangi, Canberra and Wellington.
- Kenneally K.F. 2018. Kimberley tropical monsoon rainforests of Western Australia: perspectives on biological diversity. *Journal of the Botanical Research Institute of Texas* 12, 149–228.

The mountain building continues: the Orchards' Allan Cunningham saga

Review by Alex George

The Australian botanical journals of Allan Cunningham: the Oxley and early King expeditions October 1816–February 1819

*By A.E. Orchard and T.A. Orchard
Privately published, [Weston Creek],
2018*

*Softbound, pp v, 309, 250 × 175 mm
ISBN 9780994150530
RRP \$45*

The Australian botanical journals of Allan Cunningham: the later King expeditions February 1819–September 1822

*By A.E. Orchard and T.A. Orchard
Privately published, Weston Creek,
2018*

*Softbound, pp iv, 431, 250 × 175 mm
ISBN 9780994150547
RRP \$55*

*Postage within Australia is \$15 for one
or two books.*

These are the fourth and fifth books in the Orchards' impressive series on Allan Cunningham (in addition to two papers in *Nuytsia* and *Telopea*); see reviews cited below. They will be essential sources for anyone studying AC's collections, as well as for those following the early exploration of Australia and seeking information on the many people with whom AC associated. The first of

the two reviewed here covers his journey with surveyor John Oxley in NSW, his explorations around Parramatta, the first voyage with P.P. King in HMC Mermaid, further travels in NSW and his first visit to Van Diemen's Land. The second covers the other three voyages with King and the interludes between, including his trip to the Blue Mountains with the visiting Russian naturalist Fedor Stein and artist Emel'yan Korneyeff in March 1820. It concludes with short accounts of the weeks after returning to Sydney when his priorities were unpacking his collections and preparing them for shipment to England.

The journal presented here is a fair copy that AC wrote, usually some time afterwards, but from the detail given he must have kept a daily field journal (he wrote that writing a fair copy was 'a very Laborious Task'). In addition to transcribing the journal the Orchards have recorded many of AC's herbarium collections and matched them to the citation in the journal.

Following his experience as a collector for Kew in Brazil, AC settled quickly into his duties in NSW. He landed on 20 Dec. 1816, rode to Parramatta on 21st to report to Governor Macquarie, rented a cottage there on 23rd and that day began observing the flora. His luggage arrived from the ship on 27th, and by 6 January 1817 he had started to collect specimens and seeds.

The journals are useful for providing information on many collections beyond what is on herbarium

labels and published citations—locality, habitat including soil, often further data e.g. on habit, morphology and seeding. AC often wrote brief descriptions, in English or Latin (the latter usually for presumed new species) and he knew at least some Greek. The Orchards have inserted English translations of the Latin. From his experience working with Aiton at Kew Gardens (including on the second edition of the *Hortus Kewensis*), AC had a good knowledge of the Australian flora as known to that time and of plant morphology. Although never stated, it would seem that he had with him references, or copies thereof, such as works by Dampier, Brown, Rumphius, Roxburgh, Labillardière and others. Thus, he could identify many plants as he found them. He often considered his finds to be new and proposed names for them, quite a few of which were taken up by those who formally published them, hence the authorship ‘A.Cunn. ex ...’.

He picked up the common names already being used by colonists, e.g. Bastard Box (*Eucalyptus micrantha*), Currajong (*Hibiscus heterophyllus*), Sassa-fras (*Atherosperma moschatum*), Swamp Oak (*Casuarina* spp.), Huon Pine (*Lagarostrobos franklinii*), Cedar (*Toona ciliata*).

The journals will also be useful for anyone wishing to recreate what the pre-settlement vegetation was like in areas such as Parramatta and Bathurst. Anyone familiar with the geography of those parts should be able to work out where he was when describing the vegetation.

As well as the botany, AC recorded the weather almost every day and often described the geology and soil. He mentioned the fauna, especially birds, marsupials, fish, shells, bothersome flies,

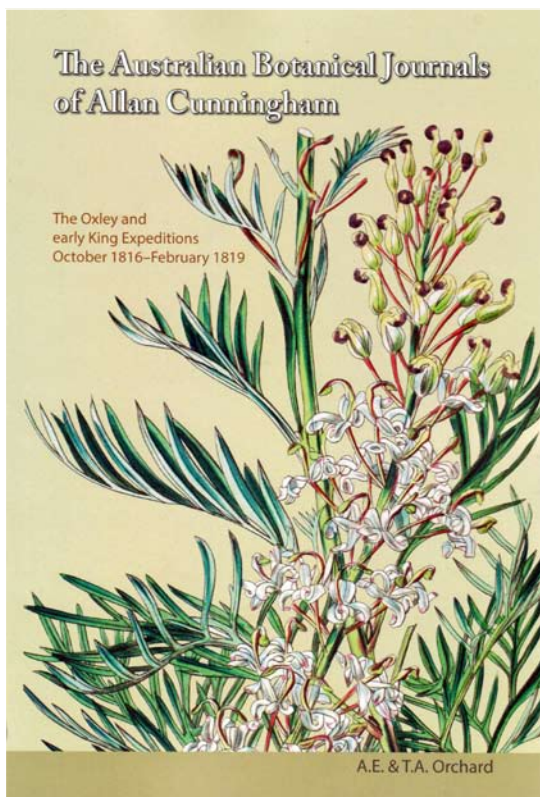
and reptiles, the last including sea snakes which he examined to see if they respired in the same way as land snakes. He recorded encounters with Aborigines and noted their characteristics, artefacts and art. Occasionally he recorded indigenous names but was frustrated by the Aborigines’ habit of simply repeating an English word of the questioner in response to a query. He compiled, however, a table of several dozen English words with the Aboriginal equivalents from different places (pp. 347, 348).

He noted effect of drought on the vegetation and at some localities such as Careening Bay on the Kimberley coast, the change that had occurred between their two visits.

At the Endeavour River, in June 1819 (where they had to build a new cutter to replace one lost at sea), he noted that there was almost no trace of Cook’s visit. He was surprised to find that the ‘Australians’ (as he often termed them, even though he still used ‘New Holland’ for the continent) did not know the word ‘kangaroo’ recorded there by Cook.

At many localities there are mentions of those who came before, sometimes with details that indicate that he had access to published works, e.g. the Dutch, English and French voyages and botanical accounts. In the early years, Banks, and throughout his lifetime, Brown, were still alive and are mentioned formally (as “Sir Joseph” and “Mr.”).

AC often planted seeds of vegetables such as beans, lettuce and carrot, and fruit trees such as peach and lemon, but at King George Sound, on 28 January 1818, he sowed seeds of several species of *Protea*, *Leucadendron*, *Erica* and



Chironia. We must be grateful that none of these became established! He himself noted that, on visiting the spot in December 1821, no trace of his garden remained.

AC developed a strong interest in plant geography, for example comparing the plants at equivalent latitudes on the west and east coast, or floristic changes as they sailed northwards on both sides of the continent.

He often mentioned tasks being carried out by others of the party, and those whom he accompanied ashore, but he rarely commented on personalities or how they got along together. On the other hand, when proposing that a supposed new species be named after someone, he explained why he thought them worthy of the honour. He was humbled but pleased when King named Point Cunningham, believing that he had paid but 'common ordinary attention' to his duty and usually returned from a day's collecting feeling that he could have done more. He and King clearly had great mutual esteem. Anyone reading this journal, however, must

admire his diligence and application. His days were almost wholly taken up with collecting, caring for his collections (specimens, seeds, bulbs, and sometimes live plants), then preparing them for consignment to England, and writing his journal which itself would have taken much time. His only 'days off' appear to have been some Sundays and when he was forced into inactivity due to illness. On Christmas Day 1821 (a Tuesday) he spent an hour ashore before breakfast, at 9 a.m. went ashore again until late afternoon, then 'until a late Hour I was fully engaged in the preparation and examn of my

gleanings for the day'.

We must add another name to the list of plant collectors in Australia: John Cummings. AC took him along as an assistant on the fourth voyage. Besides general work in processing specimens and seeds he collected on behalf of AC. In particular, while AC was indisposed on the Kimberley coast from 24 July to 21 August 1821 he often went ashore and made many collections. He was never listed as the collector but the dates and localities

would reveal which were his specimens.

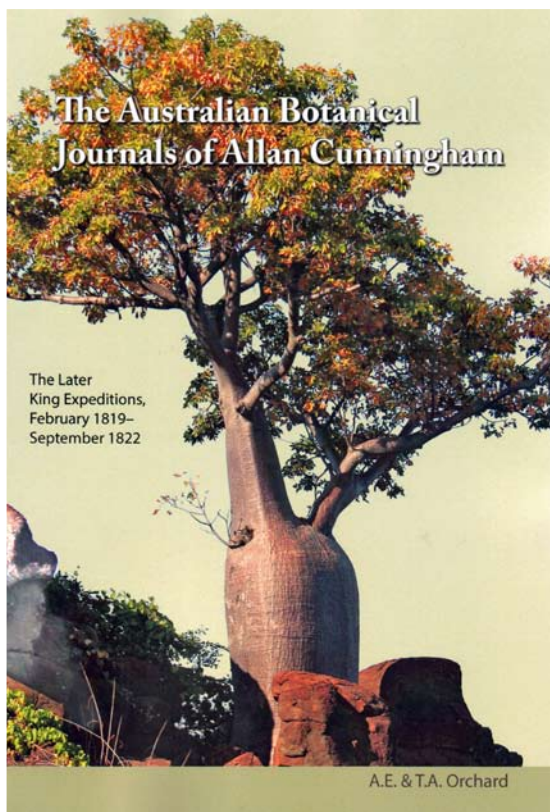
One example may be noted: on 11 August 1821 he collected 'perfect specimens' of a new *Grevillea* which became the type of *G. pyramidalis* and hence he may now be credited with it, not AC. Roe sometimes brought specimens to AC and also collected seeds 'for his friends'.

For the garden historian, he mentioned plants being grown in Port Louis, Mauritius, and described the botanic garden at 'Pamplemousse' in 1821. On 5 Feb. 1820 he had a discussion with the Commissioner, John Bigge, about the formation of a botanic garden in Sydney.

Of very many interesting events I'll pick out just a few about the vicissitudes of collecting in those times.

On 30 August 1817 the horse carrying his collections fell in a swamp and water penetrated the kegs holding his dried specimens. Four days later he again had to rescue them when the horse fell while crossing the Cox River.

A number of times he described the difficulties in drying specimens at sea where humid air can be 'pernicious' and lead to specimens rotting in the papers. But, on 23 June 1819 he wrote 'I am



never more happy than when I am shifting my plants with my own hands', indicating that his assistant was not always careful (the assistant on this voyage was a prisoner who also acted as doctor on the *Mermaid*).

After their visit to Coepang in November 1819 he discovered that ants brought aboard with wood 'had commenced their ravages among some of my Dupl. seeds' which he 'rescued from Destruction, and the Ants with some diffy partially destroy'd or diverted to other objects for Demolitn'.

Several times e.g. at Cape Banks (4 Dec. 1820), in the Kimberley (8 Feb. 1822), they were moments away from shipwreck but managed to avoid the danger. In some tidal eddies on the Kimberley coast the ship 'would whirl completely round'.

AC's writing is almost always grammatically correct, sprinkled with abbreviations and contractions. Sometimes it is embellished with unfamiliar but logical terms, often derived from Latin, e.g. 'alated' (winged), 'insulated' (referring to islands), even somewhat romantic such as when describing a sunset or impressive geographical feature. Where we use 'epiphytic' he used 'parasitical'. He used the Spanish word 'bareca' for keg, probably picked up during his time in Brazil.

The 1816–19 book is illustrated with contemporary views of localities (e.g. paintings by Lewin, King and Lycett), and the 1819–22 book similarly but also with modern photos of some places and plants. There are figures of some Aboriginal artefacts. Some are reproduced from King's Narrative of the surveys. There's a portrait of King in the first and one of Governor Brisbane in the second. AC's portrait appears on

the back cover of both.

I would like to have seen more maps to assist the reader in following where AC went. There is just one, showing the route of the Oxley expedition of 1817, and it would have been better at larger size.

Each volume has a comprehensive, single index.

In the second book, in the contents on p. iii, the page numbers from 273, and in a list of illustrations on p. iv, those from p. 277 onwards, two references are missing.

A few typos are inconsequential and not worth mentioning. Just one small quibble: at this time it was still the Royal Gardens, Kew. The title did not officially become Royal Botanic Gardens until William Hooker was appointed the first director in 1841.

In his review (see below), David Mabberley referred to 'this mountain of solid scholarship'. It is clear that orographic activity has continued. I look forward to further volumes in this fine series.

For reviews of previous volumes, see

- Adams, P. (2016), Book review: A.E. Orchard & T.A. Orchard, Allan Cunningham: Letters of a Botanist/Explorer 1791–1839, *Australasian Systematic Botany Society Newsletter* 167: 48–50.
George, A.S. (2014), Book review: A.E. Orchard & T.A. Orchard, The Botanist and the Judge: Allan Cunningham in Tasmania 1818–1819, *Australasian Systematic Botany Society Newsletter* 160: 29–31.
Mabberley, D.J. (2015), Book review: A.E. Orchard & T.A. Orchard, King's Collectors for Kew: James Bowie and Allan Cunningham, Brazil 1814–1816, *Australasian Systematic Botany Society Newsletter* 164: 41–43.

Another biography of a major Australian plant collector: Augustus Oldfield

Review by Alex George

**A greater prize than gold:
Augustus Oldfield, 19th century
botanical collector and ethnographer
in Australia**

*By M. Helen and William G. (Bill)
Henderson*

*The Book Reality Experience, [Perth],
2018.*

*Softbound, pp xxx, 520, 295 × 210 mm
ISBN 9780648222231. RRP \$70*

Augustus Oldfield is a name well-known to those who have worked in Australian systematic botany, to a less extent those who have studied our indigenous peoples, but it is little known in other circles. This book redresses that oversight. Helen Henderson is a great grand-niece of Augustus Oldfield and decided to investigate his life after finding, among family papers, a testimonial from Joseph Hooker praising his botanical endeavours. The authors have reconstructed Oldfield's life

including his ancestry and immediate family, the social milieu of the times, his education and his years working in several occupations. He was born in London in 1821 and died there in 1887. It was a period of huge change technologically, industrially, socially, artistically and scientifically.

Botanists, particularly those who collect specimens and study classification, come from a wide range of backgrounds. In

Oldfield's case his early employment was as a teacher and surveyor, but his interest in botany and natural history more broadly had been sparked through his years of learning – there were several popular works on these subjects that may have been included in his schooling. For some years he attended an academy in France which provided a broad education and, although the natural sciences were not part of the curriculum, he may have become aware of the work of French botanists of the day. At least a smattering of Latin enabled him to understand botanical works, many of which

were written entirely in that language. Back in England he gained a grounding in surveying, which probably included experience outdoors. His first occupation, however, was as a school teacher. Just why, at the age of about 23 or 24, he decided to emigrate is unknown but it appears that exploration and botany were two incentives. From the time of his arrival in Van Diemen's Land in the mid 1840s, while employed as a teacher and census-collector, he began to collect specimens and this developed into a grand passion. He clearly knew how to gather, press and dry plants and obtained the necessary equipment for doing so. At this period, spent mainly around Hobart, the Tasman Peninsula and Maria Island, he was especially interested in non-flowering plants, particularly mosses, but he

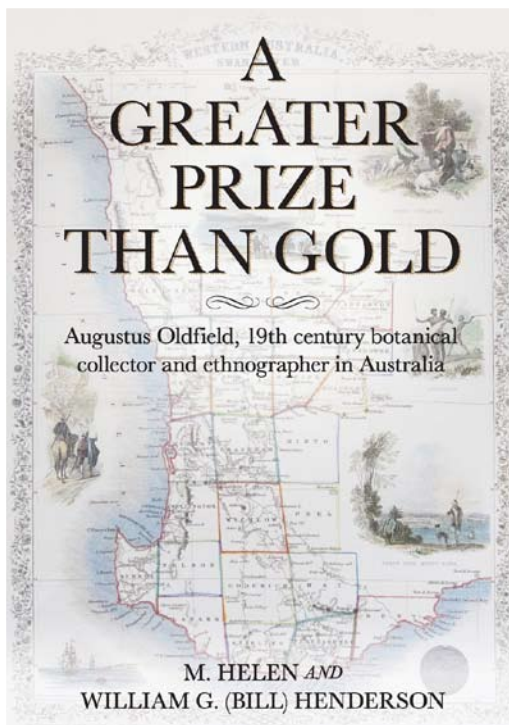
did not neglect flowering plants and as the years passed the latter became more prominent in his work. The data recorded for his specimens such as locality were elementary but at least they were better than those of James Drummond who rarely recorded much at all.

During this first stay down-under, probably in 1848, he walked from Sydney to Melbourne. Apparently he collected some plants but, if so, they are not among his known collections.

In 1849 Oldfield visited England where he corresponded with William Hooker, by now well settled as the first director of the Royal Botanic Gardens, Kew. Hooker encouraged him to pursue plant collecting when he returned to the colonies in 1850. Soon after this he made the acquaintance of Ferdinand Mueller, the newly appointed Government Botanist of Victoria, who also encouraged him. From 1853 onwards, Oldfield sent specimens to Mueller.

From 1851 to 1856 he spent long periods in Tasmania, in the central

highlands but especially in the south-east, where a co-collector on some trips was Charles Stuart. He first travelled to Western Australia in 1856. By this time James Drummond, Karl von Huegel, Ludwig Preiss, Georgiana Molloy, John Gilbert and others had explored widely in the South-West, but huge areas remained unknown. For Oldfield, every day there would have been the anticipation of new discoveries. On this first visit he collected from Cape Naturaliste to the Murchison River where, significantly, he met members of the Watchandie people. North from Perth he probably travelled with pastoralist, explorer and fellow plant collector Pemberton Walcott. After a further year in Tasmania and Victoria, during which he climbed Mt La Perouse, he sailed west again, this time landing at King George Sound.



After collecting around the Sound, he travelled to Perth and, late in 1858, headed north again. On this trip he was probably the first European to travel overland to Shark Bay. This time he spent some weeks living with the Watchandie people, participating in, and recording, their everyday life.

In 1859–61 he was in Victoria, Tasmania and New South Wales, including a period in the Twofold Bay area collecting wood samples for the International Exhibition in London in 1862. But the west lured him again. On this third visit, in 1861–62, he explored from Albany to Bunbury and Cape Leeuwin. Then, accompanied by a resident collector George Maxwell, he sailed eastwards with sealers from Cape Riche to Cape Arid, landing from time to time to collect specimens. On the return trip they travelled from Cape Riche to Albany via the Stirling Range which was already renowned for the richness of its flora.

After a brief stay in Melbourne he returned to England in 1862. He corresponded again with William Hooker before the latter's death in 1865, then with his son Joseph who succeeded his father as Director of Kew. There was much uncertainty about the placement of his plant collections at Kew, but they were available for George Bentham during his preparation of the *Flora Australiensis* (1863–1878), and some would have been in the collections sent on loan by Mueller from Melbourne. The name Oldfield appears often among collections cited in that and major works of the day. Eventually Kew came to hold the most comprehensive set of his specimens. There is also a large set in Melbourne.

In all, Oldfield probably collected some 3,000 specimens (many in duplicate). They represent several hundred species, including at least 65 previously unknown that became type specimens. Today they are lodged in more than 30 herbaria around the world (listed in an appendix).

Oldfield did more than just collect specimens. Quite often he noted details of their habit and habitat. An example is his specimen, now at Kew, of *Chorilaena quercifolia* from Bald Island, east of Albany, for which he noted that it was a 'Young form after being burned'. It has larger leaves than older plants (which Oldfield would have seen on the mainland). The fire may have been two years before his visit and is the only

record of bushfire on the island since European settlement. This is an example, however, of the caution that must sometimes be taken when dealing with old specimens. Helen and Bill have determined that the visit to the island was in 1862, but the specimen at Kew is dated 1860, possibly due to the transcriber having difficulty in interpreting Oldfield's writing.

More than 20 species currently recognised are named for him, bearing the epithet *oldfieldii* or *oldfieldianus*. A nice touch in the book is a vignette, a photograph, of a species named after Oldfield at the start of most chapters. He is also commemorated in the Oldfield River in Western Australia.

Oldfield's second important contribution to our knowledge arose from the period in 1858–59 when he lived with the Watchandie people on the lower Murchison River, part of what is now Kalbarri National Park. He learned and recorded their language and its grammar, and became familiar with their way of life, their beliefs and social organisation. After returning to England he published this in a paper of 83 pages, his only published work.

Oldfield never left England again. He corresponded with William Hooker (especially about the publication of his notes on Aborigines), and with Joseph Hooker (not always amicably) over the disposal of his collections. His eyesight and general health deteriorated, however, and he was unable to carry out any research on the specimens that he retained. He earned a little income by teaching languages but remained reclusive until his death.

The book is well illustrated with contemporary images of places associated with Oldfield during his life, with maps of all areas that he visited, and especially with the authors' photographs of places where he explored. Through these we can walk with Oldfield and picture what it was like to see large parts of the country never before seen by European eyes. As the years pass and more of these are cleared, for whatever purpose, or change in some way, these photos will become increasingly valuable.

One image that we do not have, however, is a portrait of Augustus Oldfield. With the development of photography from the 1840s it became easier to take portraits but there is none known of Oldfield. Perhaps, with his apparent

shyness, he was unwilling to be photographed and maybe his increasing blindness was a deterrent.

The title of the book comes from a statement by Augustus' brother Edwin who said, after his death: 'The discovery of a new plant was to him a greater prize than that of gold'. Unlike some other collectors of the period, he seems to have received little financial reward for his collections. Mueller engaged him for some expeditions, and Joseph Hooker paid him (apparently for some 'desiderata'), but generally he was unsuccessful in finding buyers.

There remain many gaps in our knowledge of Oldfield's life, but from the details that the authors have assembled from many sources, combined with their research into his plant specimens, they have written a remarkably comprehensive biography and brought Oldfield out of the

shadows. The thoroughness of their research is evident in a bibliography that runs to 30 pages.

There is a single index but a number of topics are grouped, e.g. Herbaria, Institutions, and Placenames under each Colony's name. A number of these run to more than a single column (13 for W.A.) so it would have been useful to have subheadings for these.

The book is also a tribute to local printing, showing that you don't have to go offshore for good quality. Unfortunately, the soft cover is too flimsy for a book of this size. The fascicles are strongly bound and should not come apart but the covers have a tendency to curl up.

This work fills a lacuna in biographical accounts of important early figures who collected plants in Australia.

Family life and notable identities in early 19th Century Australia

Review by: Tony Orchard, Canberra

George & Sarah Suttor: pioneers of early Australian horticulture.

By Margaret Winmill.

Privately published: Castlemaine, Vic.

ISBN 978-0-9873361-3-2.

Softcover, 190 × 250 mm, xviii + 305 pp., 46 illustrations.

Obtainable via The Allan Cunningham

Project website: www.artuccino.com

Price \$30 plus \$14 postage.

In late 1797 or early 1798 George Aufrère, uncle by marriage to Sir Joseph Banks, introduced Banks to George Suttor, the son of his head gardener. This introduction had significant consequences for Suttor, and for the development of Australian horticulture.

George Aufrère was a very wealthy man, who at that time was leasing Walpole House in Chelsea, between the Chelsea Physic Garden and the Royal Hospital. His head gardener was William Suttor, a Scot who had studied botany and horticulture under James Lee of the Vineyard Nursery in Hammersmith, then one of the leading nurseries in London. Towards the end of his life Aufrère gifted the use of the land at Chelsea to William Suttor, who used it to produce fruit, vegetables and roses for the Covent Garden Market, amassing a modest fortune.

William's son George had ambitions to go on the

stage, but limited success, and an introduction to Sarah Dobinson, a friend of his sister, changed his plans. He had for some time been assisting his father in his Chelsea garden as well as managing sales at Covent Garden. A career on the stage could not support him and a wife, so, on hearing reports of the new colony of New South Wales, he set his mind to emigrating and making his fortune there.

George Aufrère arranged an interview with Sir Joseph Banks. Banks spoke to Governor King and arranged for Suttor and his wife-to-be to be given free passage on the newly constructed Store Ship Porpoise to Sydney, a grant of 200 acres of land, a two roomed furnished cottage, 5 or 6 convict labourers, provisions until established, and some livestock. In return Suttor was to take charge of live plants on board Porpoise and tend them until arrival in Sydney, and on his becoming settled, to collect native plants and seeds for despatch to England.

In late 1798 George Suttor was sent to Kew to work with William Aiton in establishing plants in crates for transport. The plants included grape vines, apples, pears, hops, plums, carob, mulberries, walnuts, nectarines, peaches, willows and olives, and seeds of herbs, conifers, oaks and many other plants. The Suttors married in August, and in October embarked on the Porpoise in the lower Thames at Greenhithe. There were delays

while supplies were loaded, but in December the ship removed to Portsmouth, where the captain complained that the ship had been found unsafe. Furthermore, the Napoleonic wars raged on the Continent, and French ships prowled the Channel and Bay of Biscay. More delays ensued, and Sarah gave birth to her first son on board at Portsmouth in May. The plants in their crates on board, though, mostly survived well during the summer. The *Porpoise* finally left Portsmouth in September 1799,

twelve months after leaving London. It was part of a convoy of 500 ships. However a storm near Madeira damaged the rudder, necessitating a return to Portsmouth, where the *Porpoise* was declared unseaworthy, and she was replaced with a Spanish prize ship renamed *Porpoise*!

Plants that had died were replaced, and in March 1800 the ship finally left England. At the Cape of Good Hope George put ashore plants that were sickly, but took on board other Cape plants, including several grape vines and hops. He also took the opportunity to visit the Cape vineyards to learn

what he could of viticulture and wine making. After 4 months at the Cape the ship sailed on to Sydney, where George landed his surviving plants, and set about establishing his family on shore. Of the plants that he had taken charge of many had died, but among the survivors were several varieties of grapes, apples, chestnuts, a walnut, willows, pomegranates, mulberries, plantains, mint, oaks, oranges, lemons, limes, plums, quince, figs and several herbs.

They found 186 acres of suitable land at Baulkham Hills, and built Chelsea Farm there. The first couple of years were difficult, as the Suttors were hopelessly under-capitalised. In May 1802

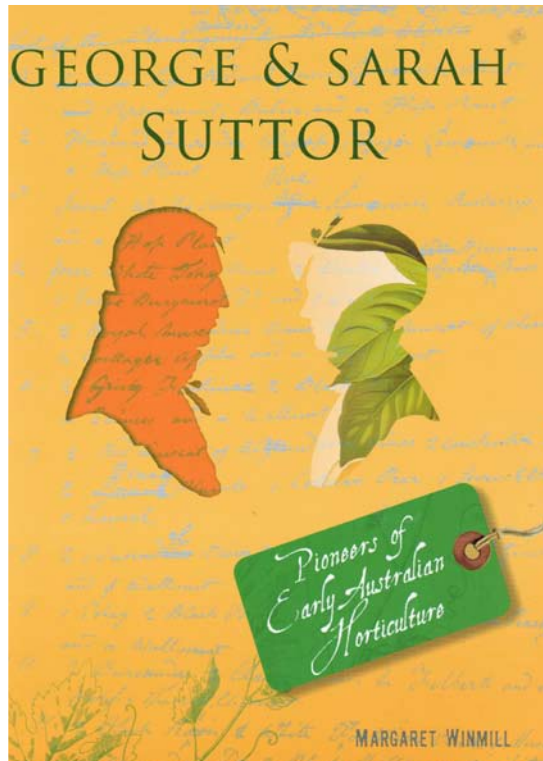
George wrote to Banks seeking help. In reply he received his payment (£5) for looking after the plants on *Porpoise*. George planted orange trees and other fruits on his farm, and by 1804 he had established a small nursery and was advertising plants for sale. By 1806 the farm and nursery were flourishing, but in that year Governor King resigned, unable to control the New South Wales Corps (the "Rum Corps"), and was replaced by Gov. Bligh. Just over 12 months later Bligh was

overthrown in the Rum Rebellion, led by Major Johnson, but with the complicity of John Macarthur, the colony's richest landowner.

The rebels demanded that the free settlers pledge allegiance to them. Suttor refused, and was jailed. His government privileges were withdrawn, including all his assigned convicts, the entire farm labour force. Sarah was left to run the farm as best she could, with 2 young children. George was released in June 1809 and later that year Gov. Macquarie with his own regiment arrived to restore order. The Rum Corps and the leaders of the rebellion were sent to England,

along with Gov. Bligh and 16 men chosen to defend his actions, among them George Suttor. Suttor spent nearly a year in England, meeting frequently with Banks, with whom he had been in constant correspondence regarding the import of selected varieties of plants into New South Wales. He returned to Sydney in November 1812, and shortly afterwards was appointed Superintendent of the Castle Hill Lunatic Asylum. He held the post for 5 years, farming the attached land as well as his Chelsea Farm property.

At Kew in 1811 Suttor had met Allan Cunningham, then working for Aiton. In 1816 Cunningham arrived in Sydney as collector for Kew under



Banks' direction, and the two rapidly became close friends. Cunningham's journals frequently refer to him staying with 'a friend' at Baulkham Hills and Castle Hill, and in his declining years Cunningham lived with the Suttors in Elizabeth Street, Sydney.

In 1821 George received permission to take his flocks over the Blue Mountains and set up a new property in the Bathurst district. This he did, establishing Brucedale on 1000 acres. In the following years he purchased many other properties in the Parramatta and Bathurst districts. By the 1830s the Suttors were well-off, their farms producing sheep and cattle, grain, and fruit, particularly oranges and lemons. The Suttors reportedly sent the first oranges to market in Sydney, and by 1829 were producing 12–20 thousand dozen oranges per annum.

In 1839 the Suttors returned to England, leaving their various properties to be managed by their sons. George spent the next six years travelling in Europe, especially in the wine areas of France, learning whatever he could of viticulture and winemaking. In 1844 Sarah died while near Rouen. In 1843 George published "The Culture of the Grape-Vine and the Orange in Australia and New Zealand", a book received with acclaim. He was elected a Fellow of the Royal Geographical Society in 1842 and read two papers to the Society. He was also elected a Fellow of the Linnean Society, reading them a paper in 1843, and a Fellow of the Ethnological Society of London. George Suttor died in Sydney in 1859.

Although subtitled "Pioneers of Early Australian Horticulture" the book provides little detail of this aspect, other than in reproducing the detailed lists of plants brought on the initial *Porpoise* voyage. There is no doubt that George Suttor was a pioneer of grape and citrus cultivation in New South Wales, and he probably facilitated the

import of many other horticultural crops through his correspondence with Banks. Sadly, the details of these imports seem to have vanished. The book is written by a great-great-great-grand-daughter of George and Sarah Suttor, and as would be expected the book is a chronicle of the first generations of the family in Australia. However it is much more than that. It provides thumbnail sketches of many of the Suttor's contemporaries, including botanists Allan Cunningham and George Caley, as well as central society and political identities John Dunmore Lang, Gov. Philip Gidley King, Rev. Samuel Marsden, Gov. Lachlan Macquarie, Gov. William Bligh, John William Lewin, Robert Campbell, Captain John Piper (of Point Piper) and many more. The book is worth reading for these vignettes alone. It is acknowledged that the book is heavily based on two earlier works, Mackaness (1948) and Norton & Norton (1994). However in bringing these together, along with transcripts of letters to and from Banks (and others), and other family correspondence, Margaret Winmill has produced an account of early 19th century Australia that is both informative and compulsive reading. It would be churlish to point out a small number of errors (for example Allan Cunningham collected far more than "four hundred and fifty" specimens of plants) because for the most part the account is accurate and based on surviving documentation. I read this book from cover to cover in one sitting and highly recommend it for botanists with an interest in history (or historians with an interest in botany).

References

- Mackaness, G. (1948) *The Memoirs of George Suttor F.L.S. Banksian Collector 1774-1859*. Australian Monograph Series: Dubbo. Reprinted by Review Publications (1977).
- Norton, J. & Norton, H. (1994) *Dear William; the Suttors of Brucedale*. Suttor Publishing Committee: Sydney

Australasian Systematic Botany Society Inc.

Hansjörg Eichler Research Fund

Applications close on March 14th 2019

We invite applications from financial members.

For eligibility and other information see the ASBS website

at www.asbs.org.au/asbs/hesrfund/index.html

or contact Vice-President at vicepres.asbs@gmail.com

New books

Guides to bees

Robyn Barker

Honey bees

In the *ASBS Newsletter* this year we have had some delvings into the honey bee and the topics of the purity of their honey product and the contretemps over the use of the term *manuka*, as well as announcing the first Marlies Eichler award to Dr Bee Gunn. On the weekend of the 8–9 December, *The Australian* newspaper featured reviews of three overseas books on honey bees, one on bee-keeping, Helen Jukes's *A honeybee heart has five openings: a year of keeping bees*, one on the intricacies of the hive and how the bees operate, Jurgen Tautz & Diedrich Steen's *The Honey Factory: Inside the ingenious world of bees*, and one on why we need bees, Thor Hanson's *Buzz: the nature and necessity of bees*. *The Australian* reviews are now inaccessible unless you have a subscription, but the web has other reviews (Web refs. 1–4).

Web references

- 1: <https://www.theguardian.com/books/2018/jul/30/a-honeybee-heart-has-five-openings-review-helen-jukes>
- 2: <https://www.smh.com.au/entertainment/books/the-honey-factory-review-jurgen-tautz--diedrich-steen-on-bee-business-20180903-h14vg8.html>
- 3: <https://www.theguardian.com/books/2018/jul/20/a-honeybee-heart-has-five-openings-buzz-review>
- 4: <https://blogs.sciencemag.org/books/2018/07/09/buzz/>

Bee identification and information tool

The Identification Technology Program (ITP) that supports the biosecurity organisation (APHIS) of the US Department of Agriculture has recently released a new Identification and Information tool, *Exotic Bee ID*.

Like other countries, the USA has experienced a decline in some bee populations, due to habitat loss, pesticides, parasites and pathogens, as well as the introduction of non-native bee species. Exotic Bee ID has been designed to help those working at ports, state departments and extension services who monitor and intercept non-native bees in the US. It will also be of interest to non-experts with an interest in learning features important in bee identification.

This initial release is the first of three phases: future releases will include keys, fact sheets, and images for additional bee families and genera. This phase includes:

- Instructions on bee specimen preparation
- Bee morphology illustrations
- Illustrated glossary of terms
- Filterable image gallery
- Searchable fact sheets
- Two Lucid keys

The information above is taken from the website (Web ref.). Despite the fact that this is only phase one of the release there is already considerable information on the site and there is much to be learnt from it by those who would set up a similar tool, whether for native or exotic bees.

Web ref. <http://idtools.org/id/bees/exotic/>

Australian native bees

Honey-bees, interesting as they are, are introduced and have almost certainly displaced some of our native bees. Therefore it's great to see CSIRO Publishing have recently produced two excellent books on native bees. The first is a visual odyssey by a Ph.D. student, James Dorey, the second by a long-time expert in the field, Terry Houston. An earlier book by Tim Heard contains all you need to know about stingless bees.

A guide to native bees of Australia

By Terry Houston

CSIRO Publishing, Aug. 2018.

ISBN: 9781486304066; PB; 280 pp;

215 x 148 mm

ISBN: 9781486304073; ePDF

\$AU49.99

<https://www.publish.csiro.au/book/7388/>

A Guide to Native Bees of Australia provides a detailed introduction to the estimated 2000 species of Australian bees. Illustrated with stunning photographs, it describes the form and function of bees, their life-cycle stages, nest architecture, sociality and relationships with plants. It also contains systematic accounts of the five families and 58 genera of Australian bees.

Photomicrographs of morphological characters and identification keys allow identification of bees to genus level. Natural

history enthusiasts, professional and amateur entomologists and beekeepers will find this an essential guide. [Publisher's blurb]

Reviews

<https://blog.csiro.au/can-you-beelieve-our-guide-to-native-bees/>

<https://www.wanaturalists.org.au/news/a-guide-to-native-bees-of-australia-by-dr-terry-houston%C2%A6a-book-review/>

Bees of Australia. A photographic exploration

**By James Dorey
CSIRO Publishing. Oct. 2018.**

**ISBN:
9781486308491;
PB; 224 pp; 255
x 225 mm**

**ISBN:
9781486308507;
ePDF**

**\$AU49.99
[https://www.
publish.csiro.au/
book/7786/](https://www.publish.csiro.au/book/7786/)**

There are an estimated 2000 to 3000 bee species in Australia, yet we know very little about the vast majority of these and there are many that are yet to be described. *Bees of Australia* introduces some of our incredible native bees, many of which, if you look closely, can be found in your own garden. Open this book wherever you like or read it from cover to cover. The combination of photography and contributions from some of Australia's leading bee researchers allows anyone to become enthralled by our native bees. [Publisher's blurb].

Reviews

<https://www.jamesdoreyphotography.com.au/Projects>

<https://conjour.world/book-review/bees-of-australia-conjour-book-review/>

The Australian native bee book: keeping stingless bee hives for pets, pollination and sugarbag honey

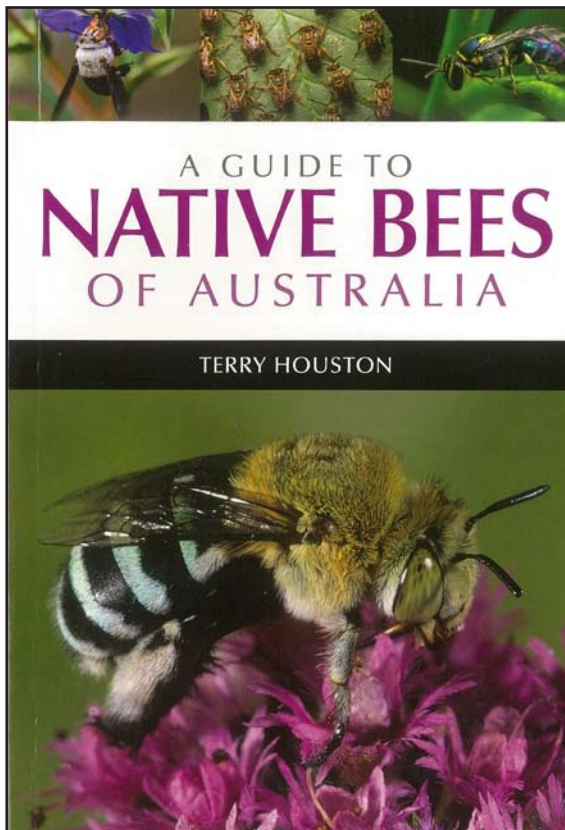
By Tim Heard

Sugarbag Bees: West End, Queensland: 2016

ISBN: 9780646939971; PB; 246 pp.;

\$AU35

**[https://www.nativebeebook.com.
au/#about](https://www.nativebeebook.com.au/#about)**



This book has been out for a bit longer and covers all things to do with native stingless bees. The author has spent a lifetime studying these bees.

Review

1: [www.theabk.com.au/
articles/2016/7/28/book-
review-the-australian-
native-bee-book-by-tim-
heard](http://www.theabk.com.au/articles/2016/7/28/book-review-the-australian-native-bee-book-by-tim-heard)

**More books,
reports and
download-
ables**

**Temperate
herbs: an archi-
tectural analysis**

By Jitka

Klimešová

***Czech Academy
of Sciences; 2018***

ISBN

9788020027603

**[https://www.ibot.cas.cz/en/
blog/2018/10/08/new-book-temperate-
herbs-an-architectural-analysis/](https://www.ibot.cas.cz/en/blog/2018/10/08/new-book-temperate-herbs-an-architectural-analysis/)**

Roots, rhizomes, tubers and bulbs of herbaceous plants seldom receive much attention in taxonomic descriptions, often because they are a feature lacking from many herbarium specimens. This book focuses on these below-ground organs responsible for key ecological functions such as overwintering, clonal multiplication and

resprouting after disturbance. The organs are documented in more than 1000 drawings made during two decades of study of Central European plants. [Adapted from the blurb]

The author of the book offered a week long course in the subject for PhD students in 2018 (Web ref.). Thanks Bob Parsons for bringing attention to this book.

Web ref. <https://klimesovajitka.wordpress.com/gobelowground/>

Algae of Australia: marine benthic algae of north-western Australia 2. Red algae

John Huisman

CSIRO Publishing; August 2018

ISBN: 9781486309542; HB - AU \$220.00

<https://www.publish.csiro.au/book/7842/>

Describes the 158 genera and 351 species of marine benthic red algae of north-western Australia. Each taxonomic level, from division to species, is fully described, incorporating current nomenclature, morphology, keys, and numerous figures, many in colour. These two volumes represent the first detailed accounts of the marine plants of tropical Western Australia and document numerous taxa newly recorded for the region. [Publisher's blurb].

Flora of the Pacific Northwest. An illustrated manual.

By C. Leo Hitchcock & Arthur Cronquist

Edited By David E. Giblin, Ben S.

Legler, Peter F. Zika & Richard G.

Olmstead

University of Washington Press; October 2018

ISBN: 9780295742885; HB; 936 pp.; \$US75.00.

www.washington.edu/uwpress/search/books/HITFL2.html

This completely revised and updated edition reflects the advances in vascular plant systematics over the decades since publication of the first edition in 1973.

The Best Australian science writing 2018

Edited by John Pickrell

NewSouth Books; Nov 2018

ISBN: 9781742235882. PB; 336pp;

AUD\$29.99, NZD\$34.99

<https://www.newsouthbooks.com.au/books/best-australian-science-writing-2018/>

This popular yearly anthology gives a snapshot of the very best science writing Australia has to offer, including everything from the most esoteric philosophical questions about ourselves and the universe, through to practical questions about the environment in which we live. [Publisher's blurb].

Nick O'Malley's article "*Would you burn the Mona Lisa if it was sent? Our horror bureaucratic bungle*" about the destruction of herbarium specimens earlier this year features in the collection (see News p. 26).

Bibliography of natural history travel narratives

By Anne S Troelstra

KNNV Publishing. 2016

ISBN: 978-9050115964; HB; 20.3 x 3.8 x 27.9 cm; c. 500 pp.

To qualify for treatment in this book you need to have published a book about your natural history travels. Those natural historians covered for Australia include many of the usual suspects such as the Forsters, Archibald Menzies, James Backhouse, Ludwig Leichhardt, Thomas Mitchell, Charles Sturt and Ernest Giles; later pioneers include Ellis Rowan, H.H. Finlayson, Douglas Mawson and Tim Flannery. The publication of their diaries after death qualified Sydney Parkinson and Robert Brown for inclusion, but McDouall Stuart would appear to be a significant oversight. For New Zealand diarists include John Bidwill, William Colenso, Ferdinand Hochstetter, Julius Haast and Johann Dieffenbach.

But it's probably not for those names which are familiar to us that this book is most valuable. Here is a ready source of information about the origin of some of those older overseas collections stored in our herbaria. For those labels where the collector is known, this book has proved invaluable in interpreting the identity of some of

the locations where the collections were made, particularly those where the boundaries and names have changed. For those undertaking databasing of their overseas collections this book would be a great starting point for interpretive purposes and the author deserves our thanks for his meticulous work.

Charles Nelson has reviewed the book (Nelson 2017) while Google books has a preview of a number of pages if you want to assess it for yourself (Web ref.).

References

Nelson, E.C. (2017). Troelstra, A.S. Bibliography of natural history travel narratives. *Archives of natural history*, 44(2), pp. 384–385. <https://www.eupublishing.com/doi/abs/10.3366/anh.2017.0472>

Web ref. https://books.google.com.au/books/about/Bibliography_of_Natural_History_Travel_N.html

Xerophile: cactus photographs from expeditions of the obsessed

By Jeff Kapton, Max Martin and Carlos Morera

Hat & Beard Press; 2018

ISBN: 978-0998723907; PB; 352 pp

Prices cited range from \$US65 - \$US80.

The first book of its kind. A selection of over five hundred photographs of arguably the rarest and most spectacular plants on earth, photographed in their natural habitats over the past 80 years by a global cadre of obsessed cactus aficionados. *Xerophile* is not a field guide or taxonomy. Neither is it a book of photography in the traditional sense. Rather, it mines the space between science and art, between gravity and levity; a space in which plants that by many measures should not exist, and may very well cease to, live on in the darkness of dusty slide carousels and forgotten old hard drives of those who have devoted their lives to searching, writing, gossiping, thinking, dreaming and, if they are lucky – after weeks of false turns, stuck jeeps, and steep mountain paths-laying their eyes on the plant they have so desperately been seeking. [Adapted from the publisher's blurb].

Two reviews (Web ref. 1, 2) provide a background to this unusual work, first seen in the library at AD.

References

- 1: <https://lareviewofbooks.org/article/cactus-love-on-xerophile-cactus-photographs-from-expeditions-of-the-obsessed/#!>
- 2: <https://www.newyorker.com/culture/photo-booth/the-strange-wonders-of-cactuses-the-plant-of-our-times>

Wilding: the return of nature to a British farm

By Isabella Tree

Picador. May 2018

ISBN 9781509805099; HB; 384 pp

Reviewed at <https://guardianbookshop.com/wilding-565525.html>

What brought me to this book was an article in *The Guardian* (referred to on *Botany One*) on British Government plans to reforest an area between Hull and Liverpool with 50 million trees over the next 25 years (Web ref. 1). The author of the article, Ms Tree, suggested that there was a much more efficient way of establishing this forest than employing an “army of planters” and that was to allow the trees to regenerate themselves. This could be achieved by allowing today’s thorny scrub “wasteland”, the “wildwood” of Kenneth Graham’s *Wind in the Willows*, to provide protection and shelter to a much more diverse ecosystem, a process she refers to as rewilding. It seems that the appropriately named Ms Tree and her husband began the [re]wilding experiment on their 3500 acres in Sussex in 2001 and have achieved a remarkable return of biodiversity. You can read all about their experience in their book which is reviewed on *The Guardian* web site.

Their tale is not a lone one, and nor is it confined to Britain. Other examples are cited in the review and of course we have our own examples in Australia and New Zealand, the one first springing to mind being Hugh Wilson’s use of gorse for regeneration purposes on the Banks Peninsula in New Zealand (Web ref. 2), although many would not classify this as wilding or rewilding. The term rewilding engenders controversy and definitions of what it concerns differ widely but there is little doubt that it has become a “buzz” word. There is *Rewilding Europe* (Web ref. 3), *Rewilding Britain* (Web ref. 4), *Rewilding Australia* (Web ref. 5) and we are even rewilding our cities (Web ref. 6).

References

- 1: <https://www.theguardian.com/commentisfree/2018/nov/26/wildwoods-britain-climate-change->

northern-forest

- 2: <https://teara.govt.nz/en/photograph/11911/regeneration-through-gorse>
- 3: <https://rewildingeuropa.com/>
- 4: <https://www.rewildingbritain.org.uk/>
- 5: <https://rewildingaustralia.org.au/>
- 6: <https://www.rei.com/blog/stewardship/rewilding-our-cities>

Land bridges, ancient environments, plant migrations, and New World connections

By Alan Graham

University of Chicago Press. March 2018

ISBN: 9780226544298 PB; ISBN:

9780226544151 Cloth; ISBN:

9780226544328 ebook

<https://www.press.uchicago.edu/ucp/books/book/chicago/L/bo27847605.html>

The structure of this book can be seen on the publisher's website. It consists of three main parts dealing with Boreal, Equatorial and Austral Land Bridges and their relevance to American plant distributions.

Review

<https://www.botany.one/2018/10/plants-bridging-the-gaps/>

Guidelines for the translocation of threatened plants in Australia.

Edited by L.E. Commander, D.J. Coates, L. Broadhurst, C.A. Offord, R.O. Makinson & M. Matthes

Australian Network for Plant Conservation Inc.; 2018 (Third Edition).

ISBN: 978-0-9752191-3-3; 168 pp.

http://www.nespthreatenedspecies.edu.au/Translocation%20Guidelines_FINAL%20WEB2.pdf

The Australian Network for Plant Conservation (ANPC) has reviewed and expanded their two earlier works of the same name (1997 & 2004) to produce this third definitive edition of their *Guidelines for the Translocation of Threatened Plants in Australia*. The guidelines were launched as part of the network's most recent conference in Canberra in November. A background to the updating and revision of the guidelines can be seen on-line (Web ref. 1). The guide can be downloaded in its entirety as a 17 Mb pdf or, if

you would prefer a bound copy, it can be ordered on-line (Web ref. 2).

References

- 1: www.nespthreatenedspecies.edu.au/news/plant-translocation-new-guidelines-a-game-changer
- 2: www.anpc.asn.au/translocation

Translocation Working Group (1997) *Guidelines for the translocation of threatened plants in Australia*. (Australian Network for Plant Conservation: Canberra).

Vallee L, Hogbin T, Monks L, Makinson B, Matthes M & Rossetto M (2004) *Guidelines for the translocation of threatened plants in Australia*. Second edn. (Australian Network for Plant Conservation: Canberra).

Reinvention of Australasian biogeography – reform, revolt, and rebellion

By Malte C. Ebach

CSIRO Publishing, Clayton South, Victoria: 2017

ISBN: 9781486304837; 192 pp.;

SAU69.95.

<http://www.publish.csiro.au/book/7438/>

The contents of this book can be seen through the web address above. John Grehan published a review in the *Botanical Society of Otago Newsletter* 81:17–18 (Web ref.)

Web ref.: <https://bsociety.org.nz/f/p8l987/bsociety81.pdf>

The Lord Treasurer of Botany:

Sir James Edward Smith and the Linnaean Collections.

By Tom Kennett

The Linnean Society: London. 2016

ISBN: 978-0-9933551000

From the review by Bil (2017) “a biography that historians of popular science will probably reckon useful, and that scholars of eighteenth- and nineteenth-century botany and natural history will no doubt regard as indispensable and overdue.”

For those further interested in James Edward Smith his correspondence is available through the Linnean Society pages at Web ref. 1.

References

- Bil, G. (2017). *British Journal of Science* 50(3): 549–551. <https://doi.org/10.1017/S000708741700070X>

Web ref.: http://linnean-online.org/smith_correspondence.html

The effective scientist: a handy guide to a successful academic career

By Corey J.A. Bradshaw

Cambridge University Press; 2018

ISBN: 9781316620854; PB; 288 pp.;

\$AU32.95 (Angus & Robertson)

There is probably more than enough on the author's blog site (Web ref. 1) for you to decide whether this book is for you or not, but there are independent reviews (Web ref. 2, 3).

Web references

- 1: <https://conservationbytes.com/2018/03/22/the-effective-scientist/>
- 2: <https://dezeracox.com/2018/10/28/book-review-the-effective-scientist/>
- 3: <https://journals.iucr.org/j/issues/2018/04/00/xo0120/xo0120.pdf>

Living Planet report - 2018: aiming higher

Edited by Grooten, M. and Almond, R.E.A.

WWF, Gland, Switzerland. 2018

ISBN 978-2-940529-90-2

<https://www.worldwildlife.org/pages/living-planet-report-2018>

Published by the World Wildlife Fund (WWF) every two years, this downloadable report brings together a variety of research to provide a comprehensive view of the health of the Earth.

We are pushing our planet to the brink. Human activity—how we feed, fuel, and finance our lives—is taking an unprecedented toll on wildlife, wild places, and the natural resources we need to survive. According to the 2018 report, we have seen

- an average **60% decline** in the size of populations of mammals, birds, fish, reptiles, and amphibians between 1970 and 2014,
- a **50% loss** of shallow water corals in 30 years
- and **20%** of the Amazon has disappeared in 50 years

The report presents a sobering picture of the impact human activity has on the world's wildlife, forests, oceans, rivers, and climate. We're facing a rapidly closing window for action and the urgent need for everyone—everyone—to collectively rethink and redefine how we value, protect, and restore nature. [Publisher's Blurb]

Go fungal! How to spread your message and make new connections on social media. A guide to taking your research to blogs, Twitter, Facebook and beyond.

By Alun Salt

Botany One downloadable

https://www.botany.one/wp-content/uploads/2019/01/Go_Fungal.pdf

This is the first version of a booklet that *BotanyOne* has been handing out at 2018 conferences. It covers just one of Bradshaw's aspects of being an effective scientist (see prior book), advising on how best to promote your work through the use of social media. It is compact, only eight pages, and you may well learn something. A background to this first iteration and plans for its future is also accessible (Web ref.)

Web ref. <https://www.botany.one/2019/01/go-fungal/>

Australasian Systematic Botany Society Inc.

2019 Membership Fees

These are due on January 1st each year.

Subscription rates:

Ordinary/Institutional members \$45 (AUS)

Full-time students / retired / unemployed \$25 (AUS)

This is also an opportunity to donate to the Research Fund.

Prospective Members need to download a membership form from the membership section of the ASBS web site.

Please direct enquiries to the Treasurer (treasurer.asbs@gmail.com).

Survey

An investigation into Academic Freedom in Australia

On behalf of the Ecological Society of Australia, researchers from RMIT are seeking volunteers to participate in a survey that asks questions about the academic freedom of ecologists and conservation scientists working within different organisations. The information collected will help to generate a better understanding of the constraints on ecologically-trained professionals when contributing to public commentary on issues about which they have expertise.

The online survey should take around 10-15 minutes to complete and will consist primarily of short, multiple-choice questions. Participation is voluntary and, if you choose to participate, you

will remain completely anonymous.

If you would like to participate in this survey and help with this research please visit the following link (Web ref.).

Web ref. <http://bit.ly/AcademicFreedomSurveyEcology>

Professor Don Driscoll
President Ecological Society of Australia

When you visit the survey site it may appear as if it is too late to participate. However, Professor Driscoll has assured us that the survey is still open and he welcomes your participation.

Eds.

Coming workshop

Plant Traits Workshop

27 March 2019, The Calyx, Royal Botanic Garden Sydney

Invited speakers:

Lorena Endara (University of Florida)
Hamish Holewa (Atlas of Living Australia)
Shelley James (Royal Botanic Gardens and Domain Trust)
Kevin Thiele (Taxonomy Australia)
Will Cornwell (University of New South Wales)
Russell Barrett (Royal Botanic Gardens and Domain Trust)

Organisers:

Rachael Gallagher (Macquarie University)
Hervé Sauquet (Royal Botanic Gardens and Domain Trust)

OPEN CALL FOR ADDITIONAL TALKS

A maximum number of 40 participants and duration (9–10 min each)

TO REGISTER

Please send an email by 31 January 2019 to
rachael.gallagher@mq.edu.au and herve.sauquet@gmail.com

explaining why the workshop is relevant to your research and how you may contribute to the discussions, and providing a short title for your talk if you wish to give one.

Chapter conveners

Adelaide

Robyn Barker
State Herbarium of South Australia
Department for Environment, Water & Natural Resources
PO Box 1047, Adelaide SA 5001
Tel: (+618)/(08) 8222 9348
Email: robyn.barker@sa.gov.au

Armidale

Jeremy Bruhl
Department of Botany
Univ. of New England, Armidale, NSW 2351
Tel: (+612)/(02) 6773 2429
Email: jbruhl@une.edu.au

Brisbane

Vacant

Cairns

Katharina Nargar
Australian Tropical Herbarium (CNS)
James Cook University Cairns Campus
PO Box 6811, Cairns Qld 4870
Tel: (+617)/(07) 4232 1686
Email: katharina.nargar@csiro.au

Canberra

Alexander Schmidt-Lebuhn
Centre of Australian National Biodiversity Research
CSIRO Plant Industry
Canberra, ACT 2601
Tel: (+612)/(02) 6246 5498
Email: Alexander.S-L@csiro.au

Christchurch

Rob Smissen
Allan Herbarium, Landcare Research New Zealand Ltd
PO Box 69040, Lincoln 7640, New Zealand
Tel: (+643)/(3) 321 9803
Email: smissenr@landcareresearch.co.nz

Darwin

Ian Cowie
Northern Territory Herbarium
PO Box 496, Palmerston, NT 0831
Tel.: (+618)/(08) 8999 4511
Email: ian.cowie@nt.gov.au

Hobart

Miguel de Salas
Tasmanian Herbarium,
Tasmanian Museum and Art Gallery
PO Box 5058, UTAS LPO, Sandy Bay, Tas. 7005
Tel: (+613)/(03) 6226 1806
Email: Miguel.deSalas@tmag.tas.gov.au

Melbourne

Frank Udovicic
National Herbarium of Victoria
Private Bag 2000, South Yarra, Vic. 3141
Tel: (+613)/(03) 9252 2313
Email: frank.udovicic@rbg.vic.gov.au

Perth

Juliet Wege
Western Australian Herbarium
Department of Environment & Conservation
Locked Bag 104, Bentley Delivery Centre, WA 6983
Ph: (+618)/(08) 9219 9145
Email: Juliet.Wege@dbca.wa.gov.au

Sydney

Peter Weston
National Herbarium of NSW
Mrs Macquaries Road, Sydney, NSW 2000
Tel: (+612)/(02) 9231 8111
Email: peter.weston@rbgnsyd.nsw.gov.au

Wellington

Heidi Meudt
Museum of New Zealand Te Papa Tongarewa
PO Box 467, Cable St
Wellington 6140, New Zealand
Tel: (+644)/(4) 381 7127; Email: HeidiM@tepapa.govt.nz

Contacting major Australasian herbaria and systematics institutions

AD tel: (+618)/(08) 8222 9307 fax: (+618)/(08) 8222 9353 www.environment.sa.gov.au/Science/Science_research/State_Herbarium	HO tel: (+613)/(03) 6226 2635 fax: (+613)/(03) 6226 7865 www.tmag.tas.gov.au/collections_and_research/tasmanian_herbarium	MEL tel: (+613)/(03) 9252 2300 fax: (+613)/(03) 9252 2350 www.rbg.vic.gov.au/science/herbarium-and-resources	NSW tel: (+612)/(02) 9231 8111 email: feedback@rbgnsyd.nsw.gov.au www.rbgnsyd.nsw.gov.au
CANB tel: (+612)/(02) 6246 5108 fax: (+612)/(02) 6246 5249 www.anbg.gov.au/	BRI tel: (+617)/(07) 3896 9321 fax: (+617)/(07) 3896 9624 www.qld.gov.au/environment/plants-animals/plants/herbarium/	CNS tel: (+617)/(07) 4232 1837 www.ath.org.au/ enquiry@ath.org.au	PERTH tel: (+618)/(08) 9219 8000 fax: (+618)/(08) 9334 0327 http://dbca.wa.gov.au/plants-and-animals/wa-herbarium
NT tel: (+618)/(08) 8951 8791 fax: (+618)/(08) 8951 8790 https://nt.gov.au/environment/native-plants/native-plants-and-nt-herbarium	DNA tel: (+618)/(08) 8999 4516 fax: (+618)/(08) 8999 4527 https://nt.gov.au/environment/native-plants/native-plants-and-nt-herbarium	AK tel: (+649)/(9) 306 7060 www.aucklandmuseum.com/collections-research/	CHR tel: (+643)/(3) 321 9999 fax: (+643)/(3) 321 9997 www.landcareresearch.co.nz
WELT tel: (+644)/(4) 381 7261 fax: (+644)/(4) 381 7070 http://collections.tepapa.govt.nz/	Australian University Herbaria CHAH representative: Frank Hemmings University of New South Wales email: f.hemmings@unsw.edu.au	ABRS tel: (+612)/(02) 6250 9417 fax: (+612)/(02) 6250 9555 email: abrs@environment.gov.au www.environment.gov.au/science/abrs	Council of Heads of Australasian Herbaria (CHAH) Chair: John Huisman (PERTH). email: john.huisman@dbca.wa.gov.au www.chah.gov.au

The Society

The Australasian Systematic Botany Society is an incorporated association of over 300 people with professional or amateur interest in botany. The aim of the Society is to promote the study of plant systematics.

Membership

Membership is open to all those interested in plant systematics. Members are entitled to attend general and chapter meetings, and to receive the Newsletter. Any person may apply for membership by filling in a "Membership Application" form, available on the Society website (www.asbs.org.au), and forwarding it, with the appropriate subscription, to the Treasurer. Subscriptions become due on 1 January each year.

The ASBS annual membership subscription is AU\$45; full-time students \$25. Payment may be by credit card or by cheques made out to Australasian Systematic Botany Society Inc., and remitted to the Treasurer. All changes of address should be sent directly to the Treasurer as well.

ASBS publications

Australasian Systematic Botany Society Newsletter

Back issues

Back issues of the Newsletter are available from Number 27 (May 1981) onwards, excluding Numbers 29, 31, 60, 84–86, 89–91, 99, 100, 103, 137–139, and 144. Here is the chance to complete your set.

Cost: Free

Australian Systematic Botany Society Newsletter No. 53 **Systematic Status of Large Flowering Plant Genera**

Edited by Helen Hewson, 1987

This Newsletter issue includes the reports from the February 1986 Boden Conference on the "Systematic Status of Large Flowering Plant Genera". The reports cover: the genus concept; the role of cladistics in generic delimitation; geographic range and the genus concepts; the value of chemical characters, pollination syndromes, and breeding systems as generic determinants; and generic concepts in the Asteraceae, Chenopodiaceae, Epacridaceae, *Cassia*, *Acacia* and *Eucalyptus*.

Cost: Number 53: \$5, plus \$1.75 postage (in Australia)

Cheques payable to "ASBS Inc." Mastercard & Visa payments accepted.

For back issues of the newsletter ONLY, contact:

Anna Monro
ASBS Sales
Australian National Botanic Gardens
GPO Box 1777
Canberra, ACT 2601, Australia

Emailing is preferred means of contact, but alternatively fax credit card details to:

Anna Monro Fax: (+61)/(0) 2 6250 9599

Enquiries: anna.monro@environment.gov.au Tel: (+61)/(0) 2 6250 9530

Evolution of the Flora and Fauna of Arid Australia (book)

Edited by W.R. Barker & P.J.M. Greenslade.

Peacock Publications, ASBS & ANZAAS, 1982

This collection of more than 40 papers will interest all people concerned with Australia's dry inland, or the evolutionary history of its flora and fauna. It is of value to those studying both arid lands and evolution in general. Six sections cover: ecological and historical background; ecological and reproductive adaptations in plants; vertebrate animals; invertebrate animals; individual plant groups; and concluding remarks.

Cost: \$20, plus \$10 postage (in Australia).

This book is almost out of print. There are a few remaining copies.

To order a copy of this book email Bill Barker at: bill.barker@sa.gov.au

History of Systematic Botany in Australasia (book)

Edited by P.S. Short. A4, case bound, 326 pp. ASBS, 1990

No longer available

Australasian Systematic Botany Society Newsletter

The Newsletter keeps ASBS members informed of Society events and news, and provides a vehicle for debate and discussion. In addition, original articles, notes and letters (not exceeding ten published pages in length) will be considered.

Every effort is taken to distribute the Newsletter quarterly; delays or rare combined issues are attributable usually to the availability of the Editors who act in a voluntary capacity rather than to lack of copy. As soon as possible after compilation of each issue a searchable pdf version (in full colour) is placed on the Society web site and announced to members by email, and printed copy (in grey scale) is produced and distributed to members who have requested it.

Citation: abbreviate as *Australas. Syst. Bot. Soc. Newslett.*

Instructions to contributors

Send copy to an Editor preferably by email attachment submitted as an MS Word (.doc or docx) or Rich-text-format (.rtf) file. We accept handwritten or typescripts by letter or fax but the associated extra editorial work may cause delay in publication. Copy is created using Adobe Creative Suite (CS3) before transfer to pdf for publication.

Deadline for copy is nominally the last day of February, May, August and November.

Formatting of submitted copy. Please use Word document formatting for paragraph indents, bullets, etc. and for tables. *Avoid tabs* (since these alter in transfer to editing software). *All text must be in upper and lower case* including in titles, headings or authors in reference lists. Express *emphasis* in italics, not in bold or capitals. If embedding tables or references or other objects from Excel, bibliographic software, etc. ensure that these are converted to Word tables or paragraphs. We do allow the flexibility of approach that exists in English literature, but do ask for consistency in form within each submitted item and adoption of the following specifically. Letters in *abbreviations of Australian States* (SA, WA, etc., but Vic., Qld) and *organisations and degrees* (e.g. ASBS, ABRS, PhD) should not be separated by full-stops. In *personal names* follow the convention of a space between initials and surname (e.g. W.R. Smith or WR Smith), distinguishing them from standard taxonomic author contractions, which omit such spaces (e.g. R.Br., not R. Br.). In *dates*, particularly in lists, months may be contracted to the first three letters (e.g. Jan, Feb, Mar), but not if the month stands alone in a sentence. Use an en dash (–) in *ranges of numbers and dates* (pp. 22–24, 1–2 Jul, May–Aug).

Providing hyperlinks and DOIs. The on-line version of the Newsletter is now enhanced with active hyperlinks to references on the Web. To ensure this in their contributions, authors should include the URLs of these links (*but do not hide them behind text*). The Editors will not undertake to do this work for you, but will check links provided are active (and therefore accurate) for the on-line pdf.

Images. Images are welcomed but inclusion may depend on space being available. Image enhancement, composites and, if unavoidable, lettering, are done by the Editors in laying out and checking the text. *Send images individually as .jpg files.* Do not provide images by embedding in your document file; if you do, you will be asked for them separately, causing delay and extra work for you. *Resolution of 700 Kb and no more than 1–1.5 Mb* for individual .jpg images suits both press and on-line publication. (Please note that uncompressed files such as *tiff* or *.bmp* need to be very much larger in size. You will clog up our mailboxes if you use these; however, a DropBox link is acceptable). *Provide captions with name of photographer and, where different, copyright owner as a separate text file or appended to the article itself.*

Attribution. All items incorporated in the Newsletter are attributed to the author(s). Any unsigned articles are attributable to the Editors (Robyn Barker compiles the News, Web items and Book listings). Authors alone are responsible for the views expressed, and statements made by the authors do not necessarily represent the views of the Australasian Systematic Botany Society Inc. The Editors may make changes to correct spelling and substantially improve syntax or clarity without recourse to the author.

Reproduction of unpublished material not the author's. It is the author's responsibility to gain permission for publication and correctly attribute sources.

Advertising

Advertising space is available for products or services of interest to ASBS members. The current fee is AU\$200 per full page, \$100 per half-page or less.

Flyers may be approved for inclusion in the envelope for products or services of interest to ASBS members. The current fee is \$200 per flyer, plus the cost of inserting them (usually roughly \$50). Flyers are not part of the Newsletter and do not appear with the Newsletter on the ASBS Website.

A 20% discount applies for second and subsequent entries of the same advertisement. Advertisements from ASBS members are usually exempt from fees but not the insertion costs in the case of a flyer.

The Editors

Please contact us for clarification or additional information.

Bill Barker State Herbarium of South Australia PO Box 1047 Adelaide SA 5001 Tel. (+61)/(0) 427 427 538 Email: bill.barker@sa.gov.au	Book Reviews editor: John Clarkson Queensland Parks & Wildlife PO Box 156 Mareeba, Qld 4880 Tel: (+61)/(0) 7 4048 4745 Email: John.Clarkson@qld.gov.au	Robyn Barker State Herbarium of South Australia PO Box 1047 Adelaide SA 5001 Tel. (+61)/(0) 8 8222 9348 Email: robyn.barker@sa.gov.au
---	---	--

Contents

From the President	
Adjournment of AGM	1
Taxonomy Australia report	1
The Nancy Burbidge Medal	
Introducing the 2018 Nancy Burbidge Medallist – Ilse Breitwieser	3
The Nancy Burbidge Memorial Lecture. Reflections on Trans-Tasman systematic botany connections	4
Eichler Research Grant reports	
Out of place: climatic anomalies in the conifer fossil record	15
Developing a vouchered DNA reference library for South Australian coastal plant communities	18
Articles	
The Nagoya Protocol on access and benefit-sharing: implications for herbaria and systematics research	21
Further to Nagoya	22
Brazilian regulations for biological materials	22
Maori Research Guidelines released	22
At the Brisbane ASBS conference	23
Genomics for Australian Plants (GAP)	24
News	
Article on herbarium specimen destruction short-listed for Bragg Prize	26
Membership drive by the Society of Herbarium Curators (SHC)	26
New newsletter from Parks Australia	26
Botanic Endeavour 250	26
A new taxonomic scheme	27
Te Papa restructured and reviewed	27
GLOVAP response to ASPT	27
Cathy Offord wins NSW Premier's Prize	27
Retirements	28
On the move	28
The NSW Herbarium on the move	28
New plans for RBG Edinburgh	28
SBS News features taxonomists	28
Baking bread with kangaroo grass (<i>Themeda</i>) seeds – back to beginnings	28
<i>Trees of Papua New Guinea</i> on the way	29
Coming conferences	
ASBS 2019 Wellington: Taxonomy for Plant Conservation – Ruia mai i Rangiatea	29
Websites of interest	
Conservation Bytes	32
Alliance of Leading Environmental Researchers & Thinkers – ALERT	32
Mushroom magic videos	32
ABRS report	33
Items of interest	
Critical collections: preserving collections for future generations	34
DNA Barcoding of Australian plants using herbarium collections	35
Going to the source: a need to question database outputs?	35
Using DNA to identify old apple types	35
Fingerprinting to discern the origin of nuts	36
First fossil species of <i>Syzygium</i> from Snowy Mountains named for David Christophel	36
Development of a daisy flower	36
The insect apocalypse	36
New Caledonia biogeography	36
<i>Diuris</i> species pollinated by same insect species as <i>Daviesia</i> species it mimics	37
Overcoming barriers to siring success in the plant-pollinator world	37
Thiamine possibly leading to declines in wildlife and other emerging issues in global conservation	37
Sounding the resistance alarm	37
The mysteries of <i>Sargassum</i>	38
Night-flowering cacti	38
The changing face of museums	38
What is a disgusting food?	39
Which human uses are acceptable in parks?	39
Cities need to incorporate nature in their planning	39
Don't use modal verbs?	39
Reviewing a manuscript for a scientific journal	40
Rectangular icebergs! What next?	40
The-most-abundant-creature-you've-never-heard-of	40
Models show global warming causes greater extinction rate due to web of life	40
Meeting and workshop reports	
IUCN Proteaceae workshop	40
The State of the World's Fungi	41
Victorian Goodeniaceae workshop	43
Miscellanea	
Using torch light to non-invasively examine hidden flower parts in herbarium specimens	44
Novel ways of encouraging weed removal	45
Deaths	
Elizabeth Edgar (1929–2019)	46
Joy Thompson obituary: a postscript	47
Les Pedley (1930–2018)	47
Margaret Stones (1920–2018)	47
David Thomas Moore (1936–2018)	48
Book reviews	
Aspects of Kimberley history	49
Insights into nature and science in the Kimberley	52
The mountain building continues: the Orchards' Allan Cunningham saga	55
Another biography of a major Australian plant collector: Augustus Oldfield	58
Family life and notable identities in early 19 th Century Australia	61
<i>Notice. Hansjörg Eichler Research Fund</i>	63
New books	
Guides to bees	64
More books, reports and downloadables	65
<i>Notice. 2019 Membership Fees</i>	69
Survey	
An investigation into Academic Freedom in Australia	70
Coming workshop	
Plant Traits workshop	70
Chapter conveners	71
Contacting major Australasian herbaria and systematics institutions	71
About the Society and becoming a member	72
ASBS publications	72
About the Newsletter: contributions, advertisements and the Editors	73