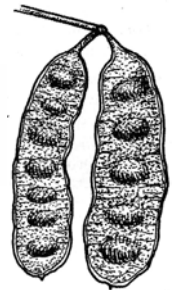
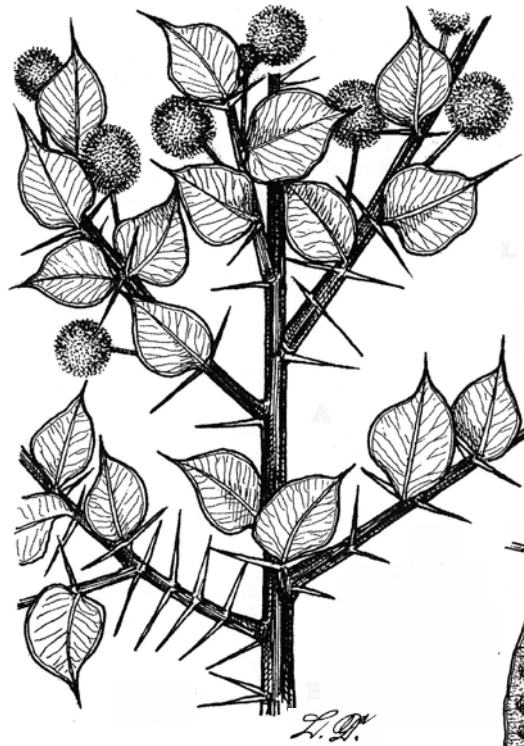


ASBS

*Australasian
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Botany
Society*



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Grant application closing dates

Hansjörg Eichler Research Fund:
on March 14th and September 14th each year.
Marlies Eichler Postdoctoral Fellowship:
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Papua New Guinea Botanical Society

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Web presence

ASBS Facebook Group

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

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Mike Bayly, email: mbayly@unimelb.edu.au

Cover image: *Acacia strongylophylla* F.Muell. Branch

surrounded by (clockwise from top) phyllode, legumes,
and seed with funicle. Artist: Ludwik Dutkiewicz.

From: D.J.E. Whibley & D.E. Symon, *Acacias of South
Australia*, 2nd edn (1992), with permission of Board of the
Botanic Gardens and State Herbarium (South Australia).

Publication dates of previous issue

Australas. Syst. Bot. Soc. Newslett. 180 (Sep 2019)
ASBS Web site: 11 Oct 2019. Printed version: 18 Oct 2019.

From the President

I am writing this more than a month after the very successful Wellington joint ASBS and NZPCN conference and a lot has happened since. As you will see elsewhere in the newsletter, reports were tabled at the AGM covering all the 2019 ASBS news so I will not go over those in great detail again here, but rather just touch on a few important points affecting our ASBS membership since the conference in late November 2019.

Firstly, the terrible bushfires and extreme heat in Australia have affected almost everyone, including smoke pollution impacting large cities in the south-east of Australia and even traveling across the Tasman to New Zealand. These fires, which have been experienced across Australia for months now and will likely continue in the months ahead, are urgent events that are polarizing many to action. The fires have drawn much international attention to Australia and have perhaps finally convinced many about the effects of climate change, plus the extinction risks posed to biodiversity, and myriad other impacts on those people directly involved. I am sure these events have affected most of the ASBS community, perhaps shifting the focus of research and day-to-day work for many of our members and institutions.

In some good news, I will take this opportunity to announce the student prize winners from the

Wellington conference. This year the winner of the Pauline Ladiges Prize for the best student talk was Helen Kennedy from the University of New England for her talk entitled: “Revising *Melichrus*: a deep dive into the past, present and future of the urn heaths”. The ASBS Poster Prize, for the best poster presented by a student at an ASBS conference, was awarded to Francis Nge from the University of Adelaide for his poster entitled: “Biogeography of *Pomaderris* (Rhamnaceae) across the ditch”, and the Bob Anderson Award also went to another student from the University of Adelaide, Raees Khan, for his poster entitled: “Game of cones: evolutionary trends and taxonomic significance of female cones in Podocarpaceae” (Fig. 1). Perhaps we should also have a prize for best titles too? Congratulations to the winners and thanks to the judges, the new Editor-in-Chief of *Australian Systematic Botany*, Darren Crayn, for presenting the awards, and our long-term supportive partnership with CSIRO Publishing for their generous sponsorship.¹

Although mentioned elsewhere (and I am trying

¹ Normally we have separate photographs of our student prize winners but they had all left or had gone on field-work in other parts of New Zealand by the time of the award presentation. So no photographs this year. I do note that they were all humble enough to think that they had no chance of winning when they mentioned to me they were leaving!

Fig. 1. At the Wellington Joint Conference ASBS awarded students travel grants (see p. 11). To qualify they had to give a spoken or poster presentation. Here are some of them, from left: Weixuan Ning, Tim Collins, Francis Nge (Best Poster), Raees Khan, (Bob Anderson Award), Nick Weigner, Anne Thomas, Harvey Orel, Patrick Fahey, Grace Boxshall, Taylor Davies-Colley, Cara-Lisa Schloots. Ph. Prashant Joshi



to comply with our newsletter editors' requests for a low-key exit), I would like to reiterate the Society's gratitude to Bill and Robyn Barker for their many years of service going above and beyond as Newsletter Editors. Later in the newsletter [the item below], Hervé Sauquet (ASBS Council Secretary) will report on plans for the next phase of ASBS communications based on our membership's feedback. I am pleased to hear that several members are willing to step up and assist, and I am optimistic about the future.

Elsewhere in the newsletter (p. 71) is the latest news from Katharina Nargar (ASBS Councillor and Chair of the Organising Committee) on the rapidly approaching 2020 ASBS conference to be held in Cairns, planning for which, I hear, is coming along nicely. I am very much looking forward to attending and seeing and talking with as many members as I possibly can.

Dan Murphy



Fig. The 2019 and the new 2020 ASBS Councils at the Wellington conference. Left to right: Ryonen Butcher (Councillor 2019, 2020), John Clarkson (Treasurer 2019, 2020), Heidi Meudt (Vice President 2019, 2020), Hervé Sauquet (Councillor 2019, Secretary 2020), Dan Murphy (President 2019, 2020), Katharina Nargar (Councillor 2020), Jen Tate (Secretary 2019).
Ph. Prashant Joshi

ASBS Council business

Communication review

Over the coming year, Council will aim to undertake an in-depth review of the society's communication strategy, including the Newsletter (see below) and how we communicate with the membership, social media accounts, our website, and our logo. To obtain adequate input from the membership, an online survey will be set up (link to be sent once ready).

As part of our planned improvements in communication, a Twitter account ([@ASBS_botany](https://twitter.com/ASBS_botany)) was created for the Society on 24

November 2019, on the first day of the conference in Wellington. The account currently has 196 followers and will require frequent activity (and many more followers) to be useful and increase the visibility of the Society. The account is managed by the Secretary and was moderated by the President and Secretary during the conference, but we need additional moderators to help us keep it live throughout the year. If you are willing to help us moderate this account, please contact the Secretary (secretary.asbs@gmail.com).

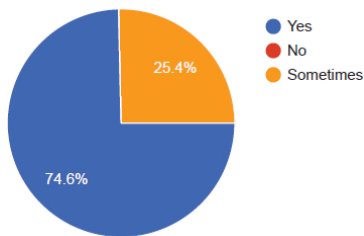
Future of the Newsletter

During the Council meeting in Wellington on 23 November 2019, a short online survey was created and sent to the membership to obtain and summarize opinions about the future of the *ASBS Newsletter*. 71 members responded, an excellent response rate given the short time frame. The results, presented here, indicate a strong interest from the membership to continue receiving the newsletter in one form or another, and 13 members expressed interest in contributing to the production of the newsletter. These members will be contacted shortly with the mission to organize and propose a plan for the continuation of the newsletter that will be reviewed by Council.

Hervé Sauquet
Secretary

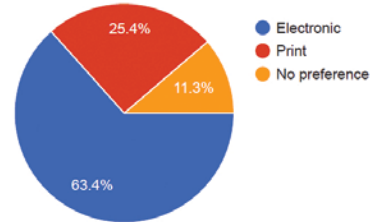
1. Do you read the ASBS Newsletter?

71 responses



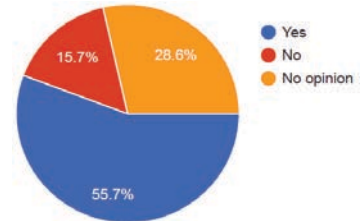
2. If you answered Yes or Sometimes to the question above, how do you prefer to read it in?

71 responses



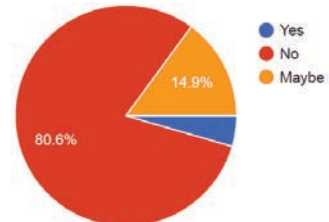
3. Do you think we should maintain the ASBS Newsletter in the current format?

70 responses



4. Would you be interested in contributing to editing and/or production of the ASBS Newsletter?

67 responses



Australasian Systematic Botany Society Inc.

2020 Membership Fees are now due !

Membership fees remain unchanged at \$45 for ordinary and institutional members and \$25 for students, retired or unemployed members.

The renewal form is available from the membership page on the Society's web site at www.asbs.org.au/membership.html

If you are reading this and did not receive an email reminder it probably means that the email address in the membership database is out of date. Your email address is the Society's primary way of contact.

I would appreciate hearing from you at treasurer.asbs@gmail.com

In response to questions from some members:

- Feel free to pay for several years in advance. Some members already do.
- Most banks will allow you to set up automatic payments. Talk to your bank if you would like to do this

John Clarkson, Treasurer

The Nancy Burbidge Medal & Lecture

Introduction to award ceremony for Burbidge Medallist Dr Barry Conn and his Lecture

Dan Murphy
President, ASBS

Prior to Barry Conn's entertaining and informative Burbidge medal lecture I delivered some introductory remarks which are briefly recounted in an edited form here.

The Nancy Burbidge Medal is awarded to a person who has made a longstanding and significant contribution to Australasian systematic botany. It is the foremost award that can be conferred by the Australasian Systematic Botany Society, and while the Nancy Burbidge Medal and the Nancy Burbidge Memorial Lecture are separate entities, in recent years the medallist has been invited to deliver the lecture. The 2019 Medallist is Dr Barry Conn. Barry is clearly a worthy recipient of the Nancy Burbidge medal. Council is pleased that he has accepted the invitation to deliver the 2019 Nancy Burbidge Memorial Lecture.

Barry is a systematic botanist who has contributed strongly to taxonomic research in Australasia. He has worked across a variety of flowering plant groups including the systematics of Malesian, Australasian and Pacific Dros-eraceae, Loganiaceae, Oxalidaceae, Ur-ticaceae, Verbenaceae, Xyridaceae, and particularly Lamiaceae. Barry is especially acknowledged for his focus on South-East Asian flora, given the loss of taxonomic capacity in recent years, and the limited number of taxonomists with a focus on that area based in Australia. After attending the past two Flora Malesiana conferences held in South-East Asia, I can personally

attest to the high esteem in which Barry is held by botanists across the region. He has many contacts and colleagues across the whole region, and, significantly, has worked in areas in the Pacific and Malesia in which it is difficult to practice taxonomy and which are understudied.

Barry has worked across many other taxonomic research areas in his career. He helped initiate the State *Flora of Victoria*,

at an early time when management had to be convinced of the need for such floras. He was also a notable early adopter of the development of consistent data standards, and with his own computer started databasing specimens, which was an early precursor to the Australasian Virtual Herbarium efforts. I was told Barry just went ahead and started databasing at the National Herbarium of Victoria, learning how to do so via trial and error. A brief summary of a few



Fig. Dan Murphy, ASBS President, on left, presenting the Nancy Burbidge Medal to Barry Conn. Ph. Prashant Joshi

of Barry's achievements are:

- Significant roles in Australasian taxonomic institutions and training of students in taxonomic botany in Australia and Malesia.
- Over 200 taxonomic publications, many of them Flora treatments or revisions.
- Major contributions to Australian State Floras, e.g. initiation of *Flora of Victoria*.
- Involvement in developing data standards and initiating herbarium databasing, e.g. PlantNET.
- Contributed strongly to the Australasian Virtual Herbarium initiative.

- Major contributions to Malesia and New Guinea in botanical research and training (e.g. *Trees of Papua New Guinea* three recent volumes)

Barry also has a strong history of contribution to the Australasian Systematic Botany Society through his various roles on Council and in other areas. These included a stint in the role of Newsletter Editor (1981–1982), as Treasurer (1980–1982), Secretary (1988–1992), Vice-president (1998–1999), and finally President (1999–2001).

Thanks for your many years of contributions, Barry, and congratulations. Barry has chosen to speak on a topic of great relevance to this joint conference. In his talk “Is Paradise Lost? Or not yet discovered?” Barry linked systematics and taxonomy to

conservation issues in Papua New Guinea. I am sure we all are very much looking forward to hearing your lecture.

Afterword

Barry’s talk was a timely, although sobering, account of the amount of work remaining to achieve a good taxonomic account of New Guinea and the challenges of undertaking plant taxonomic studies and herbarium-based research in the region. It is for this reason that it seems a worthy aim of the society in the coming years to engage more strongly with all of Australasia and particularly our northern neighbours in West Papua and Papua New Guinea.

Following his talk, I presented Barry with the Nancy Burbidge Medal accompanied by resounding applause from the audience (Fig.).

The Nancy T. Burbidge Memorial Lecture Paradise Lost, or not yet discovered¹

Barry J Conn

School of Life and Environmental Sciences, University of Sydney, NSW 2006, Australia

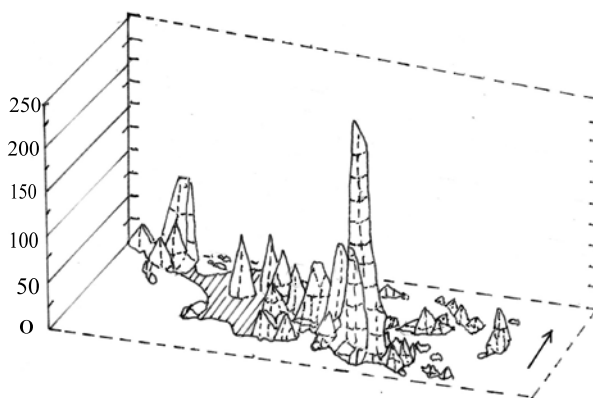
Botanical collection density in New Guinea

New Guinea is the largest and highest tropical island with an extraordinary diversity of ecosystems and associated biota (Conn 1994). Our understanding of the flora of a region is based on several factors. One of these is the extent of botanical exploration and is directly related to the number and density of plant collections from that region. Unfortunately, most areas of New Guinea (including Indonesia Papua Barat, Indonesia Papua, and Papua New Guinea) are extremely under-collected, with less than 25 collections/100km²; only a few areas have >100 collections per 100km² (Fig. 1).

Although many institutions, particularly the Royal Botanic Gardens Kew (K), Rijksherbarium Leiden (L) and CSIRO Canberra (CANB), and individuals, such as Leonard Brass and Rudolf Schlechter have collected extensively throughout New Guinea, it is the NGF (initially New Guinea Forces and then New Guinea Forests) and the subsequent LAE series that have continued to be an essential component to our understanding of this

flora. During the 28 years, from 1958 until 1986, the LAE herbarium and the Bulolo Forestry College herbarium had an extremely active plant collection program, under the direction of Mr John S. Womersley, with approximately 2,345 collections made per annum (Fig. 2). Approximately 4,000 species documented in the *Flora Malesiana* volumes were based, at least in part, on these collections. This collection series was used to circumscribe 625 new species during this period. Based on an extensive literature

Fig. 1. Botanical collection density in New Guinea. Diagram from a south-easterly to north-westerly projection (redrawn from Conn 1994).



¹ Salient points from the lecture presented at the ASBS-NZPCN Joint Conference: Taxonomy for Plant Conservation, Wellington, New Zealand, 24–28 November 2019. B/JC

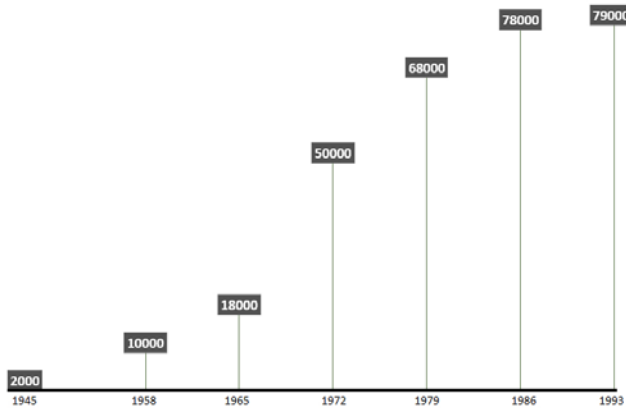
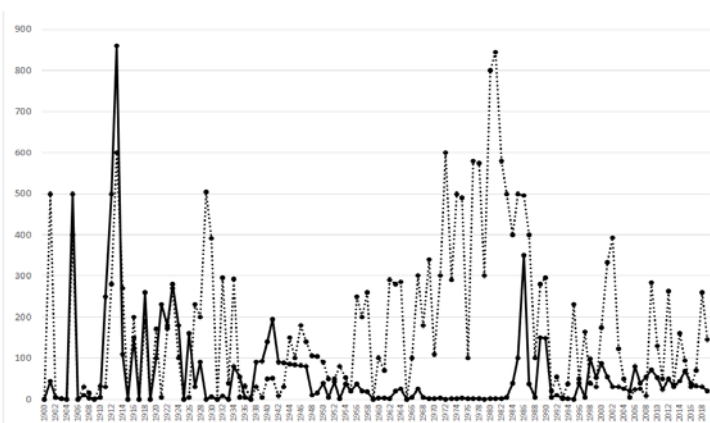


Fig. 2. Accumulated plant collections of the NGF and LAE botanical series from its beginning in 1945 until 1993.

review (Conn 1994), an average, 61 new species were published per annum during this period. The ‘burst’ of species described in the early 1900s related to the pioneering exploration of New Guinea (Fig. 3), with varying rates of publication since then. Although the number of new species being published per annum has decreased over time, it is expected that many additional new species are still to be discovered, similar to the trend across SE Asia (Middleton et al. 2019). In New Guinea, the number of pages describing these new species has increased (Fig. 3), such that more information is provided for the more recent new species than before, enabling other researchers and more general users to understand the similarities and differences of these taxa. Of

Fig. 3. Number of new species (solid line) and number of pages documenting new species (dotted line) for New Guinea published per year in 1900–2019.



course, new data sources have provided a better understanding of the relationship between similar taxa than was possible in earlier times.

How many species in New Guinea?

After more than 100 years of botanical research, the flora of New Guinea is still very inadequately known. The estimates of the number of species (of vascular plants) has varied considerably, from 9,000 species of flowering plants (Good 1960) to estimates of 15,000 to 20,000 species of vascular plants (R. Johns in Beehler 1993).

A recent estimate, based on expert opinion, concluded that there are approximately 14,000 species of vascular plants (Table 1) occurring in New Guinea (Cámara-Leret et al. 2020, in press), with about 10,799 species in Papua New Guinea and about 7,515 species recorded in Indonesian New Guinea (Papua Barat, Papua). The total species for Papua New Guinea is markedly less than the 29,756 species presented in the Global Biodiversity Information Facility (Webb et al. 2010).

Table 1. Approximate number of vascular plant species of flowering plants, conifers and ferns occurring in Papua New Guinea.

Groups	Number of species
Flowering plants	~12,780
Conifers	~57
Ferns	~1,160

Within Papua New Guinea, number of introduced species is relatively low (about 522 species, Table 2), representing c. 4% of the flora, of these, approximately 24% are naturalized (Table 2).

Slightly more than half of the flora is endemic to Papua New Guinea (Fig. 4A). The life forms of the Papua New Guinean flora are almost equally dominated by trees, shrubs and herbs, with ferns and climbers representing a smaller component (Table 2, Fig. 4B)

Documentation of the flora of Papua New Guinea

There are a few major contributions to the flora of New Guinea, that document the

Fig. 4. Ratios of distributional and life-form types in the vascular plant species of Papua New Guinea.

A. ratio of endemic to non-endemic species;
B. ratio of different life-forms of the endemic species

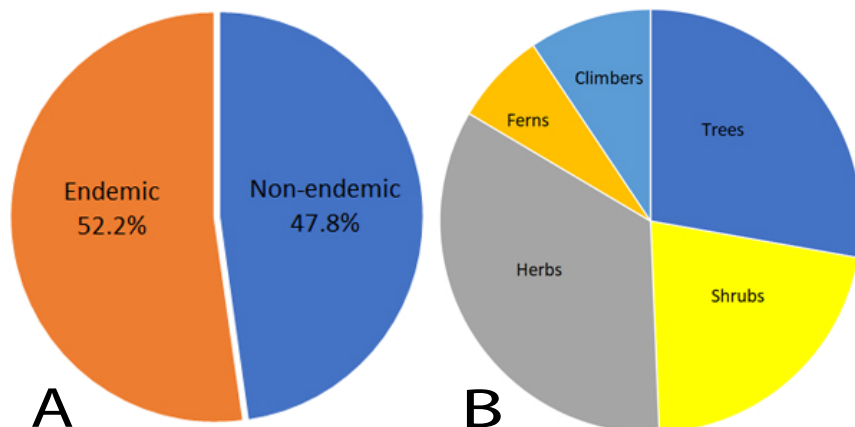


Table 2. Approximate numbers of non-native plants occurring in Papua New Guinea and the approximate number of species that are trees, shrubs, climbers and herbs in Papua New Guinea.

Groups of non-native plants	Number of species
Introduced	~522
Naturalized	~125
<i>Life forms</i>	
Trees	~3,874
Shrubs	~2,569
Climbers	~1,235
Herbs	~5,738

grasses (Henty 1969), legumes (Verdcourt 1979), the *Alpine Flora* (Royen 1979–1983), *Handbooks of the flora of Papua New Guinea* (Conn 1995; Henty 1981; Womersley 1978). These publications document 22% of the known vascular flora of

Papua New Guinea. More recently, the three volumes of the *Trees of Papua New Guinea* were published (Conn and Damas 2019a, b, c), representing the only major account of the common trees of the region. The *Flora Malesiana* series is the major flora account of the broader region, starting 1948, publishing an average of approximately 110 species per annum (Fig. 5). It is interesting to note that the trendline is positive, even though the number of researchers committed to this project has dramatically reduced. Since the *Flora Malesiana* project has not completed the documentation of the flora of the region after 71 years, the enormity of writing the Papua New Guinean flora is beyond the resources of within-country botanists. A summary of the size and time taken to complete a few major floras are presented in Table 3.

Fig. 5. Number of species published each year in *Flora Malesiana* in the period 1948–2019. Trendline (in red).

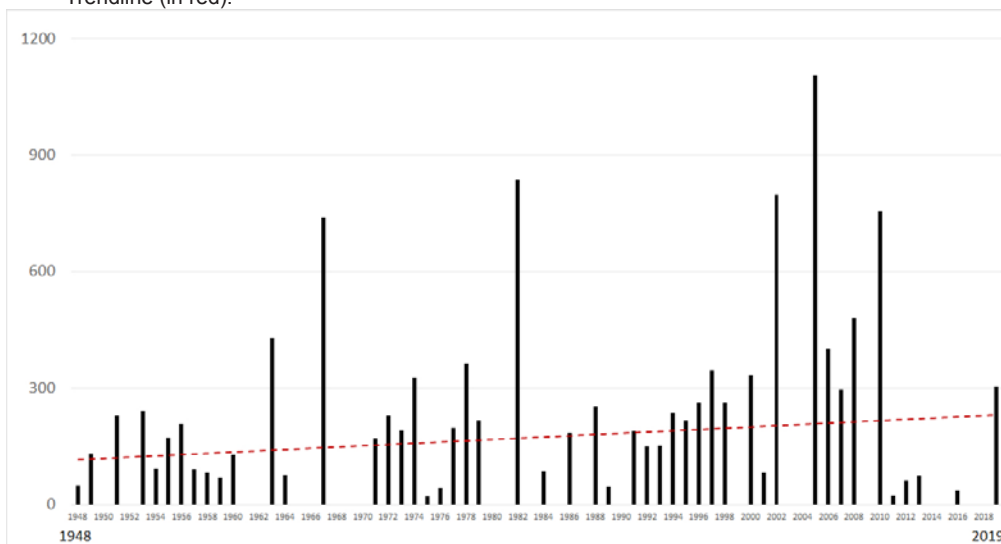


Table 3, Examples of large Flora accounts that have been completed, with number of species and years taken to complete.

Flora	Species numbers	Years taken to complete	Average rate (per annum)
<i>Flora Europaea</i>	11,557	15	770
<i>Flora of the U.S.S.R.</i>	17,520	34	515
<i>Flora of West Tropical Africa</i>	7,349	22	387
<i>Flora of China</i>	~30,000	35	857

PNGtrees – documentation of the trees of Papua New Guinea project

The PNGtrees project was established to develop a methodology and protocols that would enable the trees of Papua New Guinea, and ultimately the entire flora, to be completed with the currently limited resources available within the country (for details refer Conn and Damas 2019a).

Whether this methodology will continue to be used to document the flora is a decision to be made within the country. It is a question for Papua New Guinean management and staff within the PNG Forest Authority, PNG Forest Research Institute, the Lae Herbarium, National and Provincial governments, Universities and other agencies.

Conclusion

There is so much that could be written by way of a conclusion to this presentation, but essentially, all that matters is that Papua New Guineans need to be experts on the flora of Papua New Guinea.

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6th NATIONAL POSTGRADUATE TRAINING WORKSHOP IN SYSTEMATICS

The University of Adelaide
14-19 June 2020

Sponsored by:

Australian Centre for Evolutionary Biology & Biodiversity (The University of Adelaide)
Environment Institute (The University of Adelaide)
Society of Australian Systematic Biologists
Australasian Systematic Botany Society
Australian Biological Resources Study

This workshop will include advanced level training in phylogenetic methods, imaging techniques, DNA barcoding, NGS-based systematics, systematics theory, nomenclature and the taxonomic process, collection management, databases, publishing results, finding a job, and much more.

The workshop is designed for PhD students in the first half of their project, but applications will be accepted from anyone who is still within candidature. It is specifically designed for students undertaking projects that have a biological systematics component or are broadly relevant to systematics. There is a maximum of 30 places – available only to students enrolled in Australian and New Zealand Universities, on a first come basis. The registration fee is \$400 but this will be reduced when we know the amount of sponsorship received.

Expressions of interest (name, year PhD started, Department/School, project title) should be sent to Professor Andy Austin: andy.austin@adelaide.edu.au



ASBS Annual General Meeting

Australasian Systematic Botany Society Inc.

41st Annual General Meeting

Te Papa Tongarewa, Rangimarie I, Wellington, New Zealand.

Minutes



At 3:45 – 4:45 pm,
Tuesday 26 November
2019

Council present: Dan
Murphy (President),
Heidi Meudt (Vice
President), John Clarkson
(Treasurer), Jennifer Tate

(Secretary), Ryonen Butcher (Councillor), Hervé
Sauquet (Councillor)

Meeting opened 3:47 pm

Welcome and apologies.

Dan Murphy (President) welcomed everyone to
the meeting. Apologies noted - Jeremy Bruhl.

Confirmation of Agenda. The agenda was
outlined.

The minutes of the previous AGM were
published in the *ASBS Newsletter* #178 (March
2019). These were moved as a true record of the
meeting: Peter Jobson, seconded: John Hosking

Correspondence and business arising.

No additional correspondence noted.

Reports

President's report [see p. 12]

DM gave overview of the President's report. The
membership is growing and finances are positive.
E-banking will make financial transactions easier.
The Marlies Eichler Postdoctoral fellowship
has been running for three years. Now is a good
time for a review – the number of applications
has been low, but the quality is high. Additional
student travel funding may be possible through
ABRS and some work by Council. Council
has had a few teleconferences this year and our
full-day Council meeting on Saturday. This has
worked fairly well. DM would like to highlight
full Australasian engagement by inclusion of
other countries. Continue to tackle the goals of
the Decadal Plan goals and Taxonomy Australia.
Branding will be looked at in the coming year as
well as future communications and newsletter
strategies.

Treasurer's reports (John Clarkson) [see p. 15]

JC tabled financial report

Full document of report in the newsletter. Eleven
members resigned and 32 new members have
joined. Membership has grown on average by 26
each year. Late payment of memberships have
been chronic. Incorrect emails make it difficult to
keep track of members who may wish to continue.
Some members have paid up to date including
arrears. Positive balance from conference in
Brisbane – those funds transferred to Research
Fund. Postgraduate workshop sponsorship - \$2500
– for workshop at University of Adelaide. No
registration fees or costs for students to attend this
workshop. Contribution to Taxonomy Australia
of \$11,000 to carry out work of the Decadal Plan.
Low interest earned from investment income
now. Donations to Research Fund – one large
anonymous donation to the research fund. Surplus
in the research fund – small deficit in the general
fund, but this is due to the contributions that
are important to our work in plant systematics.
Assets are more than ample in the general fund
and sufficient funds in the research fund. Grants
program calls for \$40,000. Return on funds need
to be 3.6% to avoid eroding capital. The Colonial
First Choice Wholesale Conservative fund has
performed well. JC hopes to secure charity status
for the society. Recommends that there not be an
increase in membership fee.

Kevin Thiele asked about possibility to pay
membership fee automatically each year.

JC replied that it is possible and he will send out
some information about that to the membership.

It was queried whether the fund was investing in
ethical funds. JC replied that yes it was investing
in a general fund but that could change as the
manager of the fund changes.

Tanya Scharaschkin asked about the membership
form and indicated that some have been put
off from joining as a member because the form
requires two signatures.

JC indicated that this applies to the rules for incorporated societies.

The member asked if something could be put on the form to indicate that new members do not need to have signatures when they send in the form.

Kelly Shepherd indicated that one can put 'indicated read' on emails to know if they are being received.

Nathalie Nagalingum asked about the society becoming a charity. JC indicated that a society can claim back franking credits from donations to the society if it has charity status. Because of the work we do with students, education, and the environment, we should have a good case to gain charity status.

Darren Crayn queried if donations to the society are tax deductible, which is possible.

Juergen Kellermann suggested council to look at changing the rules to make it easier for new members to join.

JC moved that report be accepted. Kelly Shepherd seconded. All agreed.

Newsletter report [see p. 25]

DM thanked Bill and Robyn Barker for their efforts over many years, and they received a standing ovation from the membership – they are stepping down from being newsletter editors. Council is exploring options for continuing the newsletter.

Webmaster's report [see p. 25]

Anna Monro compiled the website report. Four newsletters uploaded, regular web updates for awards and new council members, now added to Google stats so can get some stats about visitation. Approximately 5086 hits per month, unique visitors per month = 1120. No major changes to web activities. AM reminds us that website is limited in its ability to expand.

Facebook report [see p. 26]

Todd McLay provided an update to the Facebook group – now over 1100 members. Posts about jobs, news, publications, notices, and conference announcements.

Research Committee report [see p. 26]

Heidi Meudt presented the research committee report and the outlined members of the research committee. David Glenny will step down next year. Hansjörg Eichler scientific research fund: two awards this year – Weixuan Ning (Massey

University) and Raees Khan (University of Adelaide). Both students presenting at the conference this week. Lars Nauheimer is in the second year of his Marlies Eichler award. Trevor Wilson was the successful awardee for 2019. Two applications were received this year.

HM will be following up outstanding student reports. DM and HM will seek advice from grants policy committee about how well Marlies Eichler Postdoctoral fellowship is running and if changes need to be made.

General Business

DM acknowledge the student presenters at the conference who will receive travel bursaries [see photo p. 1]. These are Tim Collins (University of New England), Helen Kennedy (University of New England), Weixuan Ning (Massey University), Sophie Newmarch (Massey University), Chapa Manawaduge (Queensland University of Technology), Raees Khan (University of Adelaide), Francis Nge (University of Adelaide), Anne Thomas (University of Cambridge), Grace Boxshall (University of Melbourne), Patrick Fahey (University of Melbourne), Harvey Orel (University of Melbourne), Nick Weigner (Australian Tropical Herbarium/James Cook University), Cara-Lisa Schloots (University of Otago), Taylor Davies-Colley (University of Otago), Patricio Saldivia (University of Otago)

Communications

Councillor Hervé Sauquet spoke to new communications. A survey was sent out to the membership about the newsletter. Council will review Facebook account for the society. Todd McLay has indicated he would like to step down as an administrator. HS set up a society account on Twitter with the handle *@ASBS_botany*. The account has 135 followers already since started on Saturday. HS would like to have 2-3 moderators for the society account. If members are interested, please get in touch with HS.

HS summarized the results of the survey [see update on p. 2]. Thus far 66 replies were received, of which ~73% indicated that they regularly read the newsletter. While 64% indicated that they read the newsletter online, ~25% replied that they prefer to read the newsletter in hard copy. Responses regarding whether the newsletter should continue in its current format were mixed: 51.7% indicated yes, 31% indicated no preference, and 17.2% indicated no. An important question

regarding the future newsletter: 9 people said maybe and 2 said yes to help out with newsletter.

Councillor Ryonen Butcher conveyed that we need a new logo – one that reflects the current society. The current logo does not reflect the society with an endemic Australian plant in the middle of the logo. Council has discussed using a design contest by *99designs* for new logo options.

Along with this rebranding is the website, which is reaching its limitations and is now a bit clunky and old, partly because of where it is hosted. Members can expect more surveys to be sent out because Council really wants to engage with the society on these matters.

Election of Council Officers

DM outlined Council for 2019, each position was filled by a single nomination.

Dan Murphy (President)
Heidi Meudt (Vice President)
John Clarkson (Treasurer)
Hervé Sauquet (Secretary)

Ryonen Butcher (Councillor)
Katharina Nargar (Councillor)

DM thanked Jen Tate, who is stepping off council.

Announcement concerning next AGM

The next AGM will be advised. A general meeting will be held in association with the ASBS conference in Cairns in July, but because the financial audit will not be ready by that time, the AGM will be finalized at a later date. The completion of the AGM will likely be in Sydney, Melbourne, or Canberra. Members will be advised in due course.

DM thanked the members for attending.

Meeting closed 4:45 pm.

Attendance: 50 members

Minutes: Jennifer A. Tate (Secretary)

President's report

This is my first annual report as President to the ASBS membership. I have said previously that our conferences are really the lynchpin of our society and what brings all of us, whether new members or more experienced, into the fold, and we warmly welcome back members who may not have attended for many years. It is certainly what drove my involvement with the society and later the council, and I know this conference will continue this proud tradition of welcoming all. The council is well aware of the importance of our annual conferences, and strives to create a friendly, supportive, and collegial atmosphere for all attendees, and if we stray from this, we would like to know (and we have mechanisms in place to address this).

I thank the membership for their support of the society and for me personally as President in 2019. I appreciate being given the opportunity in this role, which I have held in great esteem from afar for many years. It has been a busy, but I think, productive year, although with a steep and continuing learning curve for me. Due to a delayed start for the current ASBS council (from March 2019), I have also had the help of Darren Crayn, our immediate past President who has

assisted greatly during this year while we have transitioned to the new council. I also thank all the outgoing and new Council members for their enthusiasm and input this year. I feel this has been a great team with good balance of skills and a wide geographical representation, and I feel the new Council for 2020 has a similarly diverse set of views and skills.

During 2019, Council has held one teleconference, and sent many emails, to deal with the business of running the Society. These email and phone calls have, I think, worked very well and mostly smoothly, given the schedules and time differences experienced by the council. However, it must be said that nothing beats the annual Council meetings to discuss in person and deal with more complex matters and strategy. We take advantage of the annual conference to hold these meetings and this year we had a long list of agenda items to get through and achieved a great deal during it.

Probably the major interest of most members is if the council is effectively managing our finances. I rest assured that under our current Treasurer, John Clarkson, ASBS remains in a very healthy financial position and John will provide his detailed Financial report to the AGM and that

we will all be presented with his usual financial tour de force. John Clarkson's efforts are to be commended. He continues to look at how best to manage the society's finances and I note a major efficiency gain from the Treasurer and President's point of view, as well as those the society needs to make payments to or reimburse, has been the initiation of internet banking. This has worked much more smoothly and easily than I had expected, having removed our previous practise of mailing and physically co-signing cheques, which we would try to do in batches. This move to eBanking has rapidly sped up payments and will make a lot of people happy into the future.

Heidi has taken on the role of Vice-President and has rapidly come to grips with the responsibilities and requirements of the Research Committee. I also can see Heidi will develop her own directions and has already been following up reporting by our past grant recipients with great efficiency. Heidi will report on the outcomes of the 2019 grants in her Vice-President's report, but in summary, two Hansjörg Eichler grants were offered (both in the March 2019 round) and the single Marlies Eichler Postdoctoral Fellowship was awarded.

A personal great interest of mine is whether the funding grants offered through ASBS meet the membership's needs. Therefore in 2020, I will be assisting Heidi to review the ASBS grants scheme in collaboration with the ASBS Grants Policy Standing Committee, which was set up several years ago and is now re-activated. In particular, we need to assess if the Marlies Eichler Postdoctoral Fellowship is meeting the needs for why it was set up. This expectation for a review was always planned once the scheme had been established and now is a good time, as the Fellowship has been in place now for three rounds. I note that, while applications have been of a high quality, there has been a quite a low number of applications for each round so far. Support for travel has been a notable gap in ASBS funding, as the Research Account the society holds does not allow travel funding as part of the rules around taxation for the Society. During the ASBS Council meeting we discussed a position paper sent on behalf of ABRS, regarding student travel funding grants, and during the year I have been involved in meetings and communication with representatives of ASBS, ABRS and SASB

around this. I hope to have some news to report about travel funding support for students to attend conferences and workshops in the near future, after some questions from council are addressed.

ASBS Communications and Newsletter

The society's newsletter is a great asset and it is with a feeling of deep gratitude (and understanding) that Council recently received the news from Bill and Robyn Barker, our joint newsletter editors, that I admit I was dreading; that they would be standing aside from the role of Newsletter editors after the December 2019 issue. Bill and Robyn have provided so much to the society in their various roles, and while they have stated they would like to avoid fan-fare as they step down as editors, and we will respect their wishes, Council acknowledges and thanks them both for their enormous contributions. The newsletter has a long and proud tradition for the society, and I am sure some members see it as an integral part of our communications. I understand this point of view and note that many influential ideas have been initiated via reports and papers that first appeared in the ASBS newsletter. A couple that spring to mind are the early debates about cladistics and phylogenetic methods, and biogeographic approaches and bioregionalization. In addition, we have the countless book reviews, points-of-view and historical papers that have appeared throughout the history of the society to look back on and inform us. As for the future of the newsletter, it will be up to Council and the ASBS membership to discuss in what form we continue with our newsletter and communicate to our membership. It is acknowledged that it may not be feasible to continue the newsletter in its current format, but we would like to call for ideas, and potentially volunteers who may like to express interest in taking on an editorial role and be involved in the Society's communications. I am pleased to see that our incoming Secretary, Hervé Sauquet, and Councillor Ryonen Butcher, have taken on the task of reviewing the ASBS communications strategy and looking at branding, and there will be further news on this in the future.

I thank Anna Monro for all her work behind the scenes with the ASBS website, which is starting to show its limitations, but Anna has continued to make it a very valuable resource that I, and I am sure most members, refer to regularly. The ASBS

Council thanks Mike Bayly and Todd McLay for their efforts in continuing to manage the highly successful ASBS Facebook page. This page is very active and an excellent conduit for timely communication. I would also like to take the opportunity to thank on behalf of us all, Ainsley Calladine, who has supported the past four ASBS conference websites and payment systems associated with this.

Taxonomy Australia, Species Aotearoa and the Decadal plan for taxonomy and biosystematics in Australia and New Zealand 2018–2027

During the Wellington 2019 ASBS–NZPCN Joint Conference we will hear from Kevin Thiele, who is to be commended for all his efforts in driving forward the production of the *Decadal Plan for Taxonomy and Systematics in Australia and New Zealand 2018–2027*, which ASBS has played a major role in initiating, funding and developing. Kevin has now been striving to implement and meet the goals laid out in the Decadal Plan, one of which was the formation of Taxonomy Australia (TA) and Kevin Thiele will speak to this during the Wellington conference. The ASBS has assisted in supporting the formation of TA and I have been on the Steering Committee of TA on behalf of ASBS this year. So far, there has been an initial face-to-face meeting held at the Australian Academy of Sciences in Canberra to start the Steering Committee, and a further three teleconferences for TA. In summary, there are challenges ahead to find the necessary resourcing to support TA and much of the focus has been in this area. A names workshop was held in Canberra in February 2019, and Kevin has produced an excellent website: (<https://www.taxonomyaustralia.org.au/>) with high production values and detailed and inspiring content. In New Zealand, Species Aotearoa (formerly the National Systematics and Taxonomic Collections Working Group: <https://www.speciesaotearoa.nz/>) has been running and Jen Tate is the Chair of that organisation. I will be interested to learn more about the New Zealand development of the Species Aotearoa initiative during the Wellington meeting.

Genomics for Australian Plants (GAP)

Another initiative which was formally launched at the 2018 Brisbane ASBS conference is Genomics for Australian Plants (GAP). I know a lot of our Australian members will already be

involved in this, and we will hear more about it this week from David Cantrill, who will update us on current progress of the GAP work. This partnership with Bioplatforms Australia and researchers from across Australia, and particularly those working in Australian herbaria and Botanic Gardens, has the broad aim to develop genomics resources to enhance our understanding of the evolution and conservation of the Australian flora. While it has an Australian focus, due to the funding requirements, it is relevant to our whole membership as it is an exciting and novel approach to developing resources in the field of systematics and has the power to generate a major leap forward in our knowledge and capacity to undertake genomics methods, bioinformatics and genomic data for evolutionary research on Australian plants and their close relatives. See: <https://www.genomicsforaustralianplants.com/> for a link to the resources and the three major components of the GAP initiative.

ASBS Council

I feel that the incoming council retains a good balance of gender and geographical distribution, as well as a balance in the changing of roles and personnel, which should allow a smooth transition into 2020 and stability for the new Council. Four of our existing Council members will continue in their current roles: John Clarkson will continue as Treasurer, Heidi Meudt will stay on as Vice-President, as will our Councillor, Ryonen Butcher, and I will continue into a second year as President, which will be my final year on Council. Hervé Sauquet from the National Herbarium of NSW is to be our new Secretary, a role in which I have every confidence he will excel, and from which he will gain a lot of experience. I warmly welcome on to council in a Councillor role, Katharina Nargar, from the Australian Tropical Herbarium, Cairns. Katharina has played a vital role previously in the development of the Decadal Plan and is therefore well versed in the Australian taxonomic community and will no doubt apply her drive and skills to her role on Council. We, alas, say goodbye to Jen Tate who has been an excellent Secretary, a constant support and great to work with, and we will all miss her on Council.

Dan Murphy

Treasurer's report

1. Introduction

I am pleased to present the financial statements of the Australasian Systematic Botany Society Inc. (ASBS) for the year ended 30 June 2019. The finances of the Society are run on a financial year basis with data reported on a full cash basis.

Philippa E. Whitting of McKinnon & Co. Atherton audited the accounts. Her report to members is attached as Appendix 1.

2. Membership

Table 1 records the number of members of ASBS at the beginning of November 2019. Late payment of subscriptions is a chronic problem however this year it is cause for some concern. Despite considerable effort and several reminder notices, 79 members remained in arrears at the end of October, 10 months into the membership year. Unpaid fees total almost \$5,500. It is unlikely that the Society will recoup all of this and is at risk of losing members.

Since the last reported, 32 new members have been admitted to the Society and 11 members have resigned. Membership at 1st November 2019 totalled 346 (Table 1).

The following new members have been admitted to the Society since the last AGM:

Ronald Booth, BRISBANE, QLD
 Taylor Davies-Colley, DUNEDIN, NZ
 Sangay Dema, ARMIDALE, NSW
 Bohao Dong, HAMILTON, NZ
 Mark Edginton, SPRINGFIELD, QLD
 Patrick Fahey, MELBOURNE, VIC
 Rachel Gagen, EUMUNDI, QLD
 Megan Grixti, CRAIGLIE, QLD
 Jason Halford, WYNNUM, QLD
 Prashant Joshi, PALMERSTON NORTH, NZ
 Helen Kennedy, ARMIDALE, NSW
 Raees Khan, ADELAIDE, SA
 Teresa Lebel, MELBOURNE, VIC
 Zoe Lunniss, DUNEDIN, NZ
 Aaron McArdle, MELBOURNE, VIC

Yolanda Metti, ENGADINE, NSW
 Patricia Nagle, RUSSELL VALE, NSW
 John Nevin, ARMIDALE, QLD
 Sophie Newmarch, TIMARU, NZ
 Weixuan Ning, PALMERSTON NORTH, NZ
 Ryan O'Donnell, ROZELLE, NSW
 Harvey Orel, ELWOOD, VIC
 Ruth Palsson, ARMIDALE, NSW
 Matthew Pearson, OORALEA, QLD
 Geoff Ridley, WELLINGTON, NZ
 Cara-Lisa Schloots, THE GLEN, NZ
 Laura Simmons, KENMORE, QLD
 Anne Thomas, CAMBRIDGE, UK
 Alicia Toon, MOOROOKA, QLD
 Jian Wang, TOOWONG, QLD
 Nicholas Weigner, SMITHFIELD, QLD
 Ralph Whalley, ARMIDALE, NSW

3. Management of Funds

The Society's funds continue to be managed in two clearly defined sets of accounts – the General Fund and the Research Fund. The new investment strategy for the Research Fund that was outlined in the 2016/17 Treasurer's report (*ASBS Newsletter 173*: 6-9) has now been in place for over 2 years. The performance of these investments is discussed below.

4. General Fund

All assets in the General Fund are held as either cash at call or in reasonably short term deposits. A small amount required for day to day needs is held in a cheque account with the Commonwealth Bank. This account does not pay interest. The much larger balance is split between a high interest earning account and two term deposits with Rabobank (formerly known as RaboDirect). Like most financial institutions, interest payable on funds in the Rabobank accounts has been falling steadily over recent years. In the current financial climate, "high interest earning account" is somewhat of an oxymoron given that the current rate on that account is only 0.75% pa. Rates paid on the term deposits are somewhat "better" at

Table 1. Membership of ASBS as of 1st November 2019 (non-financial members in brackets)

Fee	Full	Concessional	Gratis	Total
Ordinary	195 (42)	n/a	0	195 (42)
Student	n/a	63 (25)	0	63 (250)
Retiree	n/a	589 (7)	0	59 (7)
Unemployed	n/a	7 (3)	0	7 (3)
Institutional	5(2)	n/a	14	19 (2)
Life	n/a	n/a	3	3
Total	200 (44)	129 (35)	17	346 (79)

2.85% and 1.95%. However the term deposit earning 2.85% will be lucky to attract more than 1.5% when it is renewed in January. A cheque account with the Commonwealth Bank, opened in 2017 to handle financial transactions related to the ASBS conference held in Brisbane in 2018, has been retained with a small balance. This cheque account will be available for organisers of future conferences.

4.1 General Fund Income

If required, Council provides seed funding of up to \$3,000 to organisers of ASBS conferences to cover any costs incurred before registration fees begin to be received. Council asks that, if possible, this be treated as a loan to be returned before any profits are distributed. The \$3,000 shown as conference income for 2018 is the return of the cash advance provided for the Brisbane conference.

Donations to the Research Fund are well above the recent average. While this can be partly explained by one significant donation from a person who asked to remain anonymous, it is unexpected this year when so many members failed to pay their annual subscription. Many members include a small donation with their annual subscription. As donations are usually received with membership payments, it is convenient to bank these in the General Fund and transfer a lump sum to the Research Fund just prior to the end of the financial year.

Notwithstanding what was said earlier regarding the number of unfinancial members, income from subscriptions is also higher than it has been in recent years. Annual receipts for subscriptions normally average around \$11,000. The larger amount this year can be attributed to members who were in arrears for more than one year paying outstanding dues when sent a reminder.

Because the conference bank account opened for the Brisbane conference was in the Society's name, cash flow for the conference is reported in the Society's annual financial statement. Expenditure was more than covered by income and the conference made a healthy profit.

4.2 General Fund Expenditure

There are a number of unusual expenses that warrant some explanation.

After being audited by the same Cairns-based company for 6 years, it was necessary to engage a new auditor with offices closer to Matt Renner's

place of residence. This, combined with the complexity of the audit, led to the fee being considerably higher than normal.

The annual conference in Wellington is being jointly hosted by ASBS and the New Zealand Plant Conservation Network (NZPCN). At its April 2018 teleconference, Council resolved to take out a 3 year Community Group Membership with the Australasian Network for Plant Conservation (ANPC). It is hoped this association will also result in mutual benefits for both societies. There has already been discussion on the possibility of holding a joint conference.

Council contributed \$2,500 towards the 5th National Postgraduate Training Workshop in Systematics held at the University of Adelaide in July 2018. This workshop, sponsored by the University of Adelaide, Society of Australian Systematic Biologists, Australian Biological Resources Study and ASBS enabled 28 PhD, Masters and Honours students from 11 universities across Australia and New Zealand to participate in hands-on training using a variety of systematic analyses. The financial and in-kind support meant that there were no registration fees or other workshop costs. Given the Society's commitment to supporting students and early career scientists, Council saw this as a very good investment. For a summary on the Workshop see the short report by Tim Collins in the September 2018 issue of the Newsletter (*ASBS Newsletter* 176: 21-22).

One of the key recommendations of the decadal plan was the establishment of Taxonomy Australia, a professional body that, working with other sector organisations and stakeholders, will facilitate and advocate for the plan's implementation. Members would be aware of progress towards this aim if they have been following Kevin Thiele's reports in the Newsletter. Given ASBS's role in the development of the decadal plan, it was obvious that, when a call for financial assistance went out to support the establishment of Taxonomy Australia, the Society would respond favourably.

Council remains committed to providing student members who attend annual ASBS conferences with some financial support, provided they present a talk or poster. \$2,000 is budgeted each year for this purpose. Last year, 6 students who presented at the conference in Brisbane received \$250 each. This was equivalent to the student earlybird registration fee.

Newsletter costs are for printing 4 issues (numbers 175-178). Depending on the number of pages, printing costs between \$405 and \$546 per issue. Just over a quarter (26%) of members choose to receive their Newsletter in hard copy. The Newsletter editors have not submitted a claim for reimbursement of postage for some time and it is hoped that this account will be lodged and settled soon.

4.3 Current Assets in the General Fund

The General Fund finished the financial year with a deficit of \$12,574. This is only the second deficit in the past decade. The last was in 2012 when the deficit was \$6,109. This year's deficit can be attributed to one-off expenses linked to the post graduate workshop and the financial support provided for the establishment of Taxonomy Australia. The Society has more than sufficient cash reserves to cover occasional deficits when expenses are directly linked to the Society's Objective of promoting the study of plant systematics.

Assets in the General Fund totalled \$142,745 at the end of the financial year.

5. The Hansjörg Eichler Research Fund

Income to the Research Fund is mainly derived from donations from members, income from funds invested and bequests. This year Council decided to direct a large part of the profits from the Brisbane conference to the Research Fund. Hansjörg Eichler Grants and the Marlies Eichler Fellowships are the only expenditure.

This financial year 60 members made donations to the Hansjörg Eichler Research Fund totalling \$7,465. All donors, including the following members who agreed to having their names recorded publicly (Table 2), are thanked for their

generous support:

In his report to the 2017 AGM, the President, Darren Crayn (*ASBS Newsletter* 173: 4-6) outlined a new grants program that had been ratified by Council. This saw Eichler Grants increased from a maximum of \$2,000 to \$5,000 and a new funding opportunity for postdocs, the Marlies Eichler Postdoctoral Fellowship, introduced. The new program requires \$40,000 per year, has been in place for just over two years, and is now fully operational.

With just over \$1.13M to invest to fund the program, an annual income of about 3.6% was required. The aim was to earn slightly more than that to ensure the grants could grow in line with inflation and the capital would not be eroded over time. Council chose to invest in a wholesale conservative fund with Colonial First State. This fund, which had been delivering average annual returns of 5.59% since its inception in April 2002 (Fig. 1) aims to produce relatively stable returns over the medium term with potential for some long-term capital growth. This matched the level of risk Councillors at the time were willing to accept on behalf of the Society.

The portfolio managers aim to hold around 70% of investments in cash and fixed interest and 30% in growth investments such as shares, property and securities (Fig. 2).

Some caution is warranted in speculating on future profits from these types of investments. Values can fall as rapidly as they rise. Despite the low to medium levels of short-term volatility that can be seen in Fig. 1, the trend since the Society bought into the fund in May 2017 has been good. The dip in late 2018 was a result of the trade war between

Table 2. Members donating to the Hansjörg Eichler Research Fund agreeing to be recorded publicly.

Rose Andrew	Gareth Holmes	David Meagher	John Thompson
Frank Bedon	John Hosking	Peter Michael	Stephen van Leeuwen
Margaret Brookes	James Ingham	Pina Milne	Helen Vonow
Christine Cargill	Laurie Jessup	Andrew Mitchell	Barbara Waterhouse
John Clarkson	Richard Jobson	Daniel Murphy	Juliet Wege
Isobel Crawford	Bronwen Keighery	Katharina Nargar	Judy West
Darren Crayn	Greg Keighery	Maggie Nightingale	Peter Weston
Mike Crisp	Phil Ladd	Matt Renner	Molly Whalen
John Gardiner	Pauline Ladiges	Susan Rutherford	Annabel Wheeler
Laurie Haegi	Robert Lamont	Carolyn Sandercoe	Karen Wilson
Caroline Morgan	Greg Leach	Elizabeth Sheedy	Peter Wilson
Frank Hemmings	Teresa Lebel	Kelly Shepherd	Stuart Worboys
Alison Hewitt	Merran Matthews	Philip Short	
Roger Hnatiuk	Dirk McNicoll	Jen Tate	



Fig. 1. Performance of Colonial First State First Choice Wholesale Conservative Fund since its inception in April 2002. Arrow indicates when the Society bought into the fund in May 2017 with an initial investment of \$1,055,356

the US and China increasing investor concern about a global economic slowdown, European politics creating uncertainty in those markets, and four rate increases by the US Federal Reserve. To illustrate how much sentiment changed over the year, the Australian share market returned more than 4% in the first six months of 2018 before declining 7% in the second half.

In addition to the funds invested in the Colonial First State fund, just over \$80K was retained in cash and invested in a term deposit with the

Commonwealth Bank of Australia. It was hoped that this, together with the donations received each year, would fund the grant program up to the end of 2018 thereby giving the Colonial investments time to mature before they had to be drawn upon. In fact, things have worked out even better than this and it should not be necessary to draw on these funds until October 2020.

The value of the Colonial investment on November 1 this year was \$1,167,629 representing a \$112,273 increase in value in 29 months. The total investment income from all sources for the

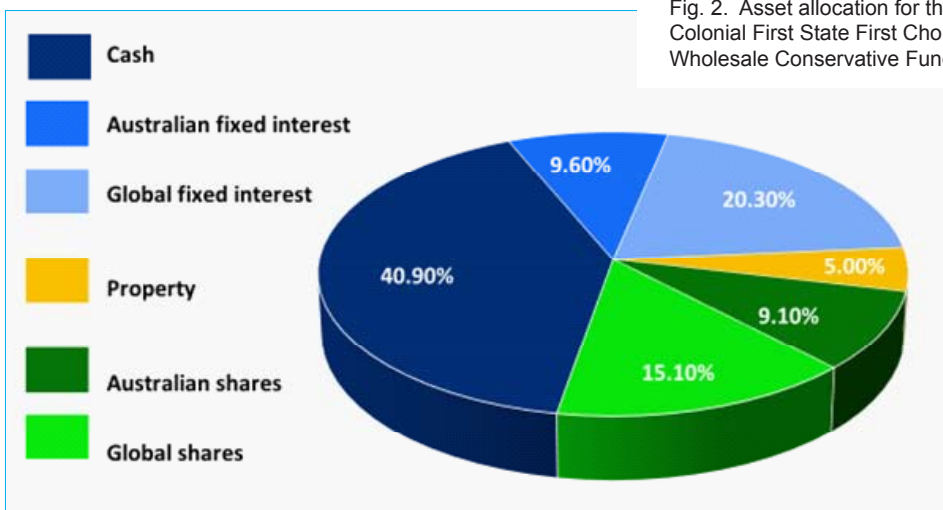
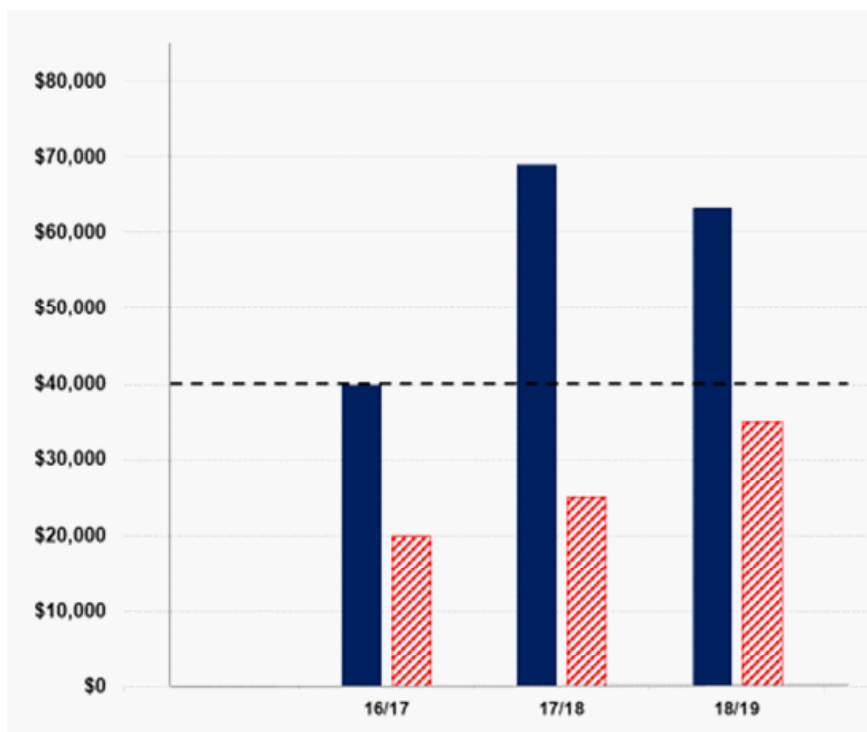


Fig. 2. Asset allocation for the Colonial First State First Choice Wholesale Conservative Fund.

Fig. 3. Total investment income from all sources (solid bar) compared to total grants awarded (cross hatching) for the last 3 financial years. The dashed line indicates the annual income required to support the grant program.



past 3 financial years (\$172,405) is compared with the total grants awarded (\$79,842) in Fig. 3.

The Society's ability to support the current grant program would not have been possible without the exceedingly generous support provided by Marlies Eichler, the first Life Member of the Society and after whom the post-doctoral fellowship is named. Marlies made donations each year between 2002 and 2010 and left a substantial bequest in her will when she died in January 2011. A number of members have advised Council that they too have nominated the Society as a beneficiary in their wills. This is a simple and effective way of making lasting provision for the people and causes you care about. Council thanks them for that while wishing them a long and happy life. If you include a gift for the Society in your will, please consider notifying the Secretary. Your personal information will be held in strictest confidence, and your anonymity maintained if you wish.

As an Approved Research Institute for the purposes of the Income Tax Assessment Act with Deductible Gift Recipient Status, the Society is eligible to apply for recognition as a charity with the Australian Charities and Not-for-Profits Commission. If this can be secured,

the Society will be able to apply for a refund of franking credits paid on the Colonial First State investments. Refunds can be back dated to December 2012. If successful, the refund would amount to over \$8,000.

5.1 Current Assets in the Research Fund

The Research Fund finished the financial year with a surplus of \$65,654 and assets totalling \$1,145,132.

6. Summary

The challenges facing Council, in current financial climate, are to consider how best to manage the sizeable surplus in the General Fund and to attempt to reconnect with members who have not paid annual subscriptions since 2018.

If Council can secure charity status it can apply for a refund of franking credits totalling a little over \$8,000.

Despite incurring a loss in the General Fund, the Society remains in a very strong financial position with total assets of 1,287,877. It should not be necessary to increase the subscription fee for the 2020 membership year.

John Clarkson
Treasurer
November 2019.

Appendix 1. Auditor's Report



CERTIFIED PRACTISING ACCOUNTANTS
ABN 65 010 329 576

McKinnon & Co Accountants Pty Ltd
Office 1, 11 Vernon Street, Atherton
PO Box 279, ATHERTON QLD 4883
Telephone: (07) 4091 1244
Facsimile: (07) 4091 3202

Email: accountant@mck1.com.au
Web: www.mckinnonandco.com.au

10 September 2019

John Clarkson
Treasurer
Australasian Systematic Botany Society Inc.
PO Box 975
Atherton, Qld, 4883

INDEPENDENT AUDITOR'S REPORT

Opinion

We have audited the financial report of **Australasian Systematic Botany Society Inc.** (the Entity), which comprises the profit and loss statement, departmental trading, profit and loss statement, balance sheet, notes to the financial statements and the depreciation schedule. In our opinion, the accompanying financial report presents fairly, in all material respects, the financial position of the Entity as at 30 June 2019 and its financial performance and its cash flows for the year then ended in accordance with the financial reporting requirements of the Associations Incorporations Act 1981 (as amended by the Association Incorporation and Other Legislation Amendment Act 2007).

Basis for opinion

We conducted our audit in accordance with Australian Auditing Standards. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Report* section of our report. We are independent of the Entity in accordance with the ethical requirements of the Accounting Professional and Ethical Standards Board's APES 110 *Code of Ethics for Professional Accountants* (the Code) that are relevant to our audit of the financial report in Australia. We have also fulfilled our other ethical responsibilities in accordance with the Code.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Emphasis of matter – basis of accounting

We draw attention to Note 1 to the financial report, which describes the basis of accounting. The financial report has been prepared to assist **Australasian Systematic Botany Society Inc.** to meet the requirements of the applicable legislation. As a result, the financial report may not be suitable for another purpose. Our opinion is not modified in respect of this matter.

Responsibilities of management and those charged with governance for the financial report

Management is responsible for the preparation and fair presentation of the financial report in accordance with the financial reporting requirements of the applicable legislation and for

Liability limited by a scheme
approved under Professional
Standards Legislation.

McKinnon & Co Accountants Pty Ltd is a CPA practice



such internal control as management determines is necessary to enable the preparation and fair presentation of a financial report that is free from material misstatement, whether due to fraud or error.

In preparing the financial report, management is responsible for assessing the Entity's ability to continue as a going concern, disclosing, as applicable, matters relating to going concern and using the going concern basis of accounting unless management either intends to liquidate the Entity or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Entity's financial reporting process.

Auditor's responsibilities for the audit of the financial report

Our objectives are to obtain reasonable assurance about whether the financial report as a whole is free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the Australian Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of this financial report.

A further description of our responsibilities for the audit of the financial report is located at the Auditing and Assurance Standards Board website at:
<<http://www.auasb.gov.au/Home.aspx>>. This description forms part of our auditor's report.



Philippa E Whitting

10 September 2019

1, 11 Vernon Street
ATHERTON QLD 4883

Financial report

Financial Report for the year ended 30 June 2019 **Australasian Systematic Botany Society Incorporated** ABN 22092454279

Council's Report

Your Council members submit the financial statement of the Australasian Systematic Botany Society Incorporated for the year ended 30 June 2019.

Council Members

The names of the Council members who held office throughout the reporting period and at the date of this report are:

President	Daniel Murphy	Elected March 2019
President	Darren Crayn	Stood down March 2019
Vice President	Heidi Meudt	Elected March 2019
Secretary	Jennifer Tate	Elected September 2016
Treasurer	John Clarkson	Elected March 2019
Treasurer	Matt Renner	Stood down March 2019
Councillor	Ryonen Butcher	Elected September 2016
Councillor	Hervé Sauquet	Elected March 2019

Principal Activities

The principal activities of the society during the reporting period were to promote systematic botany in Australasia.

Significant Changes

No significant change in the nature of these activities occurred during the reporting period.

Operating Results

The operating results are as set out here under:

	Year ending June 2019	Year ending June 2018
General Fund	(\$12,573.99)	\$1,982.42
Research Fund	\$65,654.78	\$29,696.16
Total	\$53,080.79	\$31,678.58

Signed in accordance with a resolution of the Members of the Council on:

Daniel Murphy (President)
26th November 2019

John Clarkson (Treasurer)
26th November 2019

Income and Expenditure Statement
Australasian Systematic Botany Society Incorporated
For the year ended 30 June 2019

	2019	2018
General Fund Income		
<i>Cheque Account</i>		
Conference	3,000.00	8,596.00
Copyright Agency	152.36	349.18
Transfer to Eichler Fund	7,465.00	-
Subscriptions	14,972.22	3,935.00
Sundry income	200.00	10.00
<i>Conference Account</i>		
Registration	26,490.00	900.00
Dinner	5,985.00	285.00
Workshop	2,910.00	60.00
Field trip	2,435.90	230.00
Sponsorship	1,700.00	-
Miscellaneous	130.00	-
Rabobank Accounts		
Investment income	3,522.96	1,341.96
Total General Fund Income	68,963.44	15,707.14
General Fund Expenses		
<i>Cheque Account</i>		
Council expenses	2,525.37	5,590.44
Auditor's remuneration	3,575.00	2,145.00
Australasian Plant Conservation Network	290.00	-
Bank charges, credit card fees	312.60	205.79
Postgraduate workshop sponsorship	2,500.00	-
Student travel assistance	1,500.00	1,496.00
Decadal plan/Taxonomy Australia	11,000.00	-
Legal advice (Council liability)	-	2,428.25
Miscellaneous expenses	-	60.00
Newsletter costs	1,887.74	1,799.24
Transfers to Research Fund	14,042.76	-
<i>Conference Account</i>		
Conference	20,571.60	-
Workshop	2,236.00	-
Welcome reception	2,270.30	-
Dinner	2,610.65	-

Field trip	2,209.57	-
Bank charges, credit card fees	505.84	-
Refund ASBS seed funding	3,000.00	-
Transfer to Research Fund	10,500.00	-
Total General Fund Expenses	81,537.43	13,724.72
General Fund Surplus/(Deficit)	(12,573.99)	1,982.42
Research Fund Income		
Donations to Research Fund	9,410.00	4,995.00
Investment Income – Colonial Wholesale Investment	64,930.14	47,267.56
Investment Income – Term Deposit	838.15	3,417.15
Transfer from General Fund	4,632.76	-
Profit from Brisbane Conference	10,500.00	-
Total Research Fund Income	90,311.05	55,679.71
Research Fund Expenses		
Bank Charges	40.27	-
Research Grants	24,616.00	25,983.55
Total Research Fund Expenses	24,656.27	25,983.55
Research Fund Surplus	65,654.78	29,696.16
Current Year Surplus	53,080.79	31,678.58

Balance Sheet

Australasian Systematic Botany Society Incorporated

As at 30 June 2019

	2019	2018
Assets		
<i>General Fund</i>		
Cash and Cash Equivalents		
General Fund: Cheque Account	18,659.28	30,503.17
General Fund: Rabobank HISA	20,017.72	19,721.22
Conference cheque account	221.94	4,475.00
Total Cash and Cash Equivalents	38,898.94	54,699.39
Investments		
Rabobank Term Deposit 1	51,955.49	50,619.86
Rabobank Term Deposit 2	51,890.83	50,000.00
Total Investments	103,846.32	100,619.86
Total General Fund	142,745.26	155,319.25
<i>Research Fund</i>		
Cash and Cash Equivalents		
Research Fund: Cheque Account	17,895.30	417.81
Total Cash and Cash Equivalents	17,895.30	417.81
Investments		
Colonial Wholesale Investment	1,145,132.48	1,093,550.78
Commonwealth Term Deposit	32,650.75	49,403.60
Total Investments	1,177,783.23	1,142,954.38
Debtors – Research Fund	2,358.22.	-
Total Research Fund	1,198,036.75	1,143,372.19
Total Assets	1,340,782.01	1,298,691.44
Net Assets	1,340,782.01	1,298,691.44
Member's Funds		
Accumulated Surplus	1,298,691.44	1,267,012.86
Current Year Earnings	53,080.78	31,678.58
Unrealised Capital Gain	(10,990.21)	-
Total Member's Funds	1,340,782.01	1,298,691.44

Notes to the Financial Statements
Australasian Systematic Botany Society Incorporated
For the year ended 30 June 2019

1. Summary of Significant Accounting Policies

The financial report is a special purpose financial report prepared in order to satisfy the financial reporting requirements of the members. The Council has determined that the Society is not a reporting entity.

The financial report has been prepared in accordance with the requirements of Australian Accounting Standard AASB 1031: Materiality. No other applicable Accounting Standards, Australian Accounting Interpretations or other authoritative pronouncements of the Australian Accounting Standards Board have been applied.

The financial report has been prepared on a cash basis.

The following specific accounting policies, which are consistent with the previous period unless otherwise stated, have been adopted in the preparation of this financial report.

(a) Membership

Membership fees are recorded on a cash basis.

(b) Income Tax

Under present legislation the Society is exempt from income tax and accordingly no provision has been made in the accounts.

(c) Comparative Figures

Where required by Accounting Standards comparative figures have been adjusted to conform with the changes in presentation for the current year.

(d) Members Funds

In accordance with the rules of the Society, accumulated funds are not available for distribution to its members.

Research Committee

The Australasian Systematic Botany Society is an approved research institute.

The approved membership of the Research Committee comprises:

Heidi Meudt (Chair)	Ex officio
David Glenny	Appointed March 2013
Sarah Mathews	Appointed March 2015
Joanne Birch	Appointed March 2016
Katharina Nargar (née Schulte)	Appointed March 2016
Murray Henwood	Appointed March 2016

Statement by the Members of the Council
Australasian Systematic Botany Society Incorporated
For the year ended 30 June 2019

The Council has determined that the Society is not a reporting entity and that this special purpose financial report should be prepared in accordance with the accounting policies outlined in Note 1 to the financial statements.

In the opinion of the Council:

1. The financial report as set out on pages 1 to 6 presents a true and fair view of the Society's financial position as at 30 June 2018 and its performance for the year ended on that date.
2. At the date of this statement, there are reasonable grounds to believe that the Society will be able to pay its debts as and when they fall due.

This statement is made in accordance with the resolution of the Council and is signed for and on behalf of the Council by:

President Daniel Murphy – President

Treasurer John Clarkson – Treasurer

Dated this 26th day of November 2019

Newsletter report

Since the last AGM we have produced four issues. 177–180, of the Newsletter. They comprised 224 pages of content and as usual covered a large variety of topics.

It was as we were finalising the last issue of the Newsletter that we decided to make the next issue our last. We have made this decision before the job wears us out (the enjoyment and satisfaction still outweighs the odd negative).

The next issue, which we'd like to publish by the end of January, is the most important of the year, including the conference and AGM to the extent that all reports are in and, of course, the Burbidge Medal. We don't mind how much material we get (we're not sure about Council!)– the usual postage rates should cover it, but printing costs of course will increase with the size.

In many ways it is surely time for change. We've had many thanks given to us along the way but the big thanks is the privilege to be able to do our complementary and overlapping contributions to the production with the freedom that every Council has given us.

But more importantly we both have a feeling that it is time for the Society to review how

best the content in the current Newsletter and that in FaceBook are best projected – is there a need for the current more than one means of communication of news, reports, articles and views. Some content is ephemeral, while some needs archiving so that it is readily accessed into the future. The current Newsletter gives this in the traditional way. There are still a few of us not so young members, but with the majority of membership much more attuned to alternatives the Society needs to have a fresh look at how they do their communications.

To that end we understand that Council has already been in discussion about the Newsletter and from what we've heard every effort will be made to get something that suits the membership and the times.

John, thanks for reducing the load by taking on the book reviews.

Robyn and Bill Barker
Retiring Editors
Nov 2019

Webmaster's report

The ASBS website is hosted as part of the *anbg.gov.au* domain, aliased as *www.asbs.org.au*.

Major activities for the webmaster include: four newsletter issues uploaded (volumes 175, 176, 177, 178), regular web updates (e.g. award recipients, Council members), added ASBS site to Google Search Console, and started receiving more meaningful web visitation stats from Sept. 2018.

Meaningful web statistics have not been available since server changes occurred in 2016, but in July 2018 the site was indexed with Google to

provide information on searches. In Sept. 2018 the server was reconfigured to provide visitation statistics. Preliminary results (September 2018–30 June 2019): average hits/month: 5086, average unique visitors/month: 1120, most popular pages: Newsletter, student support, conferences.

Overall, therefore, there have been no major changes to web activities in 2018/19 although we were able to regain access to some visitation and search statistics.

Anna Monro

Facebook group report

The ASBS Facebook page is now seven years old, and has grown from 951 members in December 2018 to 1,125 members in November 2019. The ASBS group is currently "public", which means anyone can see the group, members and posts, but only people in the group can post to the page. Requests to join are vetted by Mike Bayly or Todd McLay. We aim to exclude obvious spammers, but otherwise don't enforce any strict criteria on group membership. Because of the way the group is configured in Facebook (as a "group" rather than a "page"), there are limited statistics we can view on the number of posts, "comments", "shares", "likes" etc. without manually trawling through them.

Posts typically cover a variety of topics including news article relating to plants/environment/science in general, paper or book announcements, jobs and funding opportunities, herbarium news, death

notices or obituaries, photos of plants, memes, and ASBS business, including announcements relating to conferences, newsletters, elections, membership payments, workshops etc.

Posts with high numbers of interactions (likes, shares, comments) for this year include posts about ASBS business (including the Wellington conference, Eichler funding opportunities and awardees), individual success of ASBS members (including Barry Conn being awarded the Burbidge Medal), stories from herbaria, interesting journal articles, jobs, and general stories about taxonomy in the national or international media.

This Facebook group is a great way for the dispersed members of our society to keep in touch and discuss our common interests. If you are on Facebook and haven't yet joined our group, you should!

Todd McLay and Mike Bayly

Research grants program report

Grants and reporting

Since the completion of the AGM in early 2019, I have stepped in to the Vice-President's role and ex officio Chair of the ASBS Research Committee. In 2019 we have had reports published from previous Hansjörg Eichler grant winners by Patricio Saldivia (*ASBS Newsletter* 178, March 2019) and Selen Mashayekhi (*ASBS Newsletter* 180, Sept 2019). We have also received a progress report from Lars Neuheimer on the first year of his Marlies Eichler Postdoctoral Fellowship, and look forward to seeing that in the next ASBS newsletter. I have updated a spreadsheet started by Dan which follows reporting of students regarding their grants. Several are still outstanding and I will be following these up diligently early in 2020.

ASBS Research Committee

In 2019, the ASBS Research Committee was very similar to the previous year and comprised:

- Heidi Meudt (Chair, ex officio as VP ASBS), Museum of New Zealand Te Papa Tongarewa
- Joanne Birch, University of Melbourne, Australia
- David Glenny, Landcare Research Manaaki Whenua, Lincoln, New Zealand
- Murray Henwood, University of Sydney, Australia
- Sarah Mathews, Centre for Australian National Biodiversity Research, Canberra, Australia

- Katharina Nargar, Australian Tropical Herbarium, Cairns

Dan Murphy stepped down from the Committee following completion of the AGM, however he led the March 2019 round because I had a conflict of interest with one of the applicants being a student that I co-supervise. David Glenny will also be stepping down from the Committee from 2020. We would like to thank both Dan and David after many years of being members of the Committee.

Hansjörg Eichler Research Fund grants

This year we had two rounds of the Hansjörg Eichler Research Fund, which is targeted at students and non-salaried researchers. The March round this year garnered three total applications, two of which were funded at \$5000 AUD each:

- Weixuan Ning, Massey University, Palmerston North, New Zealand: Phylogenomic analysis of New Zealand polyploid *Azorella* (Apiaceae)
- Raaes Khan, University of Adelaide, Australia: Biogeography, genetic diversity and evolution of the Australian endemic *Podocarpus lawrencei* Hook.f.

Congratulations to the successful students in this round, and we look forward to reading a report about how their projects are progressing in due course. In the September round, we had one application only, and the Committee decided

not to fund that project (while at the same time making several constructive comments and encouraging the applicant to apply next year with a revised application).

Marlies Eichler Postdoctoral Fellowship

This year we had two excellent applicants for the single yearly round of the Marlies Eichler Postdoctoral Fellowship. The Committee funded one of these applicants for \$10,000 AUD per year for two years:

- Trevor Wilson, National Herbarium of NSW, Sydney, Australia: A new key for Australia's Bugle Subfamily (Ajugoideae: Lamiaceae): a

phylogenetically informed taxonomy assisted by next generation sequencing methods

The number of applicants for both the Hansjörg Eichler and Marlies Eicher grant schemes is low. In the first instance, they seem to follow a downward trend, and in the second instance, they have always been consistently low, as noted by Dan Murphy in his 2018 report. Dan and I will be seeking some in-depth assessment from the ASBS "Financial Grants Standing Committee" to critically assess the situation and suggest possible changes moving forward with our grants.

Heidi Meudt

Marlies Eichler Fellowship report

Progress report on the project "Phylogenomics and taxonomy of the donkey orchids (*Diuris*, Orchidaceae)"

Lars Nauheimer

Diuris, also referred to as donkey orchids, is a genus of Australian geophytes that consists of c. 99 recognised species, of which a large proportion (35 taxa) is listed as priority flora in Australia's states (Fig. 1). Many *Diuris* species resemble pea flowers and are food mimics, i.e. they attract pollinators by pretending to offer nectar but actually do not provide any reward (Beardsell et al. 1986, Indsto 2006, 2007). Some *Diuris* species are variable in floral morphology in order to match a variety of co-occurring pea flowers and to increase pollination success. However, this variability renders plant identification and species delimitation difficult. It further leads to the attraction of a wide-range of pollinators, which facilitates cross-pollination between species. Not surprisingly, a large number of hybrids (~45) is recorded in *Diuris*. The morphological variation of species and the reticulate evolution in the genus present challenges for species delimitation leading to discrepancies in taxonomic concepts (Govaert et al. 2017, Backhouse et al. 2016). However, an accurate taxonomy is crucial for developing efficient conservation measures in *Diuris*. High-throughput DNA sequencing approaches now provide the molecular tools to disentangle complex phylogenetic relationships and thus increase our understanding of the infrageneric relationships and evolutionary history of *Diuris*.

Previous molecular phylogenetic and morphometric studies already gained valuable insights into sections of *Diuris* in the last

two decades. A phylogenetic study resolved relationships at subgeneric level, however relationships remained largely unclear at intersectional and interspecific level (Indsto et al. 2009). Studies in two species complexes in *Diuris* based on several plastid and nuclear loci and DNA fingerprinting (Smith et al. 2005, 2007) found evidence for gene flow between closely related species, however interspecific relationships remained largely unclear. Ahrens et al. (2017) studied a complex of endangered *Diuris* species in Victoria and showed that while four putative species were not distinguishable via morphometrics, relationships within the complex were well resolved based on genomic data from reduced representation library sequencing (RADseq).

Recent advancements in high-throughput sequencing (HTS) and analytical tools now enable us to resolve complex inter- and intraspecific relationships on a large scale. Together with Katharina Nargar (CSIRO), Mark Clements (CANBR), and Darren Crayn (ATH), we aim to apply those methods to elucidate complex intergeneric relationships of *Diuris* and to re-assess taxonomic concepts in order to generate a treatment of the genus for the *Flora of Australia*. This project is funded by the ABR national taxonomy research grant and scheduled for three years. While my position as postdoctoral researcher at the Australian Tropical Herbarium in Cairns is funded for two of those three years,

the Marlies Eichler grant will enable me to extent my contribution to the project.

High-throughput sequencing methods will be used to reconstruct relationships across the genus based on extensive existing herbarium and silica dried collections amended with new collections of recently described species. Firstly, a high-throughput shotgun sequencing approach is used to establish a phylogenetic framework based on plastid data. Secondly, a target sequence capture based on previously established capture probes developed for Diurideae is used to obtain nuclear data to infer evolutionary relationships. Together, these two genomic data sets will allow for disentangling complex evolutionary relationships within the genus, including past hybridization events by identifying putative parental lineages and thus provide insights into the importance of reticulation for the morphological diversification of the genus. Based on this phylogenomic framework and a morphological data set for *Diuris*, the ancestral trait evolution can be reconstructed to identify key diagnostic characters within *Diuris*. In addition, population genomic analyses will be carried out for selected species complexes based on double-digest restriction site associated DNA (ddRAD) sequencing to assess species delimitation, and the conservation status of threatened species within these complexes. The results of the phylogenomic and morphological project components will underpin a revised taxonomic treatment of *Diuris* for the *Flora of Australia*.

In the first year of the project we focussed on sampling and commencing of lab work extracting DNA and sequencing. The large majority of sample collection was finalized. Herbarium

vouchers and floral cards were revised by Mark Clements to provide a thorough basis for an almost complete sampling of the genus. We focussed efforts to include samples from type material or from the type location, which is crucial in a group with such a morphological variation. Additional fresh samples were contributed by collaborators. In total, 394 tissue samples were collected representing 95 species and five hybrids, covering 95% of the diversity of the genus.



Fig. 1. Two *Diuris* species; above, *D. orientis*, below, *D. behrii*

DNA extractions for the project were carried out and miniaturised genomic libraries were prepared for genome skimming which are currently in the pipeline for sequencing. This part of the project was supported by CSIRO's Environomics Future Science Platform, which developed a cost-and time efficient high-throughput collections genomics pipeline.

Phylogenomic analysis commenced with the analysis of genome skimming data of 14 *Diuris* samples which resulted in a 62 plastome gene dataset. The analysis of this genomic data set was a training opportunity for undergraduate James

Perkins who carried out a CSIRO vacation internship at the Australian Tropical Herbarium in 2019 under the supervision of Katharina Nargar and me. The results confirmed the monophyly of *Diuris* and its sister relationship to *Orthoceras*, as well as provided support for the monophyly of the four subgenera in *Diuris*. For the first time, phylogenetic relationship between the subgenera was resolved and highly supported, both in the nuclear ribosomal and plastid data sets which yielded congruent results. Subgen. *Paradiuris* was found as first diverging lineage within the genus, followed by subgen. *Hesperodiuris* which was sister to subgen. *Xanthodiuris* and subgen. *Diuris*.

I am very thankful for the support of the ASBS through the generous Marlies Eichler Postdoctoral grant, which extends my contribution in this project and helps to improve the understanding and taxonomy of *Diuris*.

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Hansjörg Eichler Research Grant reports

Species delimitation in *Banksia* (Proteaceae)

Francis Nge

Dept of Genetics & Evolution, School of Biological Sciences, The University of Adelaide

Species delimitation in recently diverged organismal groups can often be complicated by ongoing gene flow (Martin et al. 2013), incomplete lineage sorting (Wei et al. 2016; Luo et al. 2018), and hybridisation (Weber et al. 2019). Species within a complex are also likely to acquire different defining taxonomic properties during progressing stages of their divergence, resulting in incongruence across different delimitation methods. Resolving these issues require the integration of multiple delimitation methods and assess for congruence critically across these methods.

For my Honours studies (2016) supervised by Dr. Kevin Thiele and Prof. Michelle Waycott, I had adopted an integrative approach and utilised morphological and molecular Next Generation Sequencing (ddRAD) methods to resolve taxonomic boundaries in a species complex of an iconic Australian plant genus – *Banksia* L.f. (Proteaceae) (Fig. 1). Unpublished results from the morphometric analyses (based on 29 floral and vegetative characters from 58 herbarium specimens and 156 field collections) showed that *B. sp.* ‘*Jingaring*’, *B. sp.* ‘*Collie*’, and an eastern morphotype of *B. porrecta* are morphologically distinct from the other taxa within ser. *Aphragma sensu* George (1996). In addition, *B. pteridifolia* subsp. *vernalis* is morphologically distinct from

the other two *B. pteridifolia* subspecies. The morphological distinctiveness is congruent with phenological and habitat differences of the four putative new taxa and their allies. Individuals of *B. sp.* *Boyup Brook* and *B. porrecta* ‘western form’ could not be distinguished from each other from the morphometric analysis. In contrast to the morphological analysis, none of the recognized or putative taxa were resolved or achieved reciprocal monophyly from the Next-Gen ddRADseq method, despite a total of 99 million sequences obtained from a one lane NextSeq run, with an average of 0.6 million sequences per sample. Similarly, the evolutionary relationships of these putative taxa (and monophyly of ser. *Aphragma*) were unresolved based on Sanger sequencing of the four non-coding chloroplast regions that had previously been utilised by Cardillo and Pratt (2013) in a genus-wide phylogenetic analysis.

Incongruence between strong morphological and weak genetic differentiation in the study taxa could be a result of recent lineage divergence, since diverging lineages may acquire different properties at different stages over the time-course of speciation (de Queiroz 2007): incongruence may simply indicate that insufficient time has passed for the lineages to diverge across all properties. Alternatively, the ddRADseq data may not reflect actual genetic divergence across these

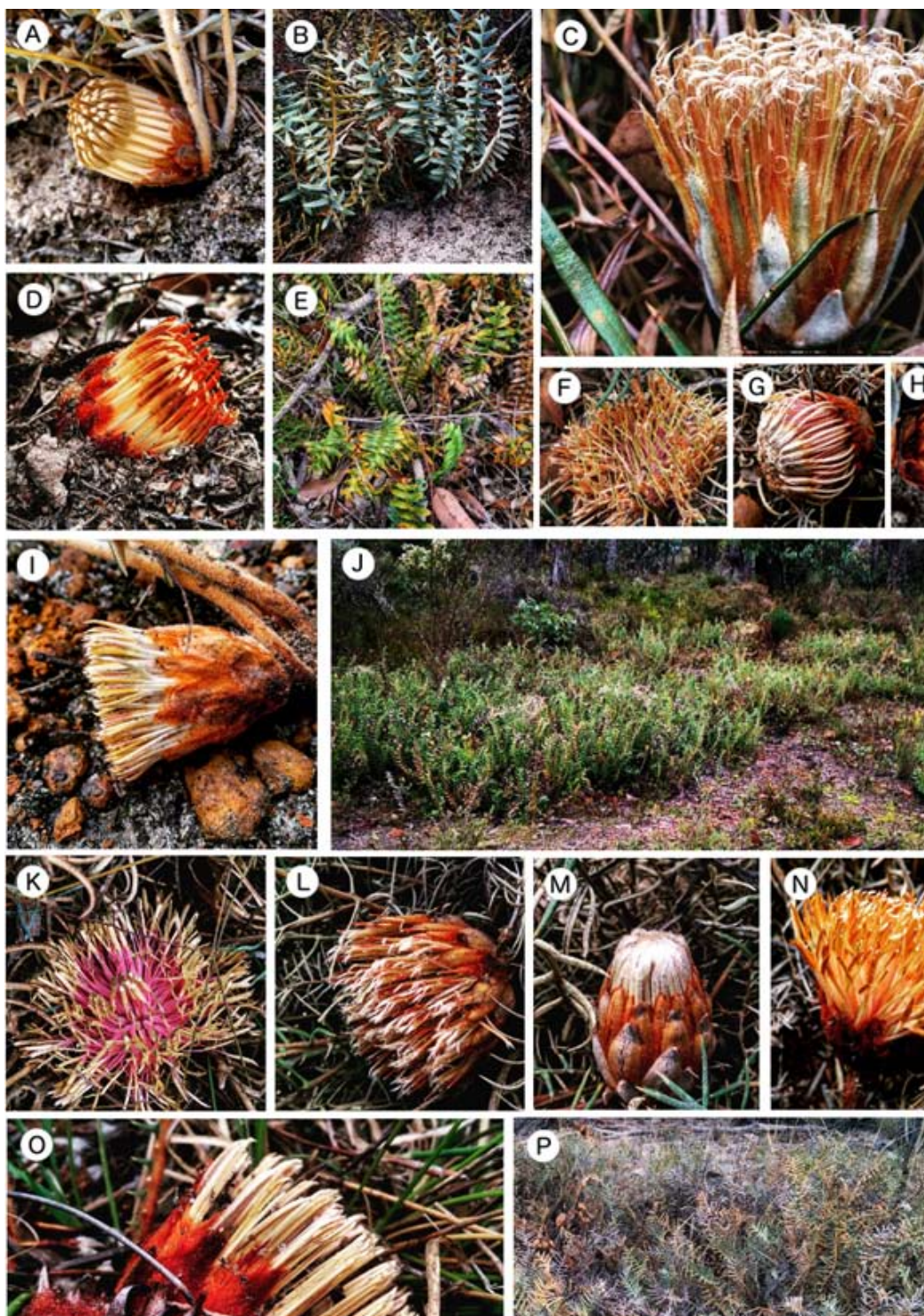


Fig. 1. Representative floral, leaf, and growth form diversity of *Banksia* ser. *Aphragma*. A) *B. aurantia*; B) grey foliage of *B. aurantia*; C) *B. alliacea*; D) *B. sp. Boyup Brook*; E) green foliage of *B. sp. Boyup Brook*; F & G) *B. pteridifolia* subsp. *pteridifolia*; H) *B. sp. 'Jingaring'*; I) *B. porrecta* 'western form'; J) prostrate growth form of *B. porrecta* 'western form'; K) pink colour variant of *B. pteridifolia* subsp. *pteridifolia*; L & M) *B. pteridifolia* subsp. *inretita*; N) *B. sp. 'Jingaring'*; O) *B. pellaeifolia*; P) growth form of *B. sp. 'Jingaring'*. Ph. Francis Nge

taxa within ser. *Aphragma*, as the method can be limited by non-random haplotype sampling and exclusion of missing data, i.e. loci with highest mutation rates are disproportionately excluded (Arnold et al. 2013; Huang and Knowles 2014). However, the library used for the ddRADseq analysis in my Honours study was compromised by very low DNA yields from all leaf tissue samples used, both freshly-collected and from herbarium specimens. Low DNA yields were not due to inadequate lab extraction protocols, as similarly low yields resulted from multiple protocols across labs in this study and from previous studies on *Banksia* (M. Cardillo, A.R. Mast, C.G. Pereira and A. Prodhan pers. comm.).

In order to revisit the genetic aspect of this project, I had successfully applied for funding from the

Australasian Systematic Botany Society through the Hansjörg Eichler Scientific Research Fund. The provided funds were used to re-extract DNA from our collected material through a different protocol and apply a different NGS method. I applied a hybrid capture NGS approach with a preliminary bait set that was developed in my supervisor M. Waycott's lab (in early 2018). This approach has allowed us to recover chloroplast genomes and up to 12–30 nuclear genes for each of our samples.

From this new and improved genetic dataset that was not compromised by low DNA yields, I was able to delimit the taxonomic boundaries of these taxa through reapplying an integrative taxonomic approach. The different delimitation approaches

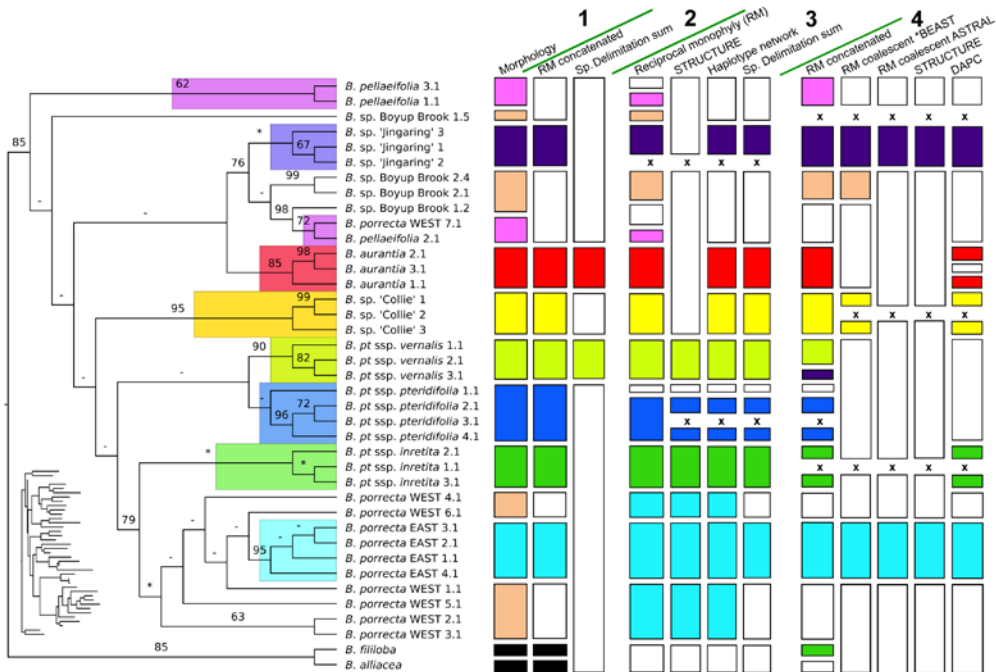


Fig. 2. Multiple evidence species delimitation of *Banksia* ser. *Aphragma*, showing summary results of 1) morphometrics analyses; molecular analyses of 2) combined chloroplast and nuclear; 3) chloroplast; 4) nuclear datasets; integrative taxonomy species delimitation – species recognition.

Delimitation summary results are shown on Maximum likelihood tree of *Banksia* ser. *Aphragma* inferred in RAxML of combined concatenated chloroplast and nuclear datasets. Bootstrap support (BS) is indicated above branches: very strongly supported clades (BS = 100%) are represented by “*”, weakly supported branches with < 50% BS are represented by “.”.

Colours highlight clades of the ML tree containing: *B. pellaefolia* = pink; *B. sp. 'Jingaring'* = purple; *B. aurantia* = red; *B. sp. 'Collie'* = orange; *B. pteridifolia* subsp. *vernalis* = light green; *B. pteridifolia* subsp. *pteridifolia* = blue; *B. pteridifolia* subsp. *inretita* = green; *B. porrecta* 'east' = light blue. RM = reciprocal monophyly. Species delimited in at least one delimitation analysis congruent with other analyses in this study are highlighted under “Sp. Delimitation sum” (out of ABGD, GMYC [single and multi-thresholds], PTP, and bPTP). Different colours represent unique partitions, and each black terminal represent a separate delimited species.

Samples excluded from datasets due to low coverage or quality are indicated with “x”. Note: *B. sp. 'Collie'* was also delimited as a separate taxon in the nuclear STRUTURE analyses (not shown in this figure).

include: (i) morphometric analysis of floral and vegetative characters, and (ii) tree-building phylogenetic analyses using concatenated datasets and coalescent models from our hybrid capture dataset; (iii) multilocus genotypic clustering; (iv) conventional species delimitation analyses. We found that using this approach of combining different methods and assessing for congruence has allowed us to account for the complex speciation history of this group and adequately delimit species within the complex.

Three of the four putative new *Banksia* species are noted as distinct through strong congruence across morphological, and molecular (chloroplast and nuclear) datasets (Fig. 2). Two of these taxa (*B. sp. 'Jingaring'*, *B. sp. 'Collie'*) are confined to just one population each. Additional analyses show the genetic divergences do not show an isolation-by-distance pattern, i.e. not isolated populations of a widespread sister taxa (results not shown). The two populations of *B. sp. Boyup Brook* are indistinguishable from *B. porrecta 'west'* from our morphological and nuclear results. However, it falls in a separate clade to *B. porrecta* in the chloroplast dataset and the two populations belong to different haplogroups with other *Banksia* taxa within the complex. Incongruence between chloroplast and nuclear + morphological datasets might be due to chloroplast capture (Tsitrone et al. 2003), or from past or ongoing introgression events with other *Banksia* taxa. Alternatively, if the chloroplast signal is indicative of real divergence, incongruence detected here might suggest that *B. sp. Boyup Brook* is a cryptic species as it is morphologically identical to *B. porrecta 'west'* (Bickford et al. 2007). Additional population samples and more extensive geographic sampling across its distributional range are required to further investigate its taxonomic boundaries with other members of the species complex. The lack of signal across our nuclear markers for widespread sister species suggests the presence of strong incomplete lineage sorting. The faster fixation of alleles and attainment of reciprocal monophyly within *B. sp. 'Collie'*, and *B. sp. 'Jingaring'* is expected due to their smaller effective population sizes, being confined to only one isolated population each. A similar process is suspected to have occurred with *B. porrecta 'east'*, where its distributional range is smaller than the remaining taxa within the complex. Fixation of alleles due to potential

genetic drift was evident for these taxa in our STRUCTURE analyses.

We also found that the conventional species delimitation methods largely failed to delimit meaningful species boundaries within this complex due to violations in their model assumptions (Wei et al. 2016; Willis 2017). in contrast to other methods applied in this study. Thus we caution against the sole use of these methods and encourage the adoption of additional complementary methods for more robust species delimitation outcomes, particularly with groups that have recent divergence histories.

Two manuscripts will be submitted for publication to document the results from this study – (i) species delimitation approach in *Banksia* and (ii) formal taxonomic descriptions of new *Banksia* species.

Acknowledgements

I would like to thank ASBS for the support and funds given through the Hansjörg Eichler Scientific Research Fund. The funding allowed me to revisit the genetic aspect of my Honours study and provided definitive taxonomic outcomes.

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The phylogeny and phylogeography of *Acacia myrtifolia* (Sm.) Willd. in southern Australia

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The *Acacia myrtifolia* group is an informal grouping of nine phyllodinous species that share a distinctive floral morphology described by Maslin (1995). The group has 4-merous flowers that are relatively large and aggregated sparsely in globular heads. The torus is often enlarged to host numerous stamens, which according to Maslin are ‘among the most numerous of any species in the subgenus [Phyllodineae]’. The group consists of *A. celastrifolia* Benth., *A. clydonophora* Maslin, *A. disticha* Maslin, *A. durabilis* Maslin, *A. heterochroa* Maslin (subsp. *heterochroa* and subsp. *robertii* Maslin), *A. myrtifolia* (Sm.) Willd., *A. nervosa* DC., *A. obovata* Benth., and *A. pygmaea* Maslin.

Acacia myrtifolia shows a widespread and disjunct distribution between southwestern and southeastern Australia across the Nullarbor Plain, while the remaining species of the *A. myrtifolia* group are restricted to the southwest of Western Australia. This disjunction between the southern temperate regions has been noted in multiple lineages across different plant families (Crisp & Cook, 2007;

Conran & Lowrie, 2007; Foster et al. 2014; Iles et al. 2014; Ladiges et al. 2005, 2010, 2011; Mast & Givnish, 2002; Marques et al. 2015; Weston et al. 1984; Wright & Ladiges, 1997) and also in multiple animal lineages (Dubey & Shine, 2010; Rix et al. 2015 and references therein).

Acacia myrtifolia is a broadly circumscribed species due to morphological variation present in phyllode size and shape (Fig. 1), flower



Fig. 1. Phyllode variation in *Acacia myrtifolia*. Clockwise from upper left: a, near Munglinup, WA; b, near Black Point D'Entrecasteaux, WA; c, Wilsons Promontory Vic.; d, near Bellbird Creek Vic.

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Fig. 2. Flower colour variation in *Acacia myrtifolia* in Victoria. Clockwise from top: a, Brisbane Ranges; b, Bunyip State Park; c, Wilsons Promontory.

Ph. Heather Merrylees.

I received \$2,000 in financial support through the Hansjörg Eichler Scientific Research Fund awarded by the Australasian Systematic Botany Society. The funding aided travel to Western Australia for field collections of *A. myrtifolia* populations between D'Entrecasteaux National Park and Cape Le Grand National Park. I completed the Western Australian fieldwork in March 2016, making collections across seven populations of *A. myrtifolia*. I also had the opportunity to visit the Western Australian Herbarium (PERTH) and sample from specimens of *A. myrtifolia* and other members of the *A. myrtifolia* group, as well as photograph and measure *A. myrtifolia* specimens covering a range of morphological variation. In addition to fieldwork, the funding supported DNA sequencing of 80 samples across the *A. myrtifolia* group from Western Australia (~40% of my total sampling), including all species of the *A. myrtifolia* group restricted to Western Australia.

Further fresh collections were made across Victoria, and remaining fresh collections from South Australia and New South Wales were kindly contributed by collaborators. Herbarium material was provided for sampling with the support of the National Herbarium of Victoria (MEL), Queensland Herbarium (BRI), Australian National Herbarium (CANB), Tasmanian Herbarium (HO) and the Western Australian Herbarium (PERTH). A preliminary morphological analysis was conducted on 27 herbarium specimens of *A. myrtifolia* from Western Australia and one specimen of *A. celsatrifolia*. The morphological variants included a long narrow phyllode form, a large phyllode form, and a range of variation within a short phyllode form. All characters recorded for the morphological study were quantitative measurements of phyllode dimensions following Gardner et al. (2005).

The molecular study included 217 individuals: 181 of *A. myrtifolia*, 29 of the *A. myrtifolia* group and 7 outgroups. Markers selected for targeted amplicon sequencing included two nuclear

colour (Fig. 2), and habit (Maslin, 1995). A distinct prostrate form of *A. myrtifolia* is found near Sydney NSW (Auld and Morrison 1992) and other variants recognised by Maslin (1995) include the short or typical eastern form, a long narrow phyllode form, and a large phyllode form. A long narrow phyllode form has been described as *Acacia marginata* R. Br., *A. myrtifolia* var. *angustifolia* Benth., and *A. acutifolia* Maiden & Blakely. The large phyllode form has been described as *A. myrtifolia* var. *major* Meisn. Maslin (1995) also recognised that the inland specimens from Bending Reserve had bright lemon yellow flower heads, rather than the yellow to pale yellow flower heads of typical *A. myrtifolia* populations.

The primary aim of my study was to assess the genetic and morphological variation in *A. myrtifolia* and to consider its taxonomic circumscription. Further aims were to consider the patterns of variation in a phylogeographic context and to assess the relationships of taxa within the broader *A. myrtifolia* group.

ribosomal markers: ITS and ETS; and seven chloroplast markers: *psbA-trnH*, *trnK-matK*, *rpl32-trnL*, *trnS-trnG*, *trnV-ndhC*, *psbA-trnH*, *psbD-trnT*, and *trnQ-rps16*. Targeted amplicon sequencing was performed with an Illumina MiSeq v3 600 cycle kit. Reference sequences for each DNA region used were obtained from GenBank, and the *Acacia ligulata* chloroplast genome (Williams et al. 2015). The aligned sequences were analysed with Maximum Parsimony methods.

Trees produced by analyses of nuclear DNA markers were largely unresolved, but the chloroplast analysis resolved biogeographic groupings within *A. myrtifolia* across its range. The chloroplast analysis indicated genetic divergence between southwestern and southeastern populations of *A. myrtifolia*. The chloroplast phylogeny resolved a clade of all the eastern Australian samples of *A. myrtifolia* (BS: 69%), subtended by a grade of western Australian samples of *A. myrtifolia* and two samples of *A. celsatrifolia*. The two samples of *A. celsatrifolia* nested within the western grade of *A. myrtifolia*, suggesting that *A. myrtifolia* may not be monophyletic. All samples from east of Albany in WA formed a clade (BS: 79%). The remaining samples from the west of Albany were placed in three well-supported clades: two clades of *A. myrtifolia* (long narrow phyllode form) (BS: 96% and 98%) and one clade of two *A. celsatrifolia* samples (BS: 76%). Clades from the west of Albany were grouped together without support. The preliminary morphological analysis of *A. myrtifolia* variants showed that samples of the long narrow phyllode form clustered together and were distinct from the other morphological forms. This may suggest that although the long narrow phyllode form was resolved as two genetic lineages, those lineages could be monophyletic. A comprehensive account of this project was submitted as a thesis in partial requirements for a Master of Science at the University of Melbourne.

Acknowledgements

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supplied material that made this project possible. My thanks go to my supervisors Dr Gill Brown (Queensland Herbarium) and Dr Mike Bayly (University of Melbourne) for all their generous support and advice.

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Taxonomy Australia report

The fires are in everyone's minds.

I'm writing this Taxonomy Australia report from the middle of one of the firegrounds, on the small farm my wife and I own in the forests of East Gippsland and where we lived for 12 years. We didn't lose our house in this fire – because we lost it in the last serious fire here, six years ago, and hadn't yet rebuilt.

While our farm has been hit again, we're more concerned about the forests that surround us. Two big, hot fires in six years is unprecedented, as is the scale of these fires.

This is a report about taxonomy and Taxonomy Australia, not about the fires. But my focus will be: how do we as taxonomists respond to these fires? What insights can we contribute?

There will be a massive response, ranging from clean-up and community support to wildlife rescue and recovery. Much of the latter will be narrowly focused on a few iconic groups such as koalas and threatened species. Soon also the news media will be full of stories about the miracle of life returning to the burnt bush, as we all know it will.

But we as taxonomists need to think more deeply about these fires and their implications. And our focus needs to be broader than the fires themselves, devastating though they were, because the fires are part of an awful synergy of drought, fire, potential continued dry conditions in the post-fire 'recovery' season, all on top of the

'usual' problems of land clearing, pests, weeds and diseases, and global pollution, and all in the context of a future where global heating will only increase and accelerate.

So what can we as taxonomists do? I believe we have an important role. Firstly, the work we do to document the biodiversity of Australia is, as we all know, a key building block for all the other responses. If we don't know what species occur in the firegrounds we're not going to be able to respond to the threats to those species very effectively. So we need to continue with our task of discovering, naming and classifying Australia's species.

But beyond that, taxonomists as a sector have the broadest knowledge of Australia's biodiversity available anywhere. Other sciences such as ecology and conservation biology have deeper knowledge about some groups (usually iconic ones like the koalas and other threatened species). But taxonomists have knowledge that covers the breadth of life, from the iconic to the utterly overlooked, and we need to deploy that knowledge to help with assessments of the fires' impacts on all organismal groups. At Taxonomy Australia we're working to decide how we as a sector can best help.

We also need to recognise that these fires have brought the environment and biodiversity into focus in a way that's been lacking now for many decades. Remember when we were all told not to

use the word ‘biodiversity’ because no-one would understand what it meant? Those days have passed, and I believe there’s indication of a wave of awareness of biodiversity and its importance. If we’re ever to rebuild investment in taxonomy and systematics in Australia, we need to catch this wave.

To that end, Taxonomy Australia will be hosting a meeting in Adelaide in March 2020 to develop a scope and detailed plan for a grand science mission to discover and document all remaining Australian species in a generation. I discussed the thinking behind this in the last *ASBS Newsletter*. With funding commitments now in hand we’re in a position to take the first important step in this – to work out how on earth we could achieve such an ambitious goal. I’m also in discussions with one of the big four accounting firms to develop a budget for this grand mission. With those two pieces in place, we plan to start some serious advocacy to government, industry and the community to launch the mission. We need to catch the wave.

Much of the attention at the Adelaide meeting is likely to be on groups that are very poorly documented. The real challenges in the mission will be dealing with hyperdiverse groups such as some insect and arachnid orders, nematodes, fungi etc. Business-as-usual taxonomy will simply not work for these groups – we may need to reinvent taxonomic practice to be effective.

The meeting will result in an implementation plan for Strategic Action 1.1 of the decadal plan (we will significantly increase the rate at which new species in Australia and New Zealand are discovered, resolved, named and documented).

I’ll report on the outcomes of the meeting in the next Newsletter.

In the meantime, if you believe you or your work can directly contribute to the response to the fires, or can help evaluate what responses are needed for the taxonomic groups you work on, please contact me at kevin.thiele@science.org.au. Our continent needs all the help it can get at this challenging time.

Kevin Thiele

Taxonomy Education Working Group initial survey

Hervé Sauquet, Convener

A Taxonomy Education Working Group initial survey was circulated widely throughout the systematic community in Australasia on 17 April 2019. This survey was established following informal discussions at the ASBS conference in Brisbane (Dec. 2018) regarding the future of training in taxonomy in Australasia. The need for new education resources to deliver high-quality training in taxonomy was a common theme raised in these discussions. This survey was established by an interim working group assembled during the conference and tasked by Taxonomy Australia to develop an implementation plan and to reflect on an actual course or package of resources. The

online survey was intended as a first step towards circumscribing what is needed as a priority, what can realistically be done, and who is willing to contribute to what.

The results (summarized below) suggest a strong interest in the topic, but with very diverse, and sometimes contradictory views on what may be achieved, particularly regarding the most appropriate format. The working group itself has not been active since the survey was sent and is unlikely to live beyond this effort. However, the results should remain a useful starting point to anyone wishing to take this further in the future.

Summary and analysis of results (Nov 2019)

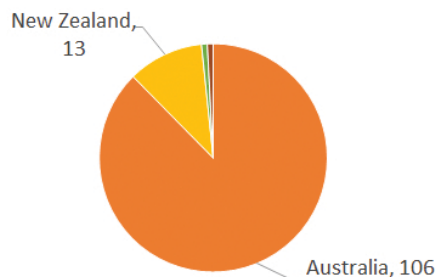
Key information

Survey circulated on 17 Apr 2019 with a deadline of 31 May 2019.

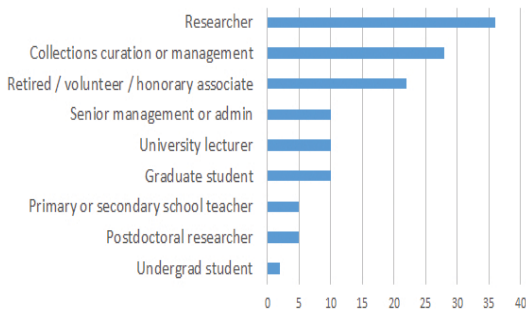
122 responses

Participant origin and identity

Country. Most participants are from Australia (88%) and the rest from New Zealand (11%), with two overseas exceptions.

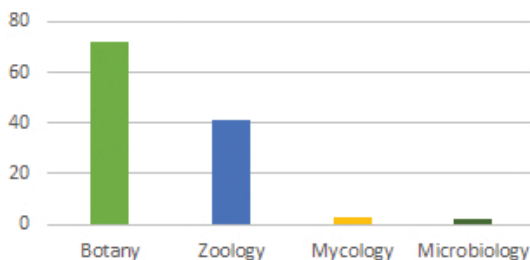


Role. The majority are Researchers (30%), Collections staff (23%), or University lecturers (8%); Retired or volunteers (18%); Early-Career Researchers (14%).



Domain of specialization. Most are specialized in Botany (61%) or Zoology (41%), with very few exceptions.

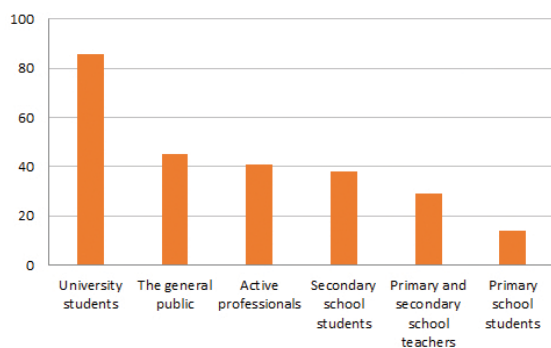
11 are members of this WG (of 21).



General education needs and course format

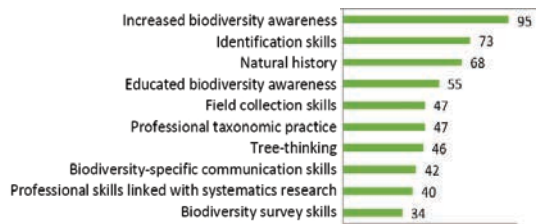
Which audience do you believe most critically needs to be targeted by new taxonomy education resources?

University students (71%), The general public (37%).



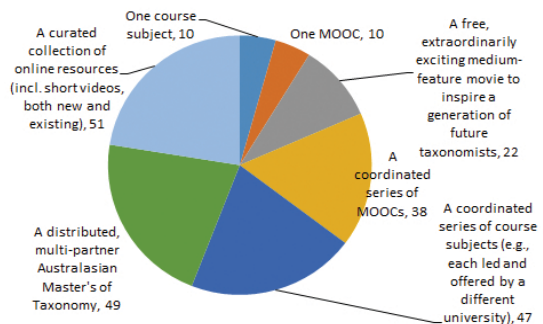
Which skill(s) do you think are most important to pass on through new education resources?

Increased biodiversity awareness (78%), Identification skills (60%), Natural history (56%).



Which of the following formats would work best, given your preferred target audience?

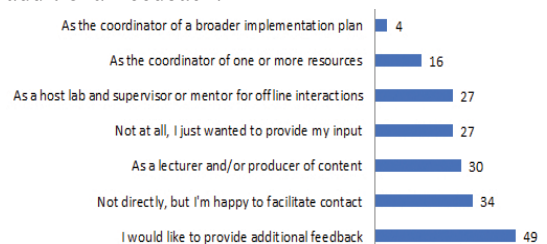
A curated collection of online resources (44%), A distributed, multi-partner Australasian Master's of Taxonomy (42%), A coordinated series of course subjects (40%). [MOOC, Massive Online Open Course, i.e. tertiary distance-learning course.]



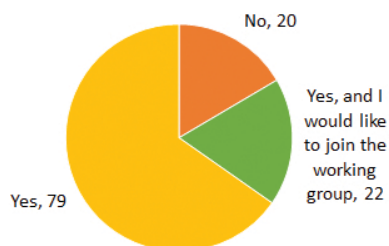
Involvement

How do you see yourself involved?

18 participants would be happy to be involved as coordinators of resources or implementation plans; almost half (41%) would like to provide additional feedback.



The vast majority (84%) would like to be informed about future developments and 20 would like to join this WG.



Articles

On orthography

Alex George, Kardinya, W.A.

Over the past three years, while preparing a new edition of *Western Australian Plant Names and Their Meanings* by the late F.A. (Ali) Sharr, I have been wrestling with the Articles of the *International Code of Nomenclature for Algae, Fungi, and Plants* relevant to orthography. From the number of names that require orthographic correction or raise issues I realise that some who name plants have similar problems. Given the declining knowledge of Latin (the ‘Sixth Declension’) this is understandable, but misunderstanding or ignoring the *Code* and grammatical terms have also played their part. Here I discuss some of the pitfalls and problems that have appeared in Australian nomenclature, especially over the past thirty years or so. I address names at the rank of species and below. Because of the background to this paper most of my examples are from the Western Australian vascular flora. Where first mentioned they are given in the form as published.

Nouns in apposition

The greatest number of errors has been in using nouns as though they are adjectives, usually involving a change of the ending as though to agree with the gender of the generic name. Under Art. 23.5, ‘a noun in apposition, or a genitive noun, retains its own gender and termination irrespective of the gender of the generic name’. A few examples show this problem.

Astus duomilius: the second part of the epithet is from Latin *milia* (plural of *mille* a thousand) and is a noun in apposition, hence it should be *duomilia*.

Daviesia euryloba: from Greek *eury*s (wide, spreading) + *lobos* (a pod). This should be *Daviesia eurylobos*. The epithet *euryloba* would be from *-lobus* (lobed), a different meaning.

Eremophila parvifolia subsp. *auricampa*: from Latin *auri-* (golden) + *campus* (a plain, field) (the species occurs on the Eastern Goldfields of W.A.)—*campus* is a masculine noun and can’t be given the feminine ending. This should be subsp. *auricampi* (meaning ‘fields of gold’) as a plural noun in apposition.

Eucalyptus sargentii subsp. *onesia*: from Greek *onesis* (advantage, use). This is a noun so should be used in apposition, i.e. *onesis*. But even if regarded as an adjective the ending would still be *-is*.

Glycine aphyonota formed from the Greek *aphyo* (pale, bleached) + *notos* (the back) (refers to ‘the pale non-display side of the standard petal’). Since *notos* is a noun it cannot be given a feminine ending and the epithet should be *aphyonotos*.

Hakea cygna: from Latin *cygnus* (a swan); this should be *H. cygnus*.

Leptosema cervicorne: from Latin *cervus* (a deer, stag) + *cornu* (a horn) (refers to the staghorn-like branching). The original spelling of the second part, *corne*, is incorrect: the nominative of the noun is *cornu*, i.e. it should be *L. cervicornu*. If it was meant to be ‘with the horn of a stag’ it would be the same since the ablative is also *cornu*.

Micromyrtus uniovula: this would appear to be formed using *ovulum* rather than *ovum* as stated in the protologue. In either case, the word is a noun, hence used in apposition and should be *uniovulum*.

Tecticornia mellaria: from Latin *mellarium* (a beehive), so should be used as a noun in apposition, i.e. *T. mellarium*.

Noun in genitive

This is also covered under Art. 23.5, ‘a genitive noun, retains its own gender and termination irrespective of the gender of the generic name’.

Westringia capitonia: the derivation was given as Latin *capitonis*. This is the genitive of the noun *capito* (a man with a large head) which can’t be altered with the ‘a’ ending. It should be *capitonis*.

Confusing the matter of nouns are final word elements that strictly are so but, through usage, have come to be accepted as of adjectival form in botanical orthography. A list of examples is provided in Table 1.

Table 1. Examples of epithet elements of substantive origin that have become accepted in botanical Latin as adjectival.

<i>-acanthus</i>	<i>-fructus</i>	<i>-pilus</i>	<i>-sepalus</i>
<i>-blastus</i>	<i>-glossus</i>	<i>-plectrus</i>	<i>-spinus</i>
<i>-bracteus</i>	<i>-glumis</i>	<i>-ramis</i>	<i>-stylus</i>
<i>-caulis</i>	<i>-limbus</i>	<i>-ramus</i>	<i>-tepalus</i>
<i>-cladus</i>	<i>-nemus</i>	<i>-ramulus</i>	<i>-thecus</i>
<i>-culmis</i>	<i>-nervus</i>	<i>-rhizus</i>	<i>-tubus</i>
<i>-formis</i>	<i>-petalus</i>	<i>-scapus</i>	

Connecting vowels

These are covered in Article 60.10.

Some changes required in recent names include:

Acacia glaucocaesia: from Greek *glaucos* (bluish-grey or -green) + Latin *caesius* (bluish-grey). This one is debatable as it combines a Greek and a Latin word, but probably should be *glaucicaesia*.

Drummondita rubroviridis: from Latin *ruber* (red) + *viridis* (green); should be *rubriviridis*.

Eremophila annosocaulis: from Latin *annosus* (long-lived) + *caulis* (having a stem); it refers to the ‘very old, withered stems’; should be *annosicaulis*.

Glycine lactovirens: from Latin *lacti-* (milky) + *virens* (becoming green); should be *lactivirens*.

Pileanthus rubronitidus: from Latin *ruber* (red) + *nitidus* (shining); should be *rubrinitidus*.

Xyris atrovirida: from Latin *ater* (genitive *atri*) (black) + *viridis* (green); this is formed from two adjectives. The latter is already feminine and should not be changed to *-a* and the connecting vowel should be *-i-*. Thus, it should be *X. atriviridis*.

Hemigenia pimelifolia: from genus *Pimelea* + Latin *-folius* (-leaved); this should be *pimeleifolia*.

Wrong changes to adjectives

Guichenotia basivirida: The component parts of the epithet were not given but clearly it’s from the Latin *basis* (a base) + *viridis* (green). The latter ending is feminine as well as masculine and orthographically shouldn’t be changed; i.e. it should be *basiviridis*.

Hemigenia dulca: the Latin word is *dulcis* (sweet, pleasant), and retains this ending in the feminine, i.e. it should be *Hemigenia dulcis*.

The wrong word

Some epithets have been derived from the wrong word, either a similar one that has been confused with the correct one, or from modifying one incorrectly. The former can result in the epithets not meaning what the author(s) thought. Because they are orthographically correct they cannot be changed. Examples include:

Eremophila aureivisca: this was said to be from ‘Latin *auri-* golden; *visca* covered with a glutinous exudate’ but the latter word is the plural of *viscum*, a mistletoe or bird-lime made from mistletoe berries (reference is to the resin on the stems and leaves). The first part of epithet is better derived from *aurei-*.

Eremophila glabra subsp. *psammophora*: from Greek *psammo-* (sand-) + *-phorus* (bearing) (said to be sand-loving, which would be *psammophila*). Perhaps it bears sand grains caught up in the indumentum.

Eucalyptus quadrans: from Latin *quadrans* (a quarter, fourth) but in fact the epithet was said to refer to not one but all four sides of the hypanthium.

Philotheca nodiflora subsp. *latericola*: in the protologue the epithet was said to refer to the ‘plant’s preferred habitat’ which was given as ‘on laterite and ironstone’. In fact, this derivation is from the Greek *lateri-* (at the side) + *-cola* (inhabiting). ‘Growing on laterite’ would be *lateriticola*.

Solanum reclusum: this is from the Latin *reclusus* (open, unclosed) but apparently was meant to be *seclusus* (separated, secluded), referring to the remote location.

Stylidium rivulosum: from the Latin *rivulosus* (having fine, wavy grooves), but mistakenly said to mean a streamlet in reference to the habitat (the correct epithet would have been *rivulare* or *rivicola*).

A wrong modification

Some epithets have been formed by incorrect modification of words but there is no clear way that they can be corrected.

Caladenia × *cala*: this is formed from the Greek *calo-* beautiful, but this word is a prefix so should be followed by something. Orthographically you shouldn’t change the ‘o’ ending to ‘a’ but *calo* would be a worse epithet.

Eremophila acrida: *acridus* is not a Latin word. It should have been *acer*.

Eremophila fasciata: the epithet was said to refer to the ‘flowers densely clustered at the branch tips and making the plant appear fasciated’, but it’s an adjectival form from Latin *fascia*, a bandage or band; it should have been *fasciculata*, bundled, clustered.

Eremophila labrosa: said to be named from ‘Latin *labrosa*, large-lipped, referring to the prominent lower lip of the corolla’ but there is no such word; *labrum* is a lip and *Labros* the name of a dog; the correct word would have been *labiosa*, with large lips.

Eucalyptus absita: this is a non-word, said to be from Latin *abitus* ‘away from the place’ (i.e. adjectival), but this is a noun meaning a departure or place of egress; the ‘s’ was inserted without explanation, apparently intentionally as it was used several times in the paper (it’s a W.A. species, whereas most related species occur only in the Eastern States). You could argue for an orthographical correction to *abitus* but that doesn’t have the intended meaning.

Eucalyptus extrica: the epithet was used in the adjectival sense ‘disentangled, free, referring to the identity of this species being previously confused with that of *E. tetragona*’; it was said to be from Latin *extrico* which is a first person singular verb meaning ‘I disentangle, free’; the adjectival form would be from the past participle of the verb, *extricatus*. Note, though, that the imperative singular of the verb is *extrica!*, i.e. disentangle! which you could say to a plant of a species that is uncertain of its identity. I’m unaware of any epithet formed from this part of speech.

Eucalyptus olivina: from Latin ‘*olivinus*’ also a non-word, presumably derived from *olivaceus* olive-coloured (it refers to the foliage).

Wrong gender

Crassula natans var. *minus*: Latin *minus* (smaller) is the neuter of *minor* and *Crassula* is feminine; it should be var. *minor*.

Heliotropium discorde: from Latin *discors* disagreeing, discordant; the neuter is the same as the masculine and feminine: it should be *H. discors*.

Solanum octonum: from the Latin adjective

octoni (eight each), referring to 8-rayed stellate hairs. The word is plural so, to agree with the gender of *Solanum*, the epithet should be *octona* (neuter plural)

Personal epithets

Article 60.8 has not been followed in forming a number of epithets. These are correctable errors. An old such epithet is *Pilostylis hamiltonii*, long thought to acknowledge just Charles D. Hamilton but the protologue clearly includes Alexander G. Hamilton, hence it must be *P. hamiltoniorum*.

Change in meaning from modifying words

If you modify a word, check whether it then has a different or alternative meaning that you may not wish to imply, e.g.

Stylidium bellum: the epithet is formed correctly from the Latin adjective *bellus* (pretty) with a neuter ending. The word then also becomes the Latin noun for ‘war’ (although it may be appropriate for an insect alighting in the flower to find itself suddenly clubbed on the back!).

Eucalyptus distuberosa: the epithet is formed correctly from Latin *dis* (without, separate) and *tuberosus* (producing tubers or swollen into a tuber), referring to the absence of a lignotuber. It can also mean the opposite of what the author believed, since there is an adjective *dis* meaning rich, i.e. the plant is rich in tubers or swellings.

Adverbs

The *Code* says nothing about the use of an adverb as an epithet but it would appear that they are covered by Art. 23.1 and Art. 23.5. As they are not adjectives they are words in apposition and therefore do not change their form. In W.A. we have two such epithets:

Ptilotus polakii subsp. *juxta*: The epithet is from *juxta* (next to, close by). This is an adverb and hence the ending does not change. It should be subsp. *juxta*.

Caladenia postea: This is from an adverb, *postea* (afterwards) (referring to the flowering time compared with related taxa). In this case, the ending appears to agree with the gender of the generic name. It is coincidental, but, should the species ever be moved to a genus of masculine or neuter gender then the epithet would remain the same.

Indigenous terms

It is nice to recognise indigenous knowledge but bear in mind that epithets such as *birrilburu*, *calobra*, *delbi*, *yapukaratja*, are meaningless to most people. You can always record such a name in your discussion. Preamble 1 of the *Code* gives ‘the avoidance of the useless creation of names’ as second in importance after the stability of names. So far, none of these has been modified and I suggest that this should always be so.

Placenames

A number of epithets derived from placenames have been used without the suffixes *-ensis*, *-[i]*

anus, *-icus* or *-inus*, e.g. *Drosera bindoon*, *Jacksonia quairading*. These are acceptable but it’s preferable to follow Recommendation 60D.

Finally

If you want to be different, at least ask someone knowledgeable in Latin (and if necessary Greek) to check the orthography—better to get it right than to have to correct it later or, worse, have a name that is orthographically correct but either meaningless or doesn’t have your intended meaning. Be aware that a classical scholar may have no understanding of botanical terminology, orthography and conventions and may find some aspects disconcerting.

A correction to the typification of *Wollastonia uniflora* (Willd.) Orchard (Asteraceae – Ecliptinae)

A.E. Orchard

c/- Australian Biological Resources Study

In 2013 (Orchard 2013), I published a paper which attempted to unravel the complexities of the *Wollastonia/Wedelia* complex in Australia, the western Pacific, southern Asia, Africa and South America. Amongst other data I cited the type of *Buphthalmum uniflorum* Willd. as follows: “Type citation:

Norfolk Island’ (holo: Habitat in insula Norfolk [sic], s. dat., specimen 16422, Herb. B-Willd., ex herb. Sprengel, IDC microfiche!; iso: Norfolk Island, Oceani Pacifici, s. dat., J.A. & G. Forster s.n., BM820296!; possible iso: *Buphthalmum uniflorum*, s. loc., s. dat., Forst. s.n., P 698454, ex herb. Sprengel (no. 1673), ex herb. Schultz Bip., ex herb. Cosson, photo!).

A recent enquiry received by me from Dr. Gildas Gâteblé who is writing a paper on Cook’s Botany Island, New Caledonia, raised doubts about the provenance and identity of Forster’s ‘Norfolk Island’ collections. I have now (via JSTOR Plants and images on the BM database) re-examined the ‘holotype’ and ‘isotype’ specimens cited above, and it is clear that I was in error in conflating the B-Willd. and the BM specimens under the same name. The Berlin holotype (*B-W 16422-01 0*) is undoubtedly the plant that I accepted as *Buphthalmum uniflorum* Willd. (= *Wollastonia uniflora* (Willd.) Orchard), but the specimen in BM (*BM000820296*) is equally undoubtedly *Wollastonia lifuana* (Hochr.) Fosb., endemic to New Caledonia and (perhaps) Vanuatu, and must be considered an excluded (mislabelled) syntype of *Buphthalmum uniflorum* and not an isotype.

Dr. Gâteblé suggests that it was in fact collected at Améré (Botany Island).

JSTOR Plants displays a GH (*14083*) sheet (ex herbarium F.W. Blatt) as an isotype of “*Wedelia uniflora* (Forst.) Moore”. This sheet contains two separate collections: one, from Anatum, New Hebrides (Vanuatu) by E.G. Paris *s.n.*; the second by E. Vieillard 799 (also numbered 391 in pencil, probably the number assigned it in the F.W. Blatt herbarium) from Ile des Pins, New Caledonia. Both are *Wollastonia lifuana*: neither is syntype material of *Wollastonia uniflora*. The Vieillard specimen is a possible isotype of *Wollastonia lifuana*, although the locality is incorrect for his no. 799.

Forster also collected *Buphthalmum uniflora* at Tonga (*J.G.A. Forster s.n.*, habitat in Tonga Taboo, *s.d.*, *K1065748*) under the manuscript name *Buphthalmum procumbens* Forster. This specimen, presented to Kew by the Corporation of Liverpool in 1885, is not type material.

The specimen that I cited from the Paris herbarium (*P698454*) seems to be a good match with the Berlin specimen. It lacks a definite locality, although it is undoubtedly a Forster collection. It may therefore be an isotype of *Buphthalmum uniflorum*.

Reference

Orchard, A.E. (2013) The *Wollastonia/Melanthera/Wedelia* complex (Asteraceae: Ecliptinae), with particular reference to Australia and Malesia. *Nuytsia* 23: 337-466.

ASBS Wellington conference

ASBS-NZPCN 2019 Joint Conference report: *Taxonomy for plant conservation – Ruia mai i Rangiātea*

Grace Boxshall
University of Melbourne, Australia

¹This year the ASBS conference crossed the ditch for the third time and for the first time joined forces with the New Zealand Plant Conservation Network (NZPCN) in windy Wellington, New Zealand for the 2019 ASBS-NZPCN Joint Conference Taxonomy for Plant Conservation – *Ruia mai i Rangiātea*, 24–28 November 2019. Needless to say, we were all blown away! (Fig. 1).

Not unexpectedly, local kiwis dominated the conference attendance, with 147 of the 201 registered conference attendees coming from New Zealand. However, Australia was not to be forgotten and put forward a strong representation of 50 attendees. We even had a smattering of visitors from further afield: two from the USA, one from the UK, and one from Sweden. In particular it was excellent to see many early career researchers and students attending and presenting their work, many for the first time, in a very supportive and encouraging environment.

The theme for the conference was taxonomy for plant conservation, with an emphasis on coming together and establishing foundations from which to continue developing our shared taxonomic and conservation work. The conference provided a wonderful format for us all to swap ideas and share our work, and also provided opportunities to create something new together. Many new cross-Tasman connections were forged throughout the week, and conversations about the similarities and

differences between Australia and New Zealand, ASBS and NZPCN were abundant. As an Aussie, I was particularly fascinated and inspired by the respect shown and inclusion of Māori culture and knowledge.

For those who arrived early, there were a wide variety of workshops available during the day on Sunday: botanising with iNaturalist led by Jon Sullivan and John Barkla; two sessions of Plant Identification (a ferny morning led by Patrick Brownsey and Jeremy Rolfe and an afternoon of plant surveying led by Alex Fergus and Rowan Hindmarsh-Walls); “Basics of Illustration” led by

Tanya Schraschkin; and Science Communication Skills for Botanists led by Kevin Thiele, Andrea Wild and Alison Balance. While some of us enjoyed learning the tricks of shading, stippling and tracing or were out exploring Wellington’s various botanic gardens, others practiced pitting themselves and their communication skills against the good-cop-bad-cop antics of two tame(ish) journalists.

Sunday night brought drinks, nibbles and after-hours access to the new Te Taiao/Nature exhibition,

as the conference began with a welcome function at the conference venue, the Museum of New Zealand Te Papa Tongarewa, New Zealand’s national museum (Fig. 2). Te Papa as it’s known means “Our Place” and it really did feel like our place for the week.

Monday, Day One, kicked off with a formal welcome including a Mihi Whakatu (Māori speech of welcome), a waiata (song) and a welcome speech by ASBS and NZPCN presidents, Dan Murphy and Rewi Elliot. The opening keynote



Fig. 1. Heidi Meudt and Rewi Elliott led the committee who organised this wonderful conference. Ph. Prashant Joshi

¹ As the single author of a conference report, Grace has done a great job in the face of many concurrent sessions. Figures 6 and 7 are extra pictures taken during two talks she missed hearing. Eds.



Fig. 2. The main conference hall at Te Papa.
Ph. Prashant Joshi

speaker was Hon. Eugenie Sage, New Zealand's Minister of Conservation and Land Information and Associate Minister for the Environment (Fig. 3). It was fascinating to hear her present a new *Biodiversity strategy and action plan for Aotearoa New Zealand* [see p. 68]; her point on how New Zealand must recognise and invest in mātauranga Māori (Maori wisdom) and western science to improve biodiversity management outcomes was particularly interesting. It was also notable that Minister Sage had carefully read, and praised, the *Decadal plan for taxonomy and biosystematics in Australia and New Zealand*.

Monday was our only day spent together without concurrent sessions of talks, so we were briefed early on about the enormous silent auction and the Pig Protocol (to signal time to conclude for speakers) – an apparently foreign concept to many of our new friends. Aren't all conference talks delimited by its iron-clad "oink-oink"?

Fig. 3. The Minister, the Hon. Eugenie Sage gave an informed speech.
Ph. Prashant Joshi



Session one, *Conservation genetics, genomics and ecology*, perhaps pointedly planned to bring us naïve Aussies our first glimpse into the horrific impact of introduced, Australian possums on the local vegetation in the form of Zoe Lunness's engaging student talk on *Tupeia antarctica*: a precious parasite. Although all talks in this session provided valuable insights, I was particularly riveted by David Orlovich's talk on using genomic tools to understand beech forests and their fungi. Apparently, my enthusiastic reaction upon finding a rare, fellow mycologist and hearing about using sand-filled fungal ingrowth bags to sample ectomycorrhizal fungi was equally entertaining to those sitting around me!

After lunch (and perusal of the silent auction), session two kicked off with two perspectives on the contributions of citizen science, one from using Facebook in Australia and the other from using iNaturalist in New Zealand. iNaturalist is much more established in New Zealand than in Australia, although Aussies have definitely taken to the platform since its Australian debut in August 2019 and iNaturalist records were recently incorporated into the Atlas of Living Australia. First up, I shared how I used sightings reported to a dedicated Facebook page that I created in the absence of iNaturalist to inform collections for my master's research in Australia (Fig. 4). As my heart rate gradually returned to its normal speed, Jon Sullivan (NZPCN) shared how he has been able to encourage citizen scientists to identify and report new- and potentially invasive- weeds in their area via a new iNaturalist NZ initiative, Find-A-Pest, with a view to improving early detection and hopefully the control of weeds.

With lingering ideas of citizen science tantalising us with possibilities, we launched into a discussion on *Conservation in response to environmental*

Fig. 4. Our correspondent Grace's talk was on fungi and iNaturalist. She was a visual aids victim, but the Society's Mr Fixit Todd McLay was on hand. In the foreground is Hervé Sauquet.
Ph. Prashant Joshi



change. The message was bleak, with talks on how climate change has already had an effect on the historically significant New Zealand collection at the Melbourne Gardens of the Royal Botanic Gardens Victoria; and another on how combination of changing water quality and habitat loss has supported the decline of threatened New Zealand bladderwort, *Utricularia australis* and proliferation of a new species, *Utricularia* sp. "Choc-a-bloc," in its stead. Thankfully Darren Crayn fortified us at the start of the session with early results from a multi-institutional and multidisciplinary project to secure Australia's climate-threatened endemic tropical montane flora. Their research on seed banking strategies, genetic diversity and plant climatic tolerances provided some optimism.

Session three, *Aligning western sciences with mātauranga Māori for better conservation outcomes*, commenced after a restoring cuppa and cake with a heartening story of how developing mutual trust between western science and mātauranga Māori enabled the restoration of vegetation at Manawatāwhi, an island decimated after four goats were released as a potential food supply for shipwrecked persons in 1889. We also heard from Graeme Atkins who shared with us the horrific changes that have occurred through the Raukumara Ranges, once a lush and diverse ecosystem and now on the brink of collapse. Graeme detailed the effects of deer and Australian possums on this precious site, the disconnect between the tangata whenua (Maori residents) and the Raukumara Ranges, and how he is working to educate and engage the community to try to bridge that gap and save the ranges. The visible and horrific effects of possums on the New Zealand flora and fauna, shown in both Graeme's talk and Zoe Lunnis's talk earlier in

the day, triggered a visceral reaction from the audience. In response, Kevin Thiele proposed that all Aussies (who weren't required to pay the entry visa which includes a contribution to conservation) voluntarily stump up an equivalent \$35 to go towards controlling New Zealand's unwanted Australians: possums. I'm proud to say that 21 of us have paid the "Possum Tax" so far! There'll be more information on the Possum Tax elsewhere in the newsletter [see p. 65].

Day one concluded with a change in theme: *Celebrating 250 years of advances in botanical science and conservation since Banks and Solander*. The final session provided some interesting historical context and included Helen Kennedy's Pauline Ladiges Prize-winning student talk on the past, present and future of urn heaths (Fig. 5).

Although the formal proceedings of the day

Fig. 5. Helen Kennedy giving her prize-winning talk on *Melichrus*. Ph. Prashant Joshi



were finished, Prof. Sverker Sörlin gave a public lecture that night on “Solander, Sparrman, and the Anthropocene: Saving “the environment” on a planet made unstable for humans.”

Onwards to Day Two! Melanie Mark-Shadbolt, Day Two’s keynote speaker, asked us quite sobering questions about western science and its impacts in “Do hapū and iwi views and practices provide an alternative paradigm to Aotearoa New Zealand’s biosecurity system to better protect our taonga [highly prized] species?”

We then divided ourselves between the first of many concurrent sessions. Session four comprised three themes: *Decoding the green: Combating plant blindness; Ecological restoration; Recovery of threatened plants: success stories?* Tim Park shared phenomenal photos from biophilic buildings in Singapore – I was particularly astounded by the jungles of Khoo Teck Puat Hospital which are designed to lower blood pressure, promote patient healing and entertain/distract patients so that they don’t request nurse contact as frequently. Maggie Hanes divulged her secret for information science outreach: using food and drink to teach the public about biodiversity. Maggie runs the Taste of Life and other events where people are invited to share a multicourse meal and learn about what’s on their plates- and at the end attendees are provided with a species list of everything that appeared on their plates that night. Next, Kelly Shepherd revealed her double life moonlighting as a modern-day

Fig. 6. Jessica Beaver spoke on the restoration of *Pennantia baylisiana* from the sole surviving (female) plant of the species, a process cementing ties of mutual trust between matauranga Maori and western science. Ph. Prashant Joshi



Sherlock Holmes, teaching police how to solve crimes using minute botanical clues. Across the hall in Session five *Recent progress in taxonomy and phylogeny of Australasian plants I*, insights abounded with talks on a variety of genera including *Celmisia*, *Eremophila*, *Eucalyptus*, *Platylobium*, *Veronica* and *Trithuria*.

We returned after lunch (and further perusal and bids on the vast selection of silent auction items) to sessions six and seven which continued the themes of *Recovery of threatened plants: success stories?* and *Recent progress in taxonomy and phylogeny of Australasian plants II*. In session seven, we heard from Nick Weigner about the tangled (and hybridised) phylogenetic web that is *Nepenthes*, and how target sequence capture and haplotype phasing have been assisting in its untangling. Jürgen Kellerman shared the fascinating story of how a mystery shrub growing on sub-Antarctic Marion Island was identified as *Ochetophila trinervis*, native to the southern Andes, and how on earth it ended up growing so far afield (spoiler: the answer is most likely birds, specifically barn swallows, *Hirundo rustica*). Not to be forgotten, Heidi Meudt gave us the latest on *Myosotis* in New Zealand and Matt Buys talked us through how his work with *Kunzea* highlighted the effects of alignments and gaps on tree topology. It was a relief to discover that I was not alone in my troubles with ClustalW: the plugin really does not like gaps.

Session eight combined afternoon tea and posters. Nine posters were on display covering a broad range of topics: native orchid conservation, prioritising karst ecosystems in the Waikato, the evolutionary significance of female Podocarpaceae cones (featuring the eye-catching title “Game of Cones”), *Libertia* polyploidy, *Eucalyptus* population genomics, unexpected taxonomic outcomes from assembling biocontrol test lists, taxonomic revision of leafy liverworts, support for the recognition of *Schoenus caespitans*, and Francis Nge won the ASBS Student Poster prize for his poster on *Pomaderris* biogeography.

At this point, our previously intermixed conference briefly divided once more for the respective annual general meetings, which were run to a strict deadline of an hour as, we joined forces once again to witness the presentation of the Nancy T. Burbidge Medal to Dr Barry Conn and to partake of his lecture “Is paradise lost? Or not yet discovered?” on the flora of Papua New Guinea (see p. 4). We then waited with bated

Fig. 7. Peter Heenan presented an impressive conservation case study centred on taxonomic knowledge of a scattered and highly threatened limestone flora on the east coast of NZ's South Island. In his talk he launched a newly published book on the flora (see p. 78).

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breath by the bidding sheets as the silent auction wound to a close or attended the launch of *Seeds of New Zealand Monocotyledons* by Colin Webb (or both).

The conference dinner and kapa haka (showcase of Māori performing arts) took place in an incredible area within the museum, where a delicious three course meal was partaken, much wine was consumed (at least at my table), and we were entertained by the auctioneering skills of Matt Ward in an impromptu live auction of remaining silent auction treasures.

Conference dinner merriment couldn't continue too late into the night for everyone, as Day Three (Wednesday) brought a very early start for all those attending the various conference field trips! Five field trips were on offer this year, each exploring a unique facet of the environment close to Wellington. Deciding which field trip to attend was far from easy.

Upon our respective returns (some with soggy boots after kiwi-style creek crossings), a bundle of us early career researchers ventured off on an "informal social networking evening", organised by Todd McLay, where we bonded over beverages whilst wending our way through several of Wellington's watering holes. I think the unofficial theme for the evening was "no supervisors allowed"!

Day Four, the final day, came far too soon. Thursday began with Kevin Thiele's keynote talk "Breaking through the barriers- taxonomy and systematics in the Anthropocene" in which Kevin proposed we aim for a 16× increase in species description rate to identify Australasian biodiversity in an attractive and timely manner, which generated many questions and a lot of interest.

Session nine explored *Hybridisation: an ongoing dilemma for conservation* with insights from Frances Nge, Chapa Manawaduge, Lars Nauheimer and Peter Lockhart. Meanwhile session ten dived into *Australasian biogeography* which featured an engaging talk by KC Burns on

the search for island syndrome in plants. While many of us are familiar with the famed naivety of the dodo – which ultimately contributed to the demise of the species – we may not be as familiar with predator naivety in plants. *Pseudopanax* provided an excellent example: species found in areas never inhabited by moa have much softer, "normal" foliage than species where moa previously browsed.

Session ten continued with updates from Jen Tate, who launched Species Aotearoa (Fig. 8: <https://speciesaotearoa.nz>) and David Cantrill on the "Decadal Plan and future of taxonomy in Australasia". After lunch, many hearts were divided with the difficult choice between the last two sessions of the day: session eleven *What is the fossil evidence for extinction, adaptation and diversification in the assembly of the flora of the SW Pacific* and session twelve *Phylogenomics*. In session eleven, Kia Matley shared how she single handedly "destroyed" one of Australia's key fossil sites for the last glacial maximum by inadvertently proving that the site was actually much older than previously thought. In session twelve, suspicions were aroused when Todd McLay noted that of the nine talks using Next Generation Sequencing presented at the conference, only one didn't encounter difficulties with the complex resulting datasets... hmmm... before discussing the effect of paralogs on tree topology and how various pipelines can assist.

One last round of afternoon tea later, and it was time for the awards presentation, wrap up and a heartfelt thanks and handover to Katharina Nargar, Darren Crayn, Ashley Field, John Clarkson and Frank Zich for ASBS 2020 in Cairns. And, because it's so hard to say goodbye, the awards and wrap up were followed by an informal meeting regarding AVH and a public



Fig. 8. Presentations in good hands. Left to right: Jen Tate (launching Species Aotearoa), Randy Lacey, and Patrick Fahey. Ph. Prashant Joshi

panel discussion on the politics of collecting: from Banks & Solander to today.

It was sad to say goodbye to the ASBS gang and our newfound cross-Tasman friends. I look forward to many years of friendship, collaboration and shared learning. This conference has really

highlighted how exciting and beneficial it can be to meet and share ideas with our colleagues around Australasia and the world. I'm sure I'm not alone in sending my sincerest thanks to Rewi and Heidi and the rest of the organising committee for putting together such an immense event.

Conference workshop reports

Wikipedia Edit-a-thon on Australasian endangered plant species (Workshop 1)

Led by Mike Dickison, NZ, and Margaret Donald, Sydney.

By Peter Jobson & Heidi Meudt

On a glorious Sunday sunny day in Wellington, a small group made their way to Te Papa to participate in learning how to become a Wikipedia editor. The class was a mixture of conference attendees and the public and ranged from complete newbies such as Peter, to those that have done edits in the past, but wished to improve their skills. The aim of this workshop was to get interested natural historians, and botanists from the conference, to rectify the bias of a Northern Hemisphere editor base regarding natural history entries. The botanists in the room were encouraged to populate entries from their own research groups.

Mike is an excellent teacher: he daily adds to Wikipedia and has an incredible breadth of knowledge on building on a stub, and to creating new entries. He is a regular on Radio NZ Critter of the Week and he devotes time beforehand to create a well researched and presented Wikipedia article. He has also created many articles on species of interest over the years, and is the NZ representative for the International committee of Wikipedia Editors (Wikimania).

Wikipedia is surprisingly strict on what it will accept as an entry and its content, and the whole site is actively monitored. Mike thoroughly explained the main expected tenets to a good Wikipedia entry. A good entry must be supported by a reputable source that is in the public domain. Public domain is not exclusive to scientific publications – an article in a newspaper or magazine, or an official blog is sufficient. Wikipedia is also not a site in which one can publish original ideas – these are forbidden and quickly removed. All it ever is, is a summary of information from other sources. Articles have to be unbiased. This is not so controversial for entries on species or genera, but it is for climate change, for example, where it is necessary to include both sides of the current debate.

Finally, the hardest of them all was to write original text. It is so easy to cut and paste a species description, but this violates Wikipedia's policies, and so one needs to be inventive to generate original text, and to keep the scientific language and jargon to a minimum.

Photos accompanying articles are important, descriptive, and make the article interesting and engaging. The biggest problem is copyright. Photos must have full open access, which is frustrating when considering institution photo libraries often have self-imposed restrictions, thus making them void for Wikipedia.



Fig. . The Wikipedia workshop included ASBS members Heidi Meudt (rear) and Peter Jobson (right) Ph. M. Dickison

What became apparent from the reactions of the public in the room is that taxonomists working on their own taxon interests have knowledge and easy access to sites the layperson is not intimately familiar with. We are daily users of such sites as AVH, APNI, IPNI and BHL; we are not fumbling to do Google searches for information that may be absent in these sites; we know the weaknesses and strengths of our sources, the historical lacunae, and how to laterally work with them.

What we managed to achieve is summarised online (Web ref.).

Apart from the skills learnt in the workshop, the other important message is – Wikipedia, particularly in the natural sciences is accurate, informative, reliable and considered trustworthy. Thus this is an ideal medium for members of the ASBS community to get our research into a form that is accessible, and to have it valued by the public.

Web ref. https://en.wikipedia.org/wiki/Wikipedia:Meetup/Wellington/Australasian_Endangered_Plants

Botanising with *iNaturalist* (Workshops 2, 3): report and considerations, particularly on dealing with competing taxonomies

Led by Jon Sullivan, Lincoln University, and John Barkla, Department of Conservation, Invercargill.

By Bill Barker

Probably the main driver of *iNaturalist* as a tool promoting citizen science is its effective identification procedures that reward uploaded photographs and their associated observations

and geocoordinates. The identification process is founded on a consensus amongst those identifiers, who have developed special interest in organismic groups; these committed participants being a critical element for the ongoing success of the facility. It works pretty well in my limited experiences in identifying South African *Orobanchaceae* images and limited work so far on New Zealand *Euphrasia* for which I encouraged photography in the field: Barker 2012)¹.

Questions. Based on my previous experiences I went to this workshop to be educated as to

- whether a country's approved plant census could work in with the *iNaturalist* global standard, Plants of the World On-line.
- how a specialist might express an interim view of a taxonomy to guide and stimulate those in the field to make image-centred observations of greatest value.
- whether there is a part-way point for a specialist to be involved, rather than have a heavy commitment to *iNaturalist* once involved.
- what other aspects of *iNaturalist*, additional to what is immediately apparent to a first-time user, would encourage participation and provide useful functionality.

The workshop provided some answers and an improved understanding of the application, but questions still remain.

The iNaturalist workshop

The workshop was held at the Wellington Botanic Garden Treehouse seminar facility. Jon Sullivan led participants enthusiastically throughout the morning's Basic and afternoon's Advanced sessions with clear and detailed Power Point presentations. Apart from the opportunity to upload one or two photographs to *iNaturalist* NZ (Web ref. 3) taken in the morning break, the day was devoted to being shown the ins and outs of this interactive data system that has obvious benefits for its many users in NZ, many of whom have been involved for many years now. Most of the morning participants were new users, while those in the afternoon seemed already to be users.

The morning session began with two case studies, one in the "Invertebrates eating plants in NZ"

¹ My involvement with both genera was initially on a competing product, *iSpot*, developed in the UK (Web ref. 1), with the NZ rendition going by the name Nature Watch NZ (Web ref. 2). Observations were transferred when when both countries migrated these citizen science services to *iNaturalist*.

iNaturalist project comparing ranges of the Magpie Moth and introduced ragwort (*Senecio*: Web ref. 4), the other showing observations of the *Chrysolina hyperici* beetle biocontrol of St Johns Wort (*Hypericum*) (Web ref. 5).

New observations for such projects or for general use can be uploaded to the project site applicable for your region, in this case on the iNaturalist NZ website, from a PC or via the smart phone app.

Data ownership and use. Image and observations are owned by photographer/observer, but the recommended copyright setting allows these to be shared freely. At a subsequent stage this licence can be withdrawn, but that decision is not retrospective. All publicly released images and observations can be downloaded in several standard formats and used by anyone.

The Web site and Mobile app differ in their functionality. Your Mobile app is limited to: uploads single photos and observations; audio limited currently to iPhone; allows provision of identifications and comments on one's own observations; joining a project; access to user guides; exploring observations. By comparison, further functionality gained via the web site extends to: batch image and data uploads; audio; identifications and comments on any observations or images; establishment of projects; establishment of user guides; download of observations or images.

Jon took us for a tour of the iNaturalist NZ website (Web ref. 3). You can register an interest, for example in *Senecio*, known as a "subscription", providing you an alert every time an observation is made [or commented upon]. Observations can be a location, perhaps with provision of a standard tag (e.g. whether the organism is wild or "captive/cultivated"). Such observations are improved if backed by photos; but note: photos may have incorrect metadata (date, time, place).

Principles for deciding when to submit an observation. Jon's list (drawn from NatureWatch NZ) included:

- an observation if it interests you, e.g. if you've not seen it before or if it's something you've often seen but in an unusual place.
- a batch of quickly assembled observations from a day out in the bush or a location is welcome as they may include something important to someone.
- a perceived mundane observation particularly if making up a systematic set.

Plotting location of your observation. Apart from threatened species, which [in NZ] are obscured to a 10 mile grid by default, locations are as accurate as the observer makes them, which is very accurate with wide use of GPS, available these days on smart phones and modern cameras, providing automated application of geocoordinates ("geotagging"). Jon showed how he geotagged and uploaded his many images taken on frequent bike rides in the local bush. He had a standard camera and a Garmin GPS, which he set to its track function. A tool in *darktable* freeware (Web ref. 6²) allows seamless application of the geocode to the images on uploading the images to the PC, and once done, the batch loading of the images with all the tag information to iNaturalist.

If you've no GPS giving "pinpoint" accuracy, iNaturalist allows easy application of a geocode after the event manually using e.g. Google Earth, the location marked by a bounding box of area of your choosing, depending on how accurate your memory and map reading ability are.

Photography tips. Jon showed macro attachments for smart phone cameras or the use of a hand lens or even binoculars as an interface. A scale adds to the usefulness of your picture (ruler, coin, hand). A handkerchief or tissue can reduce shadowing. More than one photo for an observation may be essential for identification, e.g. a picture of the undersurface of a fern frond is important to go with a habit shot.

Identification, a dynamic process. The main way of gaining identifications is via a "cream rising to the surface" approach. While any user may provide an identification, the intention is that the prevailing identification will come from those who have knowledge, through specialist or accumulated experience in that group of taxa.

² Advantages of darktable alluded to by Jon were its "white table" which enables maintenance of a digital image library and the application and maintenance of standard exif or custom-made data tags applicable to images (compatible with those applicable to iNaturalist projects). Also useful are its tools e.g.: batch editing of filenames and tags, enabling batch application of common elements such as date and location, and ability to utilise predictive text associated with a reference checklist (e.g. of scientific names). darktable allows a discrepancy between the date/time on camera and GPS to be corrected in one action across a selected chronological sequence of images (e.g. over several days). [I subsequently found that its "dark table" area has image-editing tools of capability equivalent to now very expensive Adobe Photoshop. I also note alternatives to darktable for image editing: RawTherapee (free: Web refs. 7, 8) and Lightroom (a small monthly fee: Web refs. 9, 10).]

“Agreeing” to everything is frowned upon and may eventually catch up on a person; propose or agree with an identification only if you “know”. With an inadequate image, an expert may substitute a generic identification for a debatable species name and that in turn might prompt agreement. [I remain unclear whether one can be dubbed expert in a group (a “curator”) through existing specialist knowledge, or if it is only gained through weight of identifications that reach general agreement].

Image recognition is also available, but Jon demonstrated that the quality of identifications is highly variable.

Curating taxon names. Jon stressed that iNaturalist is not at the cutting edge of taxonomy; it uses authoritative taxonomies, in the case of vascular plants, Kew’s Plants of the World Online (POWO) (Web ref. 12). However, a “curator” can add, edit existing, merge and delete taxa, and if there is doubt a taxon can be flagged for discussion with other name curators. He professed that a country can choose a subset of names. So New Zealand uses the NZ Organisms Register (NZOR) as far as possible. This includes the authoritative NZ Plant Names Database. Subsequently, however, I found that this is not the understanding of some NZ and Australian vascular plant botanists. As a result I remain unclear as to how disagreement at a regional or taxon level with iNaturalist’s POWO taxonomy standard is processed.

Projects. iNaturalist supports many types of project: “collections projects” (e.g. a checklist for a reserve over time or in a concerted group exercise); umbrella projects (for schools or community groups); “peripheral projects” (e.g. flowering time of a species); “traditional projects” (e.g. Australasian fishes; invertebrates eating plants). Associated with these may be a set of observational fields selected from ones existing in iNaturalist or made anew. These may be populated by uploading of spreadsheet data.

Jon warned of the proliferation of different tags where existing ones would suffice. There is no flagging or encouragement of tags matching existing global data standards such as Darwin Core.

Projects can be readily created and existing data uploaded as csv or kml format. Data from a project may be exported in bulk. An administrator, furthermore, can export geocoordinates hidden for conservation reasons, where this might be needed for research purposes.

Interfacing with third-party applications. Most of iNaturalist’s data are freely available for use by other applications and websites by means of a large and well developed programming interface (API). For data analysis the *rinat* package in R is often used.

Conclusion

Dependence on identified geocoded images. Science has long traditions of self-taught or volunteer enthusiasts making valuable contributions in the realm of herbaria and systematics. Using the community through the iNaturalist tool to support taxonomic research — and potentially to link in with dynamic information systems such as eFloras

— promises mutual benefits. On occasions in the past, taxonomists would encourage keen members of the public to focus on collecting herbarium specimens in support of revisional or floristic study. Encouragement, via project pages, of a linked voucher specimen deposited in an institution would add huge value to iNaturalist images, but these days it has become increasingly difficult for the general community to collect flora for scientific purposes (a stark contrast to the ways vegetation and plants are damaged and destroyed in the general community often with no consequence). Digital images with accurate geocoded locations is the modern-day substitute that iNaturalist provides.

In a recent development the Atlas of Living Australia has signed an agreement to use iNaturalist as a tool for recording species occurrence (Web



Fig. Workshop leader Jon Sullivan presented on an iNaturalist citizen science project on new weed introductions at the Conference.

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ref. 11) with a claim that iNaturalist's features will improve the identification service.

Despite the propensity for all photographs to be identified to species level, there are the usual deficiencies in photographs that become evident in some groups of plants. In *Orobanche* in South Africa I readily allocated images of the 60 plus records to the two taxa occurring there, but elsewhere in the World species separation from closely related species would be more difficult. In *Euphrasia* in NZ there are photographs where there is inadequate rendition of diagnostic characters and, without specimen vouchers, species identification is problematic.

Conflicting taxonomies. A major sticking point I see for taxonomists for making use of iNaturalist is in relatively well known organismic groups where there are conflicting taxonomic opinions. In systematics, which alternative taxonomy prevails can ultimately be decided upon by levels of usage in authoritative global and regional lists and floras, in the broader literature, and, in these times, products such as iNaturalist. For vascular plants POWO has been adopted as iNaturalist's fall-back global standard. However, taxonomic knowledge advances unevenly across the globe. Countries and global regions such as Australian and NZ have adopted their own standard censuses, important for governance of threatened species, weeds, and for congruence with associated manuals and Floras. Concerns with POWO's taxonomy can have a strong practical and scientific basis. POWO reinforces this view in itself acknowledging such limitations up front (Web ref. 12):

By 2020, POWO will be the most comprehensive single information resource covering all plants but it will be imperfect and not all the taxonomic decisions contained derive from a peer reviewed, curated, authoritative source. *POWO therefore should only be treated as advisory. Other, more authoritative lists may exist for particular regions or taxa.* [My highlight].

Attracting taxonomists. These concerns surely need to be addressed. For systematists this is potentially a great tool to work with: to garner images, observations and follow-up support from the general community, with that important spin-off of citizen science of mutual appreciation and enthusiasm. I see the potential usefulness in the groups I am revising, though clearly it can become a time-consuming attraction for limited

return. What a pity if iNaturalist cannot find a way to attract the valuable identification know-how of more taxonomic specialists who would benefit from images and observations in the taxonomic knowledge gaps they could so readily define.

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Identifying New Zealand ferns (Workshop 4)

Led by Patrick Brownsey, Te Papa, and Jeremy Rolfe, Department of Conservation

By Ashley Field

New Zealand is one of Oceania's centres of fern diversity, being home to almost 200 species of ferns in an area of 268,021 km². Moreover, ferns are very abundant to even dominant in many of the wet vegetation communities of New Zealand. As a pteridologist, I was excited to be visiting there for the first time for the ASBS conference 2019. On the Sunday before the conference, Pat Brownsey and Jeremy Rolfe hosted a workshop on fern identification Otari-Wilton's Native Botanic Gardens. In addition to being rich and abundant, New Zealand's fern biota is well studied, and Dr Brownsey has produced many useful resources for the identification of New Zealand's ferns. ASBS and New Zealand Plant Conservation Network members enjoyed a lecture on the common fern families presented by Dr Brownsey. This was followed by a hands-on-fern workshop to identify them. Many fern families and genera are almost cosmopolitan, so most of the things



Fig. 1. The fern workshop. Clockwise from top left: a, Maggie Hanes and Demet Töre using Dr Pat Brownsey's key to the ferns and allied plants of New Zealand. Most of the characteristics used in the identification of New Zealand's ferns would be equally applicable in Australia, Madagascar or Brazil. b, Dr Patrick Brownsey explains the minutiae of fern morphologies in his key to students Cory Meister, Jacqui Bond, and Juergen Kellermann. Students learned to look at their fern in this order: rhizome form, frond division, fertile characteristics, indument. c, Dr Patrick Brownsey of Te Papa explains the differences between New Zealand's many tree ferns and how to identify them in the field. Otari-Wilton's Bush native botanic gardens had a rich collection with many species growing side by side making it easy to compare their characteristics. d, *Pneumatopteris costata* is an unusual Thelypteridaceae, far removed both phylogenetically and geographically from its tropical congeners. In Australia, it is extremely rare, but in New Zealand it is the most widespread and abundant Thelypterid. e, Ivan Lin up close and personal with ring fern, *Paesia scaberula*. Many of the characteristics for the identification of ferns require a hand lens. In particular to see the sori, indusium and indument and in some families the arrangement of veins. f, A New Zealand icon—*Cyathea dealbata*—silver fern. g, Touring through Otari-Wilton's bush to examine many terrestrial and epiphytic ferns. .

learned at this workshop are equally applicable in Australia and elsewhere. Many species are also shared with New Zealand and Australia and I am used to them back home. Touching and seeing their counterparts up close for the first time raised many questions. For example, both *Adiantum hispidulum* and *A. diaphanum* looked different to those I know back home. Instead of gestalt recognition, they were identified based on the key characteristics: rhizome form, frond division, fertile arrangement and indumenta. The workshop was followed by our group splitting in two for a walk around Otari native botanic garden with each group guided by Patrick Brownsey or Jeremy Rolfe. The gardens, established many decades ago, have a rich rainforest and fern garden with numerous species growing side by side making it the perfect place for a short walk to see many species that would otherwise be more difficult to see. Seeing how conducive they were to teaching, it made me wonder of the feasibility of an equivalent back home in the Wet Tropics. Both Otari and Pat Brownsey's workshop were extremely enjoyable.

Basics of botanical illustration (Workshop 6)

Led by Tanya Scharaschkin, Botanical Artists' Society of Queensland

By Sophie Newmarch, Patricio Saldivia Perez, Tim Collins and Jen Tate

As botanists, we aim to describe the plants we see as accurately as possible. However, our written descriptions, although valuable to fellow botanists, can be daunting for those less familiar

with our lingo. This is where illustration can reveal our subjects to satisfy both the seasoned and amateur botanist. The botanical illustration workshop run by Tanya Scharaschkin was thus fitting for a conference that brought together botanists working on the taxonomy, systematics, ecology, and conservation of Australasian plants.

Sixteen participants from diverse backgrounds gathered at the Otari School Hall for a bright and early 8:30 am start to learn the art and science of botanical illustration (Fig. 1). We began the day with introductions and goals from each participant. The goals ranged from where to draw the first line to detailing leaf texture and venation. Ultimately, we all recognized that drawing would help us to see, describe and understand our study subjects better, with many wanting to be able to include their work in future publications.

We learnt there is a difference between art and illustration. The former emphasizes creativity and the latter accuracy. Tanya emphasized that whether someone was an artistic scientist or a botanical artist their work was neither more nor less valuable. As an example, historical botanical still-life paintings have been used to gauge what crops were grown during certain times and in particular areas, so that historical plant movement by humans and the food diversity consumed was known.

Good technique and regular practice were emphasized. We discovered straight lines are not so straight forward! Pencil hardness, grip, pressure, hand placement and wrist movement

Fig. 1. Back to school. From left, at front, Francis Nge, Patrick Fahey, Grace Boxshall; Jen Tate, Sophie Newmarch; second row, ..., Kelly Frogley (pink), Chapa Manawaduge, Wyne Johns; third row, Nick Weigner, Seoljong Kim (UC cap), Dev Dutta, Tom Mayo; at rear, Patricio Saldivia Perez, Duncan Nicol, Tim Collins, Lalita Simpson. Ph. Tanya Scharaschkin



Fig. 2. From left: a, stippling, by Chapa Manawaduge; b, images laid out, and c, their tracings.

Ph. a, Tanya Scharaschkin; b, c, Jen Tate;



must all be considered. To generate curves is to use one's joints as pivots in a compass – and this was just one line! Adding parallel lines is when things started to get a bit groovy. Indeed, topology started to emerge within the shapes we were producing. Shading was a literal jump into the depths of illustration. Although not essential for scientific depictions, the ability to capture form and texture (three dimensions) was intriguing for many. Different styles were explored from gentle rolling circles with pencil to stippling with pen (Fig. 2a). All the while, our instructor jollied us on with anecdotes from her learning process. It became clear that illustrating is less about perfection and more about perseverance in order to accomplish what the illustrator wants to show and share with others.

The afternoon was passed doing exercises that combined techniques and developed our compositional skills. Our first project was a plate showing the diversity of a noxious weed in Australia – cat's claw creeper, *Dolichandra unguiscati* (L.)L.G.Lohmann, an ideal example given its great morphological variability. Leaf morphology ranges in size, shape, margin,

venation, and tendril number while seedlings can develop from single ovules to triplets in just one seed. One could imagine that writing descriptions would be somewhat confusing. Our task was to select a representative collection of leaves or germinating seedlings to illustrate the diversity found within this one species. Selecting a representative collection to illustrate proved challenging for many, let alone deciding scale and arrangement. A collective sigh of relief was shared when Tanya said we could trace our A3 page full of plant parts (Fig. 2b,c, 3). For this, we arranged our botanical subjects onto large A3 sheets and with the aid of tracing paper, captured the outlines and special features of the relevant plant parts. We were impressed at the outcome and to realize that this approach was accepted practice! Our second project was a subject of our own choosing. Some had brought digital images or printed photos, while others ventured into Otari Wilton's Bush with phone-cameras in hand for inspiration, and some chose to use the time to develop further the new skills just learned.

Fig. 3. Participants working together to select and trace images for a plate. Left to right, Chapa Manawaduge and Wyne Johns, Sophie Newmarch and Jen Tate. Ph. Tanya Scharaschkin.



By the end of the workshop, we all had much greater confidence to take pencil to page and also realized that mastering such a skill needs time, patience, and understanding of plant morphology. Tanya was excellent at demonstrating the skills in a supportive and encouraging manner. She was a guiding presence over all our shoulders, happy to help us improve no matter what level we were. The structure of the workshop, which involved short talks and demonstrations followed by practicals, was well-suited as an introduction to the basics of botanical illustration, although we all felt that the time went too fast! Tanya shared her own journey in a way that made everyone feel less self-consciousness of their work. It was a relaxing and an inspiring way to start the conference.

How to communicate our science in a clear and engaging way. Science communication skills for botanists (Workshop 7)

Led by Andrea Wild, National Research Collections Australia, CSIRO,
Kevin Thiele, Taxonomy Australia,
Alison Ballance, Radio New Zealand

By Katharina Nagar

Talking about my science to a scientific audience in the tearoom, a meeting or at an international conference? That is easy. Because I can happily apply my scientific jargon and know that my peers understand exactly what I am talking about. However, the thought of communicating my research to a general audience via blogs, Twitter, YouTube, radio or TV always seems rather daunting. How can I possibly put complex research topics into plain language and make a general audience understand how exciting and relevant it all is? I decided it was high time to do something about this and therefore attended the Science Communication workshop, presented by Andrea Wild, Science advisor for CSIRO's National Research Collections and Kevin Thiele, director of Taxonomy Australia, at this year's ASBS meeting in Wellington.

Jumping into the deep end - from science writing to storytelling

As researchers, we have undergone years of training in reporting our science as objectively and factual as possible, presenting it in a way that makes it reproducible and verifiable. Storytelling on the other hand, is persuasive in nature and claims made usually do not need to be backed up in a defensible way. However, we learned from Andrea that storytelling is much more engaging and facts are much better remembered and passed

on to others. Therefore, science communication is at its best when done through storytelling and evoking emotions. But for us scientists who want to focus on the facts, this is a real conundrum. Not at all, says Andrea Wild. As long as the stories are backed up through published research and present different scientific views on the topic in a fair way.

Andrea showed us how to easily transform a list of facts and events (our science) into a story by using the 'this_but_therefore' approach: The story starts out with presenting the initial state with a couple of facts ('this'), then the problem or challenge is presented (the 'but') and then what was done or has happened as a result ('therefore'). An example for this readily implementable story structure is the opening paragraph of this report.

The three pillars of science communication

In the next part of the workshop, we learned that storytelling represents one of three pillars of science communication. For the story to have the desired effect and outcome, two additional pillars need to be in place: strategy and spokespeople.

To develop a good science communication strategy, we need to find out who our target audience is and understand what they already know, what their attitudes and interests are. Then we need to work out what the purpose of the science communication should be. Usually, the purpose of science communication is to educate, to change minds, perceptions, and behaviours or to call for a specific action. The strategy then helps to develop the story in a way that helps to reach our target audience and achieve the purpose.

However, it is very hard to reach and convince a target audience without spokespeople. For example, scientists are the spokespeople for their research institutions as well as are researchers from other institutions who can validate the content of the story. Each of us then had the opportunity to practice this three pillar approach by using an example from our own research for which we developed a science communication strategy, wrote a 50 word story and identified potential spokespeople.

Tips and tricks for successful interviews

In the afternoon, two experienced science journalists joined us to share their insights into how to prepare for and give an interview: Veronica Meduna, Editor of *The Conversation* in New Zealand and Alison Ballance, producer of science podcasts for RNZ, the New Zealand equivalent of the ABC.

We learned that in preparation of an interview, it is important to identify one to maximal three key messages and to craft these as clearly as possible with our target audience in mind, using a language that a 12-year-old can understand. If there is time before the interview, it is good practice to ‘road test’ your messages by speaking to family or friends and see how well you get your points across to a general audience.

Also, we learned that it is fine to ask a journalist before the interview what the parameters of the interview are, how long it will be, whether it will be pre-recorded or live, what they are after (e.g. something entertaining or factual) and what the context of the story is that they want to cover. You can also ask if they are happy to share their questions beforehand and if they would like to receive some background information beforehand (e.g. dot points in an email), and offer to fact-check the piece afterwards [but see p. 85]. To avoid being cited with some awkward and irrelevant statement, the two journalists explained that the long and complex sentences that we love to make can lead a journalist to use a ‘sound bite’, a statement that is usually 7–14 seconds long, just because it was short and clear enough, even if it is quite random. Therefore, we should always aim for short sentences and repeat key messages in a variety of ways.

We then had the opportunity to be interviewed by Alison and Veronica, who exposed participants to different interviewing styles, from interested

and well-meaning to ignorant and confronting, which demonstrated the importance of entering an interview well prepared, of not being tempted to go off track, but of bringing your message across as clearly as possible. Alison and Veronica stressed the importance of using everyday language and ran with us through a list of common science words and how to replace them with everyday words. The two journalists also advised that the preparation for an interview should include finding metaphors and analogies to help the audience understand complex concepts. And if there is science jargon that we feel is necessary to use, we should make sure that it is explained and the term is used a couple of times so that the audience can get familiar with it.

In the last part of the workshop we honed our new learned skills by interviewing each other and obtaining feedback from the group on how the interviews went.

Equipped with my new science communication skills, I feel much calmer at the thought of engaging with the media. Thank you to Andrea, Kevin, Alison and Veronica for sharing your insights into science communication in a fun and engaging way!

Further reading and resources:

Craig Cormick 2019: *The science of science communication*. CSIRO Publishing, Clayton South, 249pp.

ScienceSavvy: <https://sciencemediasavvy.org/>

Conference field trip reports

Wild Wainuiomata and rugged Remutaka forests (Field trip 1)

Led by Owen Spearpoint (Greater Wellington Regional Council) and Melody McLaughlan (Department of Conservation)

By Andrew Thornhill

A group of around 40 ASBSer’s participated in field trip number 1 of the ASBS–NZPCN joint conference. The first destination was the Wainuiomata Water Collection area, a place that has had restricted access to the public since the late 1800s and an intensive pest control program for almost 15 years. We were divided into two groups, those who wanted to get wet, and those who didn’t. I chose not to get wet and instead went on a slow stroll up a track.

The area *our group* walked through was a lush temperate rainforest environment very different to what I have grown accustomed to living in

Adelaide (although there were some eucalypts growing in the area). I was lucky enough to pair up with Peter Beveridge and he became my own personal bryophyte identifier. I can’t say exactly how many species I saw on the walk, but

Fig. A cryptogamist’s delight. Ph. Bill McDonald



there were many that I had only seen pictures of in a book, and I understand better now why NZ has many more dedicated bryologists than Australia does – they (bryophytes, I mean) were everywhere.

Our second stop for the trip was at the Remutaka Forest Park Catchpool Valley. This differed from the first place in being more coastal and the soil seemed sandier. Highlights at this stop were the *Knightia* trees that were in flower, the patches of *Cyathea* forests, and some terrestrial orchids popping up here and there.

We returned back to Wellington well botanised for the day and some of us then kicked on for the early career researcher trip investigating the wild hops of Wellington led by Todd McLay.

Spectacular coastal Parangarahu Lakes and lowland forest of Eastbourne (Field trip 2)

Led by Carlos Lehnebach (Te Papa Botany) and Barrett Pistol (Greater Wellington Regional Council)

By Chapa Manawaduge and Rachael Fowler

Well we were warned that Wellington could be windy, and our field trip to Parangarahu lakes approx. 35km around Wellington Harbour and east of the city did not disappoint. Hopping off the bus we were blasted with a westerly that at times, made me question whether it could actually knock a person off their feet. The locals didn't seem fazed, and it certainly added to an atmosphere of rugged beauty for us visitors. Despite the relatively short drive from Wellington city, the lakes were beautifully pristine, and the 360 degree views across the lakes up to mountains then back around across the ocean were breathtaking (Fig. 1). In classic botanist style, the group pored over the landscape at a

Fig. 1. Parangarahu Lakes, taken on the field trip.



snails pace, taking in an abundance of tiny plant species that would otherwise be missed. Much of the vegetation was highly appressed to the ground, no doubt accustomed to the harsh winds.

At the second of the two lakes we were greeted by a colony of banded dotterel (*Charadrius bicinctus*) scampering around the pebbly landscape. The baby birds looked like cotton wool balls on skinny legs, and it seemed unbelievable that as adults these would be more than capable of flying approximately 1600 km seasonally to mainland Australia. With lunch time approaching we all sat down sheltered from the wind on the lake hillside. Over sandwiches we passed around a diverse range of freshwater plant specimens left for us by diving researchers based at the lake over the previous few days. These freshwater grasses and sponges added a whole other dimension to understanding of plant diversity in the region. After lunch we again wandered the lake edges, the west side opening out to spectacular elevated lake and mountain views, while to the east we could get right in amongst the marshy vegetation. Plant diversity consisted of *Muehlenbeckia complexa*, *Melicytus crassifolius* and *Coprosma* species all wind pruned and close to the ground. One particularly interesting highlight was the sighting of the highly modified and rare *Muehlenbeckia ephedroides*. With no leaves, brown stems and small cream/brown flowers, if not pointed out we would have thought we were stepping over a dead pile of twigs.

Finally we finished up with many noses to the ground smelling the fragrant flattened daisy *Raoulia albosericea*, which remarkably smelt like chocolate!

Next up we piled back onto the bus and drove a short distance back around the bay for an entirely different forest walk. We climbed a narrow track up the mountainside, passing through wet and dry beech forest. We turned off a small hidden path and traversed along the ridge where we observed remarkable diversity in orchid species. Despite their relatively small size and often pale colours, the diversity in species and form was fantastic, with many species of *Dendrobium*, *Thelymitra*, *Pterostylis*, *Gastrodia*, *Corybas* and *Caladenia* all observed. Other highlights of the walk included the unmissable flame red flowering mistletoe species, *Peraxilla tetrapetala* (it literally stopped us in our tracks with its bursting bird pollinated flowers) (Fig. 2), and the curious

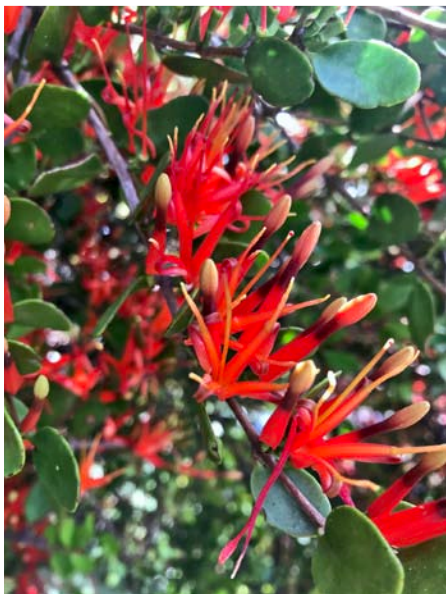


Fig. 2. The mistletoe *Peraxilla tetrapetala* stopped us in our tracks.

habit of *Pseudopanax crassifolius* (such a change in juvenile to adult foliage was super interesting). The diversity of ferns was also spectacular. Aside from showing us these beautiful plants, our devoted leader Carlos had to search for a few of the participants. Someone could easily become lost in this spectacular dense forest but, thanks to Carlos, we all returned safe and sound.

As visitors to Wellington and New Zealand, the value of these locally hosted field trips really shone through. Aside from Carlos's incredible knowledge of orchids, many of the participants could name just about any of the species we passed, which really added to the experience of better understanding NZ plants, their ecology and the conservation challenges they face.

Experiencing the emerald in our harbour — Matiu / Somes Island (Field trip 4)

Led by Gemma Wright (Department of Conservation Kaitiaki Ranger) and Jon Terry (Jon Terry Ecology and Wellington Botanical Society).

By Dan Murphy

Despite a windy start to the day the ferry still ran to Matiu/Somes island with a hearty bunch of ASBS and NZPCN conference attendees. The cries of excited children getting splashed on the top deck of the ferry punctuated the start of the day, as this was a bumpy ride. Little did we know we would be making similar cries on the way back, as some large waves crashed over the

deck (and us) when we returned in very windy conditions with a sea running quite a bit higher. (Fig. 1)

Quarantine is emphasised as very important on the island (Fig. 2), and we were prepared for this by our guide and field trip leader, Jon Terry. Although bags are vacuumed out for weed seeds, I think quarantine is probably intended mostly to prevent the introduction of vertebrates, as it is difficult to prevent and control all weedy plants, as being so close to the mainland seeds can probably blow across. However, the island is free of pest mammals and there is an introduced and healthy population of Tuatara on the island, as well as other reptiles and bird species that are hard to see on the mainland. I expect the quarantine process plays an even more valuable role in educating the many visitors to the island, as quarantine and its purpose was explained in a very detailed and courteous way by the iwi rangers on the island as we arrived.

Despite the wind it was pleasant on the island, especially on the lee side. It was warm enough for the Tuatara to be active and sunning themselves, and at least two were reported as being sighted by a sharp-eyed member of our group. I only saw a tail, as it escaped our prying eyes into a drain.

Matiu/Somes island has played many roles in its human history. Initially used (possibly) only during times of war by Maori people for hundreds of years prior to European colonisation, there are the remains of two hillforts (Pa) and various archaeological artefacts have been discovered, some of which are displayed in a

Fig. 1. Riding the waves, between Wellington and Matiu/Somes Island, Kevin Thiele, left, and Andrew Rozefelds. Ph. D. Murphy





Fig. 2. The quarantine station at Matiu/Somes Island.
Ph. D. Murphy

small museum. There is also a lighthouse and an interesting quarantine station that is almost completely preserved, which was used for quarantining introduced stock, and now would make a spectacular setting for a zombie movie or an “abandoned places” YouTube video. At the very highest point of the island are defence emplacements from World War II days when the island was used as an internment camp. The island now has a focus on conservation, revegetation and rehabilitation, tourism, some accommodation and education, and has an amazing 360 degree view over Wellington Harbour (Fig. 3). It was surprising to hear that at one stage the island was basically devoid of vegetation, due to clearing and habitat degradation, demonstrating revegetation efforts over the past 20 or more years have been extremely successful.

Fig. 3. The entrance to Wellington harbour from Matiu/Somes Island. Ph. D. Murphy



Thanks go to Jon Terry and our guides on the island for a fun and informative trip, I felt it was just what was needed in the middle of a busy conference to get back to nature and get a good idea of Wellington and its biodiversity and human history.

Inside and out: discovering the collections at Otari-Wilton’s Bush and Te Papa (Field trip 5)

Led by Finn Michalak (Otari-Wilton’s Bush), Patrick Brownsey (Te Papa Botany) and Rebecca Rice (Te Papa Art)

By John Clarkson, Queensland Parks and Wildlife Service, Atherton

After two days of talks in the public side of Te Papa, participants on field trip 5 were treated to a peek behind the scenes with a visit to the herbarium and the art store. Sixteen delegates and guests gathered in the “botany bubble” to be reminded again to “drop, cover and hold” should the earth move for us and to be reassured that Te Papa is perhaps the safest building in Wellington to be in should an earthquake occur. Even following a 1 in 2,000 year quake, we were told, people and the treasures would be safe. Just out of interest, three earthquakes were recorded in the 30 days before the conference. The closest to the conference was a 5.8 magnitude shake on Saturday 23rd November (Web ref. 1). The “bubble”, with its wrap around windows allowing spectacular views of the harbour, is perhaps the best staff tearoom I have seen in any herbarium I have visited. Participants were split into two groups to avoid congestion. While one group set off for the herbarium, the other went to the art store (Fig. 1).

The Herbarium

The Te Papa Herbarium (WELT) is the third largest of 12 active, registered herbaria in New Zealand. The collection contains ca 300,000 specimens of which 219,000 are databased. Our guide for the hour-long visit was Patrick Brownsey. Pat, the recipient of the 2017 Nancy Burbidge Medal, provided a general overview of the WELT collection with, not surprisingly, a strong focus on ferns and the documentation



Fig. 1. *Left:* Patrick Brownsey provided a general overview of the WELT collection and the documentation of the New Zealand fern flora; the magnificent fern album by Thomas Cranwell and Anton Seuffert can be seen in the foreground; from left: Matt Buys, Patrick Brownsey, David Orlovich, Paul Adam (partly obscured), Serena Jones, Harold Jones. *Right:* Rebecca Rice, Curator of Historical New Zealand Art at Te Papa, introduces participants to a selection of works from the museum's extensive collection depicting the New Zealand flora; either side of Rebecca are the works by George French Angas and James Crowe Richmond; from left: Paul Adam, David Orlovich, Harold Jones, Rebecca Rice.
Ph. J. Clarkson

of the New Zealand fern flora. It was such a comprehensive overview that it is hard to single out some highlights, but I'll try. The conference was held in Wellington this year because 2019 is the 250th anniversary of Cook's first voyage so seeing the first collection of the endemic ponga or silver fern (*Cyathea dealbata*) (Web ref. 2) has to be one of the special things. This is one of 301 specimens collected by Banks and Solander held by WELT (Brownsey 2012). Pat also spoke about the trade in fern albums that developed in the late 19th century to supply the pteridomania that was sweeping Victorian England at the time (Whittingham 2010). These albums contained pressed specimens mounted between wooden covers featuring beautiful marquetry depicting images of ferns using New Zealand timbers. Pat's display featured 3 albums held by Te Papa. One that particularly caught my eye was produced by Thomas Cranwell and Anton Seuffert about 1875 (Web ref. 3).

The Art Collection

Our guide for the visit to the art collection was Rebecca Rice, Curator of Historical New Zealand Art at Te Papa. Rebecca had selected about a dozen works from the museum's extensive collection depicting the New Zealand flora. What was surprising, and was noted by one of the participants, was how well the works of the early New Zealand artists selected by Rebecca, particularly those by George French Angas

and James Crowe Richmond (Web refs. 4, 5), captured the essence of New Zealand plants and the landscape they grew in compared to early attempts to depict Australian trees particularly eucalypts. Of course, this might be partly explained by the fact that the early Australian landscape artists were convicts, soldiers and free settlers with little formal training in art. It wasn't until the latter part of 19th century that artists started presenting a more realistic representation of the Australian landscape. Rebecca finished her talk with some works by Sarah Featon who, in 1889, together with her husband Edward Featon, published *The Art Album of New Zealand Flora* in an attempt to disprove the 'mistaken notion that New Zealand is particularly destitute of native flowers'. In 1919, widowed and financially distressed, Sarah sold her collection of 134 watercolours of New Zealand's flowering plants to the Dominion Museum, Te Papa's predecessor (Web ref. 6). Both the book and a selection of Sarah's watercolours are currently on display in the Toi Art Gallery at Te Papa.

Ōtari-Wilton's Bush

About midday the two groups came together, collected a packed lunch, and boarded a bus for the short trip to Ōtari Native Botanic Garden and Wilton's Bush Reserve. Rewi Elliot, one of the co-organisers of the conference and President of the New Zealand Plant Conservation Network is the manager there. The guide for our visit was the



Fig. 2. *Left:* Finn Michalak, collections curator at Ōtari-Wilton's Bush shows participants around the formal part of the garden; from left: Finn Michalak, Kate Roud, Mabel Lum, Rainer Vogt, Ilse Breitwieser, Vivienne Sampson, Serena Jones, Matt Buys. *Right:* Ilse Brietwieser and Rainer Vogt inspect the nursery at Ōtari-Wilton's Bush. Ph. J. Clarkson

collections curator, Finn Michalak. Ōtari-Wilton's Bush is the only botanic garden in New Zealand dedicated solely to native plants. This unique plant sanctuary and forest reserve in the hills just 6 km by road north west of Te Papa, consists of 100 hectares of native forest and 5 hectares of plant collections. It is managed by the Wellington City Council with active support from the Ōtari-Wilton's Bush Trust. The plant collections contain approximately 1,200 species, hybrids and cultivars from the subantarctic islands in the south to Cape Reinga and offshore islands in the north (Web ref. 7).

The New Zealand flora is well known for its diversity and endemism, for the high incidence of divarication in shrubs and juvenile trees (ca 10% of all New Zealand woody species) and for the high frequency of heteroblasty (ca 200 tree species) (Lee & Gould 2009). The functions of divarication and heteroblasty in New Zealand plants, and the selection pressures that have led to their evolution, have long been a subject of debate and Finn discussed many of these as he led us around the more formal part of the garden (Fig. 2).

While some of the more adventurous members of the field trip took off into the forest reserve to see what is claimed to be an 800 year old rimu (*Dacrydium cupressinum*), a reminder of the ancient native forests that covered Wellington before the arrival of European settlers, the rest of us settled into the visitor centre for a cup of tea and some respite from the wind. Here Harold and Serena Jones, founders of Queenstown Natural

Perfumiers, one of the sponsors of the conference, explained how they set up a company to produce perfumes with exquisite fragrances from carefully chosen New Zealand native plant extracts (Web ref. 8). We were back at Te Papa in time for my wife to indulge in a bottle of Lakeland Flora and earn a \$10 donation to the Societies as part of a sponsorship deal. How better to end a great day. Thanks to everyone involved.

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Scene in a New Zealand forest near Porirua.
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Launch of Colin Webb's *Seeds of New Zealand monocotyledons*

Speech by Ilse Breitwieser, 16 November 2019

Good evening! For those who don't know me, I am Ilse Breitwieser, plant systematist at the Allan Herbarium at Manaaki Whenua – Landcare Research. During my time as programme leader for plant systematics and OBI leader, then portfolio leader of Characterising Land Biota, I was also responsible for our Flora and Guide projects. Since I was so closely connected with Colin Webb and his work on *Seeds of New Zealand* and facilitated it over many years, I am now launching the second and final volume of *Seeds of New Zealand*.

Colin has been an invaluable mentor for me, particularly during my first few years at Manaaki Whenua. Therefore, I feel very humbled to be given the honour of launching *Seeds of New Zealand monocotyledons*.

This guide provides, for the first time, an account of the seeds and other persistent parts of fruits for New Zealand plants. The first volume, published in 2001, covers the native gymnosperms and dicotyledons, while this volume covers the monocotyledons.

This monocot "Seed Atlas", as we call it, provides more than 700 illustrations, representing all the seed types in the monocots, as well as descriptions and keys to aid identification. While the first volume on gymnosperms and dicotyledons was authored by Colin Webb and Margaret Simpson, the monocot volume is all Colin's work.

The Seed Atlas is an amazing achievement. In order to understand the magnitude of the achievement, one needs to consider that although the project was supported with operational funding and technical time by our plant systematics programme, during most of the work on the Seed Atlas, Colin was not employed by Landcare Research. As a Research Associate of Landcare Research he spent uncountable

evenings and weekends during the last 25 years working on the Seed Atlas. During that time he had very demanding day-jobs, actually positions that were much more demanding than just day-jobs. From 1995 to 2001 he was Manager, then Group Manager of Investment Operations at the Foundation for Research, Science and Technology, and then until 2014 Group Manager Strategy and Research, then Acting General Manager, and finally Deputy Chief Executive of the Tertiary Education Commission. It is hard to imagine

how Colin managed to have the energy and the discipline to work in each free minute on the Seed Atlas. Even in the years before he moved to Wellington, there was not much time for Seed Atlas work during work hours because of his leadership roles at Botany Division, then Landcare Research. He was first section leader and programme manager, then Group Manager, Site Manager and then Science Planner in the Corporate Office.

Also, he worked not only on the Seed Atlas in his free time. During all these years he still made time available to support the botanical community by being on botanical and systematics

advisory committees and panels. He was Trustee of the Koiata Trust from 1988 to 2013 and for most of these years also Chairman; he established in 1989 as a partnership the small publishing company, Manuka Press, to publish and market high quality, low cost botanical books [that's why the Seed Atlas is so cheap!]; he was coordinator of the foundation committee to establish the New Zealand Botanical Society and is still a Committee Member; he was for more than 20 years a committee member of the Loder Cup Committee, New Zealand's premier conservation award; and he was a member of the recent panel that wrote the Royal Society report on New Zealand's taxonomic collections.



Fig. Author Colin Webb with his long-time assistant in the work, Debby Redmond, of the Allan Herbarium at the launch. Ph. Kerry Ford

In his free time, Colin did not only work on the Seed Atlas. He also continued following his interests in taxonomy and reproductive biology of New Zealand plants. In the 1980s, he was, as we all know, the senior author of *Flora of New Zealand* Volume 4. However, his heart was in reproductive biology, and he published a series of very significant publications, many in collaboration with David Lloyd, for example, on evolution of heterostyly, evolution of plant breeding systems, or reproductive biology of the NZ flora.

These achievements led to recognitions such as being made Fellow of the Royal Society of New Zealand in 1994; he was awarded the Allan Mere for contributions to New Zealand botany in 2002 and the Hutton Medal of the Royal Society for major contributions to plant systematics and evolutionary biology in 2006. I am mentioning all this just to demonstrate Colin's huge scientific contribution in spite of his high-flying positions. But today, I would like to emphasise particularly his *excellence*, *efficiency* and his *dedication* to the work on the Seed Atlas.

In more recent years Colin's focus expanded. Since meeting Pasang Sherpa in 2006, he has been involved with a range of projects supporting Sherpas of Nepal, including funding restoration of the Monastery in Lukla and following the earthquakes in Nepal establishing a give-a-little page and raising enough funding to repair houses for the six families most in need of help. He is also supporting education of children in several families. However, in spite of this endeavour, Colin did not give up on the aim of completing the Seed Atlas. Pasang, you will probably never forget all the endless hours Colin spent downstairs in his own MPI approved containment facility, working away towards the completion of the Seed Atlas.

Colin, I would like to congratulate you on this tremendous achievement! I am glad that I can do

this in person. When we launched the first volume of the Seed Atlas in 2001, we were fortunate that Colin was able to be present. Just four days before the launch he had a severe mountain bike accident. He managed to get to Christchurch in spite of broken bones and cuts to his face. I remember that it was really touch and go. At the Seed symposium we hosted in collaboration with the New Zealand Botanical Society to honour the launch of the Seed Atlas, Colin even managed to give the keynote address, although he had problems breathing and speaking because of the pain. Today, I also didn't know until the last minute whether Colin would be able to be here. We are very lucky indeed that Colin can be with us – not because Colin went on his mountain bike again just days before the launch of the Seed Atlas but because of ill health.

That's why I am stepping in for Colin now to say his words of thanks.

There are many people and organisations Colin thanked in his book. The publication of the book would not have been possible without the long-term financial and operational support by Manaaki Whenua – Landcare Research, and generous contributions toward the publication

costs from the Koiata Botanical Trust and the Charles Fleming Fund – Publishing award. The preparation of the Seed Atlas has been supported by MBIE and its predecessor organisations. Colin thanks particularly Allan Herbarium and Manaaki Whenua library staff. He acknowledges many people in the Seed Atlas, and I am mentioning only a few here. He refers to Bryony MacMillan and the late Ruth Mason, Margaret Simpson, and Neville Moar for building up the seed herbarium, now part of the main Allan Herbarium, and the early photography by Jim Miles and Kay Card. He thanks particularly Robert Lamberts, Vaughan Myers and Murray Dawson who provided most of the high-quality images. Debby Redmond provided the technical support that enabled him

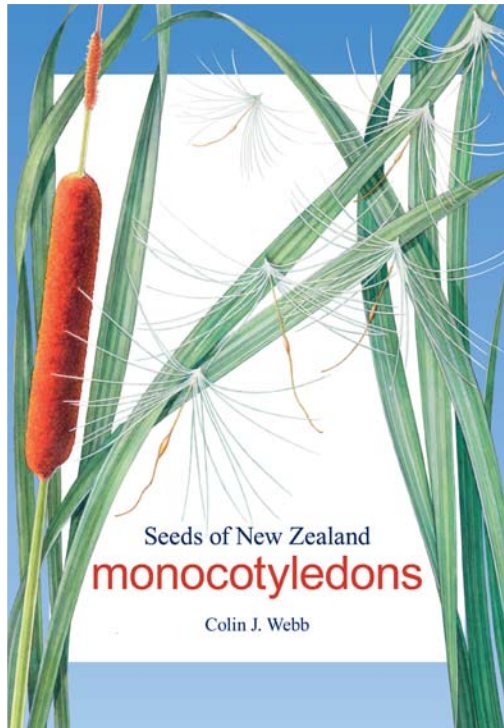




Fig. Speakers at the launch of *Seeds of New Zealand monocotyledons*, Richard Broadhead (left) and Ilse Breitwieser.

Ph. Prashant Joshi

to work remotely in Wellington. Kerry Ford, Phil Garnock-Jones, David Glenny, Peter Heenan, Alexis Loh, Matt McGlone, Ines Schonberger, Hugh Wilson and the late Elizabeth Edgar helped at various stages.

We would not have this book without Richard Broadhead, Colin's close friend and partner in Manuka Press, who spent uncountable hours preparing the book for publication.

Colin's personal thanks go to all his friends and family who have supported him during the long task of bringing this work to completion. I am highlighting here particularly his brother Terry and family and Pasang and family.

Colin dedicates the monocot Seed Atlas to Dr Eric Godley OBE [1919–2010]. I will finish with reading this dedication:

New Zealand's Possum Tax

John Clarkson

From 1 July 2019, most international visitors entering New Zealand have been charged an International Visitor Conservation and Tourism Levy (IVL). Proceeds from the levy, which costs NZ\$35, are used to maintain the facilities and natural environment that tourists will use and enjoy during their stay. For projects funded by the levy see Web ref. 1. Australian citizens and permanent residents are not required to pay the levy.

Eric Godley was for many years the Director of The Botany Division of the Department of Scientific and Industrial Research, the main centre in New Zealand for plant systematic research. He presided over significant expansion of the Division and its activities, including ongoing expansion of the Herbarium which supplied most of the material on which this work is based. Eric encouraged progress with the Flora of New Zealand Series, and conceived the idea of a series of systematic works on plant parts of indigenous species—this resulted in a long series of papers on chromosomes, another on wood anatomy, a Pollen Atlas, and the two volumes now completed for seeds. This book is dedicated to Eric, friend and mentor over many years.

The Minister for Conservation, the Hon Eugenie Sage, briefly discussed the levy in her key note address on day one of the recent conference in Wellington. This prompted a question from Patricia Nagle, an ASBS member from the Janet Cosh Herbarium at the University of Wollongong, "Why do Australians not have to pay the levy?" The Minister explained that, as Australians make up the majority of visitors to New Zealand, the Government did not want to do anything that



Fig. 1: A large totara (*Podocarpus totara*) killed by possums in the Raukumara Ranges. Totara have long lived leaves that have a small surface area relative to the trees size. One possum going back night after night can do enough damage to a mature tree over a three year period that it can kill the tree through defoliation.

Ph. G. Atkins

much to get to New Zealand, a few extra dollars would not be noticed.

Later that day, we heard Zoe Lunnis explain the impacts of Australian possums on *Tupeia antarctica*, one of New Zealand's five extant native mistletoes, and saw Graeme Atkins's horrific images of dead totara (*Podocarpus totara*) killed by possums in the Raukumara Ranges north of Gisborne (Fig.). This prompted Kevin Thiele to suggest the following morning that perhaps Australian delegates might consider donating the \$35 they saved by not having to pay the IVL to support a suitable conservation project in New Zealand, preferably targeting possums. Many delegates responded and the funds raised will be sent to the New Zealand Plant Conservation Network who, in due course, will let us know what they have done with the money.

New Zealand is building an excellent track record in aiming to eradicate introduced predators by 2050. Information on the program can be found on line (Web ref.) .

Web ref. <https://predatorfreenz.org/>

might have an impact on this. She also suggested that, as visitors from further afield have paid so

News

Bushfires

Many of us have been affected in some way by the present bushfires in Australia (see Web refs 1–3) for recent summaries) or know someone who has been. Even if not directly affected we have all heard of the heartache associated with the fires, or indeed, some of the other disasters (e.g. Canberra hailstorm, Web ref. 4) which have affected some other, or even the same, areas. Our biodiversity has taken an incredible hit and there remains a lot of work to be done in the future as Australians regroup and come to terms with the results of these fires. At the very least climate change would now appear to be recognised by most politicians.

Web references

- 1: <https://www.theguardian.com/australia-news/2020/jan/09/bushfires-crisis-more-than-75-of-australia-had-worst-weather-conditions-on-record-last-month>
- 2: <https://www.bbc.com/news/world-australia-50951043>
- 3: <https://disasterphilanthropy.org/disaster/2019-australian-wildfires/>
- 4: <https://www.abc.net.au/news/2020-01-21/years-of-scientific-research-lost-in-canberra-hailstorm/11884062>

Special secret efforts save Wollemi pines from bushfires

Fears had been held for the Wollemi pine in its secret location in the Wollemi National Park (web ref. 1) but a mission to save the trees means that

they are safe for now (Web ref. 2).

Web references

- 1: <https://www.abc.net.au/radio/programs/pm/fears-for-worlds-only-wild-wollemi-pines-in-bushfires/11823740>
- 2: https://www.smh.com.au/environment/conservation/incredible-secret-firefighting-mission-saves-famous-dinosaur-trees-20200115-p53rom.html?utm_medium=Social&utm_source=Facebook&fbclid=IwAR3E9403sk7GEgEMA9isCDmN0-xXNkW9qi4NoDCH_ufb7gHbKsHtK2KU9QU#Echobox=1579066524

Mt Tomah Botanic Gardens burnt

Parts of the Mt Tomah Botanic Gardens in the Blue Mountains were burnt in a bush fire in mid December (Web ref. 1), particularly the native area over the road from the main Botanic Gardens. The good news is that the garden has now re-opened and you can see a map of which parts were affected at Web ref. 2.

Web references

- 1: <https://www.heraldsun.com.au/news/aerial-footage-of-a-fire-at-mt-tomah/video/315656dc7947ef72fcf28bd127bf7558>
- 2: <https://www.bluemountainsbotanicgarden.com.au/About-us/Notifications/Garden-re-opening>

Care-and-recovery-of-personal-items-after-bushfire

A lot of people have been affected by fires or one of the other incidents which have taken place in the last few months. *The Conversation* included this general advice on recovery of precious items after the experience.

Web ref. <https://theconversation.com/how-to-care-for-and-recover-personal-items-after-bushfire-129356>

Awards

Orders of Australia

Congratulations to the following members and colleagues who have just appeared in the Australian Day Honours lists for 2020.

Officer (AO) in the General Division of the Order of Australia.

- Emeritus Professor Raymond Louis SPECHT, St Lucia Qld 4067. For distinguished service to science, and to education, in the fields of botany, plant ecology and conservation.

There's a fitting article and picture on the web about Professor Specht (Web ref.). He lectured at the University of Adelaide, not University of South Australia, which did not exist then.

Web ref. <https://www.liverpoolchampion.com.au/story/6598209/aus-day-honours-for-accidental-biologist/>

Medal (OAM) in the General Division of the Order of Australia.

- Mrs Bronwen Jean KEIGHERY, Subiaco WA 6008. For service to conservation and the environment.
- Mr Gregory John KEIGHERY, Subiaco WA 6008. For service to conservation and the environment.
- Dr Christopher John QUINN, Hamilton QLD 4007. For service to research science in the field of plant systematics.

NZPCN Lifetime Achievement Award

The recent conference in Wellington was the occasion not only of the launch of Colin Webb's *Seeds of NZ Monocotyledons* book (p. 63), but also of the presentation to him of the NZ Plant Conservation Network's Lifetime Achievement Award.

Botanical appreciations

Beth Gott interview

Great to see this appreciation of Beth Gott and her long time ethnobotanical work from Queensland Remote Aboriginal Media.

Web ref. <https://qram.com.au/2019/06/25/greg-talks-to-living-legend-beth-gott-ethnobotanist/>

An appreciation of Ilma Stone

An appreciation for the work of Ilma Stone by fellow bryologists, Jessica Beever and Pina Milne.

Web ref. <https://www.australiangeographic.com.au/topics/history-culture/2019/12/meet-ilma-stone-who-studied-australian-moss-for-60-years/>

Seventeen incredible Australian women in botany

Australian Geographic published this article in March 2019 and it is good to see acknowledgment of some of the usual suspects – Georgiana Molly, Ellis Rowan and the Scott sisters – but even better to see some of later generations, including the two already mentioned above. Others to be acknowledged include Edith Coleman, Mary White, Olive Pink, Fran Bodkin, Janet Cosh, Thistle Harris, Nancy Burbidge, Barbara Briggs, Winifred Curtis, Maisie Carr, Enid Robertson and Vera Scarth-Johnson.

Web ref. <https://www.australiangeographic.com.au/topics/history-culture/2019/03/17-incredible-australian-women-in-botany/>

Harvard nomenclaturist Kanchi Gandhi

It's not often that nomenclaturalists get profiled – read all about Kanchi Gandhi and his dedication to his work in making sure that the correct botanical names are used.

Web ref: <https://news.harvard.edu/gazette/story/2019/10/how-new-plant-species-get-their-names/>

Fechshrift for David Mabberley

In 1977, a special issue of *Gardens' Bulletin Singapore* was published with the title 'Tropical Botany: Essays presented to E.J.H. Corner for his seventieth birthday, 1976'. The editors were David Mabberley of Oxford University and Chang Kiaw Lan of Singapore Botanic Gardens, both former students of Corner. The collection, written by his students and peers, included an eclectic mix of essays reflecting the wide range of interests of E.J.H. Corner. As well as editing the volume, David Mabberley was also an author of three of the included papers.

In 2018, David Mabberley celebrated his 70th birthday and it is our great honour, to come full circle, to dedicate to him this issue of *Gardens' Bulletin Singapore* with a new series of essays written by his students (one might call them Corner's botanical grandchildren) and peers. This collection too reflects the wide range of David's interests and publications, and challenges us to question whether our own interests have become too narrow. [From the Preface to the volume].

Enough said. The 23 papers in *Gardens' Bulletin Singapore* Sep. 2019, vol. 71 (Supplement 2) do indeed cover an enormous range, consistent with David's broad botanical interests, and you will

need to set aside some quality time for reading them. Congratulations David on a well-earned recognition.

Web ref: <https://www.nparks.gov.sg/sbg/research/publications/gardens-bulletin-singapore/listing-of-publications>

Other news

50 years of *Nuytsia*

Since its launch on 10 December 1970, a vast number of people have helped us to grow our knowledge of Western Australia's remarkable flora and its botanical collections by writing, reviewing and editing manuscripts, collecting, processing, databasing and curating herbarium specimens, and of course discovering new species.

We're thrilled to mark this collective effort with a golden anniversary edition of the journal. It will be a botanical celebration like no other — and you are all invited!
[Juliet Wege on ASBS Facebook]

BHL adds images to its bounty

The Biodiversity Heritage Library has put 100,000 images and photographs on line (Web ref. 1). "Millions of vintage wildlife and botanical illustrations from journals around the world are available for free thanks to the BHL's Flickr account".

I have to confess to getting a little lost when trying to make use of this service but managed to access the images on Web ref. 2 after taking the advice.

Web references

- 1: <https://blog.biodiversitylibrary.org/2013/03/bhl-image-collection-on-eol.html>
- 2: <https://about.biodiversitylibrary.org/ufaqs/how-do-i-search-for-images-in-the-bhl-collection/>

Websites of interest

New Zealand's next Biodiversity Strategy

You can read more about the planning for New Zealand's next Biodiversity Strategy, due in 2020, on the DOC (Department of Conservation) website. This new strategy was introduced at the conference in Wellington by the opening keynote speaker, the Hon. Eugenie Sage, New Zealand's Minister of Conservation and Land Information and Associate Minister for the Environment (see p. 44). Aspirational goals for 2070 are:

Nature in Aotearoa is healthy, abundant, and thriving. Current and future generations connect with nature, restore it, and are restored by it.

There is also information on this site about other ambitious goals – including ridding New Zealand of introduced predators by 2050 and the replacement of pests with native species in Hawkes Bay (Cape to City Project).

Web ref: <https://www.doc.govt.nz/nature/biodiversity/nz-biodiversity-strategy-and-action-plan/>

What is *Imagine*?

Imagine is a newsletter from The Conversation that presents a vision of a world acting on climate change. Drawing on the collective wisdom of academics in fields from anthropology and zoology to technology and psychology, it investigates the many ways life on Earth could be made fairer and more fulfilling by taking radical action on climate change. [From the website]

This website is about solutions to climate change. Already the five issues have covered the harnessing of the energy of those students who have already demonstrated their concerns into action, providing energy to the world, producing cars that will fight climate change, ways of dealing with the mass extinction crisis and how we might travel without destroying our world.

Web ref. <https://theconversation.com/imagine-newsletter-researchers-think-of-a-world-with-climate-action-113443>

Conservation Optimism: accentuate the positive

At this time of apparent global ecological crisis the *Journal of Applied Ecology of the British Ecological Society* has taken the brave step of putting together a special virtual issue under the title *Conservation Optimism* (Web ref. 1). The papers, all of them open access, have been chosen by E.J. Milner-Gulland, founder of *Conservation Optimism*, whose mission statement reads as follows:

Conservation optimism: A global movement for nature and people.

Wild nature is declining rapidly, and the earth's life support systems are under increasing stress. As nature erodes and the response of human systems is inadequate or destructive, it can seem like the only rational response is despair. Yet if you zoom in from the big picture, a mosaic appears; in amongst the stories of loss there are inspiring stories of regeneration and positive change, with nature making a difference in people's lives, and people valuing and nurturing their natural environment.

These stories are the key to securing our planet's future; we need to learn from them, replicate them and thereby build a world in which nature and people can coexist. Our mission is to help tell and amplify these stories of conservation optimism — and to provide tools and resources to empower people from every walk of life to take action for conservation. [From the Conservation Optimism Website (Web ref. 2)]

A second Conservation Optimism Summit has just been held at the University of Oxford and their programme is available through the website.

Web references

- 1: [https://besjournals.onlinelibrary.wiley.com/doi/toc/10.1111/\(ISSN\)1365-2664.conservationoptimism2019](https://besjournals.onlinelibrary.wiley.com/doi/toc/10.1111/(ISSN)1365-2664.conservationoptimism2019)
- 2: <https://conservationoptimism.org/mission-statement/>

Points of view

Once more unto the breach

Vincent Demoulin has recently published a history on the spelling of *Brachy(s)come* in the journal *Lejeunia*, with a proposal for defining a correctable orthographical error in botanical nomenclature. Older members of the Society will remember when arguments about the spelling of this particular genus and *Lagenophora/Lagenifera* occupied far more time than they probably should have. Is it to happen all over again?

References

Demoulin, V. (December 2019). The *Brachycome* saga, with a proposal for defining a correctable orthographical error in botanical nomenclature. *Lejeunia, revue de botanique* [en ligne], n. 200. <https://orbi.uliege.be/bitstream/2268/242798/1/lejeunia%20200-web.pdf>

Does saving the planet mean the end of farming as we know it?

The answer to a looming food crisis may well lie in a switch to a completely new way of producing food from microbes and water in laboratories which occupy much less land than our present farms. Such laboratories already exist in Helsinki and no doubt elsewhere. However a side effect of this technology would almost certainly be the end of animal farming as we know it. But in so doing can the planet be saved? See George Monbiot's thought-provoking item on this topic at the website below.

Web ref. <https://www.theguardian.com/commentisfree/2020/jan/08/lab-grown-food-destroy-farming-save-planet>

ABRS report

In November the ABRS released the 2020-21 round of the National Taxonomy Research Grant Program and in October Bush Blitz led an expedition to the Little Desert National Park. Progress is ongoing with the *Flora of Australia* and the *Bryophytes of Australia* eFloras.

Peri Bolton, who worked on the Floras and technical developments, left ABRS at the end of 2019 to take up a postdoc from the Smithsonian Museum of Natural History in Washington DC in 2020 to work on South American manakins (birds).

Flora of Australia

ABRS continues to work with a number of contributors to add or update taxon profiles on the *Flora of Australia* (FoA) platform. Since September, the following treatments have been published or revised online: *Bergia* (Elatinaceae), Caryophyllaceae *p.p.*, *Duboisia* (Solanaceae), *Gentianella* (Gentianaceae), *Indigastrium* (Fabaceae), *Pentameris* (Poaceae), Restionaceae family profile, *Watsonia* (Iridaceae) and miscellaneous taxa from various other families.

In November, ABRS welcomed biodiversity informatics expert Dr John Busby as a scientific volunteer in the Flora team. Our first project with John is updating the Sapindaceae treatment from Volume 25 (1990) with particular attention to nomenclatural changes (from taxonomic revisions) and assessing geospatial distribution data. Meantime, long-time ABRS research associate Tony Orchard, amongst his various projects, has been busy editing a book on the slime moulds of Australia by Steven Stephenson that is due to be published around mid-2020.

The Floras of Australia Working Group (WG) with representatives from ABRS, ALA, various herbaria, Department of Agriculture and Water Resources, and Weeds Australia, held its inaugural meeting on the 18 December 2019. This group was created to assist with the expanded scope of the eFlora platform to accommodate multiple independent collections (a number of Flora collections) and it will focus on (1) coordinating the delivery of flora content between different institutions to reduce the duplication of effort, and (2) prioritise key functionality and bug fix requirements across all collections on the eFlora platform for development by the ALA. The Floras of Australia Advisory Group will continue in its role overseeing the overall governance, platform priorities and directions of the Flora projects.

Excel spreadsheets have been developed as living documents providing details on the status of the *Flora of Australia* and the *Bryophytes of Australia*, which will assist in monitoring the progress of these projects (completed and outstanding families, last publication dates, level of updates required and potential revisions, relevant research and grant projects, who is doing what). These documents indicate how content is being managed, and will provide a possible guide or ideas on ways to integrate and coordinate efforts across the States and Territories when it comes to preparing and maintaining flora content over the various jurisdictions and their requirements, including sharing information and where to target the available resources.

Please contact the ABRS (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. This could include anything from adding complete treatments to adding profiles for taxa from your research papers. There is also much opportunity for updating and editing treatments loaded from the hard copy floras, reconciling the information with currently accepted taxonomic concepts.

Bush Blitz

Bush Blitz ran a successful expedition to the Little Desert National Park (Victoria) in October 2019. Botanists from the Melbourne Herbarium, Museums Victoria and Queensland Museum made up the scientific team. Five teachers from across Australia supported the team through the Bush Blitz TeachLive program. Some botanical highlights included: 25 different species of Orchid in the Tallageira State Forest and the only population of native Currant *Acrotriche depressa* known in Victoria at Forrester Springs. A collection of *Bryobartramia novae-valesiae* which has not been collected in the area before (the closest records are 140 km to the east) and which has been rarely collected in Victoria (24 herbarium records).

Grants

The 2020-21 National Taxonomy Research Grant Program (NTRGP) round closed on December 11, 2019. The evaluation process for applications is continuing, via the Community Grants Hub, and will be complete shortly.

ABRS
January 2020
abrs@environment.gov.au

Coming conferences

'Biodiverse futures – Systematics in a changing world' ASBS Conference 2020 in Cairns

The Society's next annual conference will be held in Cairns, Queensland, Australia. The conference will run from Sunday 19 July to Friday 24 July 2020 on James Cook University Campus in Smithfield. The conference will provide attendees with an exciting opportunity to view our research in a global context and how it contributes to addressing the big challenges such as biodiversity loss, climate change, habitat degradation and invasive species. We will also explore how new technologies such as artificial intelligence, machine learning, genomics and digital collections offer exciting opportunities to improve the way we meet those challenges in the context of national and international collaborations and knowledge exchange between cultures and across borders.

Preconference workshops on Rainforest Plant Identification and Genome Assembly and Annotation will be held on Sunday 19th July, as well as the *pre-conference mixer event*.

The *Scientific program* will run from Monday the 20th July to Wednesday the 22nd July, including Keynotes, the Nancy Burbidge Memorial Lecture, an ASBS General Meeting (Tuesday 21st July), and a Conference dinner at Tjapukai Cultural Centre (Tuesday 21st July).

Post-conference field trips will be offered on Thursday the 23rd and Friday the 24th July to three destinations: a one-day field trip to Fitzroy Island,

a one-day field trip to Davis Creek National Park, and a two-day field trip to the Daintree National Park, including a visit of JCU's Canopy Crane Research Facility.

Attendees also have the opportunity to visit the *Australian Tropical Herbarium* (CNS) which is located on JCU campus. Please contact the curator, Frank Zich, to arrange your visit prior to the conference (frank.zich@csiro.au).

Registration is scheduled to be open by the end of February 2020.

More information will become available on the conference website (Web ref. 1).

Please feel free to contact the Conference Organising Committee (asbs2020Cairns@gmail.com) if you have any queries or keep up to date by subscribing to the conference web site.

The conference ties in with the Cooktown Expo 2020 which runs from the 17th July to 4th August, including the arrival of the *HM Bark Endeavour* replica at Cooktown and a rich cultural and arts program (Web ref. 2).

We look forward to seeing you in Cairns soon.

Web references

1. <https://systematics.ourplants.org/>
2. <https://cooktown2020.com/program/>

The Organising Committee—
Katharina Nargar, Darren Crayn, Ashley Field,
John Clarkson and Frank Zich



Australasian Seed Science Conference 2020

The Australasian Seed Science Conference 2020, coordinated by the Australian Seed Bank Partnership, will be hosted on 5 – 9 April 2020 by the Australian National Botanic Gardens in Canberra.

The call for abstracts closes on 27th January and early bird registrations closes 8th March.

Much more information, including a preliminary list of speakers, is available from the website.

Website. <https://seedscience2020.com.au>

Workshop report

Plant Traits Workshop

Hervé Sauquet
Royal Botanic Garden Sydney

A Plant Traits Workshop was held at the Royal Botanic Garden Sydney on 27 March 2019, organised by Rachael Gallagher (Macquarie University) and myself. This workshop brought together 38 plant systematists and ecologists (incl. 14 interstate participants) to brainstorm for a day about the future of plant traits research, data standards, infrastructure, and community engagement.

From my perspective, this workshop was a success and all the discussions were really useful. Feedback from the participants, both on the spot and through a post-event survey, also indicated a very positive general feeling. This was a one-off event, without any intended outcome other than having a productive exchange of ideas and perspectives.

Several key points emerged:

1. The Minimum Trait Set (MTS) idea developed by Russell Barrett and myself was received with broad support. This could represent one way forward, provided we succeed in engaging the community further and encourage it to both finalize and own the concept with us (e.g., foundational paper with lots and lots of co-authors).

2. Ecologists and systematists are much more willing to work together than usually assumed. Traits are clearly a domain of shared interest, with potentially huge benefits of collaboration among the two research communities. The future of trait-thinking in plant systematics clearly requires the contribution of ecologists (beyond initial exchanges such as this workshop).

3. The future of plant trait data is probably not in a single database, but rather in several trait homes (and secondary aggregators). These need to be defined and infrastructure needs to follow (candidates include eFloras, collections institutions, ALA, and third-party infrastructure such as PROTEUS).

4. A key, initial challenge is to agree collectively on the anatomy of trait records, including minimum requirements for collection of trait data (such as provenance, taxonomic level of observation from individual to species, and credit) and standardized metadata. This would considerably facilitate integration from multiple trait data stores.

Fig. Participants in the Plant Traits Workshop; organisers Rachael and Hervé are kneeling in front



Obituaries

In memoriam – Basil and Mary Smith of Manmanning, Western Australia, deceased September 2012

Mike Crisp

Research School of Biology, Australian National University and
Australian National Herbarium, CSIRO, Canberra

Recently I stumbled upon an obituary and tribute to Basil and Mary Smith on Jerry Coleby-Williams's web site (Web ref.). Although I had a lot of contact with them when doing field work in the Western Australian wheatbelt, I hadn't seen or heard of them recently. It was a shock to learn that they had passed away seven years previously without the news reaching me. As Basil and Mary have been very generous in helping the causes of plant taxonomy and conservation, their sad loss should be drawn to the attention of ASBS members.

As plant hunters over wide regions, we taxonomists benefit greatly from contact with people on the land who know their local flora. In the Western Australian wheatbelt, where the indigenous flora was once diverse but sadly is mostly cleared, surviving populations are reduced to tiny remnants and it can be very hard to find the taxa we seek. Farmer-naturalists often have extensive knowledge of their local flora and become dedicated to its study and conservation. They discover undescribed species and others that have been described and then 'lost', and bring

them to the attention of scientists.

Some of these people have become well known in the professional community – such as Ken Newbey, Alison Doley, Charles Chapman and William Archer – but others can go unsung. Perhaps, Basil and Mary Smith were among the latter. It was Jim Ross who first put me in touch with them. Initially they collected *Bossiaea* and *Templetonia* species for him; later, this contribution diversified into many collections for MEL and other herbaria.

I first visited Basil and Mary in mid 1980. We arrived in late afternoon at their homestead, which was discreetly tucked away in a block of remnant bush (Fig. 1) bearing a strong contrast to the vast cleared wheatfields east of Wongan Hills (see Coleby-Williams 2012 for a detailed description). As soon as I mentioned my interest in eucalypts, Basil rushed me into a shed where he showed me a dried bunch of foliage and flowers. What species is this? he asked. I gaped with astonishment at the tubular staminal tubes and said probably an undescribed one.

Fig. 1. On the Smith farm at Manmanning, WA, in Sep 1985, with a glimpse of their old ute; from left, Mary and Basil Smith, Barry, Lori and Blair Conn.

Ph. Helen
Conn per
Barry Conn



"Do you want to see the plants", he asked? "They are just up the road, it won't take long".

"Yes, please!"

So we jumped into the ute and tore off at a hectic pace. Nearly an hour later we were 70 km away, groping about in the dark collecting specimens. Such was Basil's enthusiasm for his beloved native plants. I described the species as *Eucalyptus synandra* (Crisp, 1982; Fig. 2). It was only the second known eucalypt with stamens fused into a tube.

I visited Basil and Mary again multiple times and always enjoyed their hospitality and infectious enthusiasm for their beloved bush. Basil was a licenced pilot with his own light aircraft and flew all over the wheatbelt spotting remnant batches of vegetation. These he would visit on the ground, making valuable collections including new discoveries. One example of their contribution to conservation biology is

Verticordia hughanii, which had been reduced to a single known population which later seemed to have disappeared: "... attempts to relocate this population proved unsuccessful until it was found by Mary and Basil Smith in December 1983" (Patten et al., 2004).

The following species are named after the Smiths, the types of the first three names being collected by the Smiths:

- Bossiaea smithiorum* J.H.Ross
- Daviesia smithiorum* Crisp
- Templetonia smithiana* J.H.Ross
- Melaleuca smithiorum* Craven ined.
(taxonomic synonym of *M. fabri* Craven).

Other botanists who were in contact with the Smiths include Jim Ross, Barry Conn and Alex George. Jim Ross, I and others made Smith collections the type of new species or subspecies (Table 1).

Data associated with 5101 specimens, mostly in MEL and CANB, with lesser numbers, many possibly duplicates, in PERTH, HO, AD and NSW, was assembled from a search on the name

Table 1. Type specimens collected by the Smiths.

<i>Acacia imitans</i> Maslin (B.H. Smith 613)
<i>Acacia subflexuosa</i> subsp. <i>capillata</i> R.S.Cowan & Maslin (B.H. Smith 101)
<i>Bossiaea atrata</i> J.H.Ross (B.H. Smith 1292)
<i>Bossiaea smithiorum</i> J.H.Ross (B.H. Smith 1652)
<i>Daviesia smithiorum</i> Crisp (B.H. Smith 848)
<i>Eremophila grandiflora</i> A.P.Br. & Buirchell (B.H. Smith 428)
<i>Eutaxia lasiocalyx</i> Chappill & C.F.Wilkins (B.H. Smith 543)
<i>Grevillea haplantha</i> subsp. <i>recedens</i> Olde & Marriott (B.H. Smith 658)
<i>Hemigenia ciliata</i> G.R.Guerin (B.H. Smith 449)
<i>Psammomoya grandiflora</i> Keighery (B.H. Smith 454)
<i>Templetonia smithiana</i> J.H.Ross (B.H. Smith 204)

B.H. Smith in the Australasian Virtual Herbarium. A running series of collection numbers 100–2053 is more or less complete (there were also a few other numbers outside this range and unnumbered collections as well). With removal of duplicates, unique collections recorded in the AVH number almost exactly 2000 (Fig. 3).

References

- Coleby-Williams, J. (2012). Farewell friends. <https://jerry-coleby-williams.net/2012/09/22/farewell-friends/>. Accessed 13 November 2019.
- Crisp MD. (1982). *Eucalyptus synandra* (Myrtaceae), a new species of mallee from Western Australia. *Nuytsia* 4: 129–134.

- Patten, J., Brunt, K. & Luu, R. (2004). Hughan's featherflower (*Verticordia hughanii*) interim recovery plan, 2004–2009. Department of Conservation and Land Management, Western Australia. <https://www.environment.gov.au/system/files/resources/2e5cfffac-f371-41d3-a15a-006ae07f231a/files/v-hughanii.pdf>. Accessed 13 November 2019.

Postscript

Alex George has provided additional insights into Basil and Mary:

The Smiths began sending material to the WA Herbarium around 1970. I first visited them in 1971 and saw them a number of times over the following 15 years. They were extremely hospitable.



Fig. 2. *Eucalyptus synandra* Crisp.

Fig. 3. Herbarium collections of Basil and Mary Smith (corrected data from Australasian Virtual Herbarium), showing how comprehensively they sampled the WA wheatbelt but scarcely ventured beyond. It shows the value of Basil's aerial surveys.

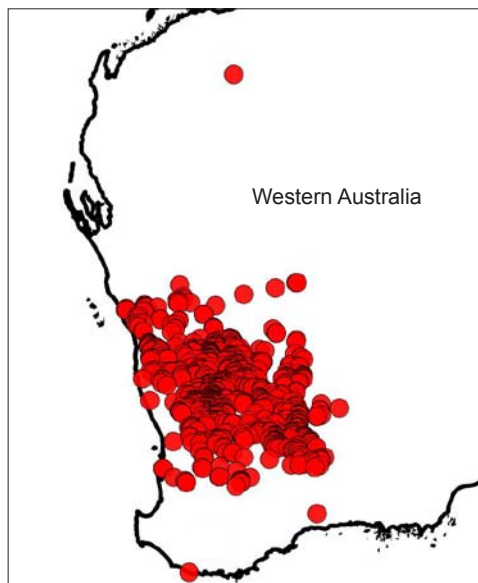
From AVH data it was 1980 when they began collecting herbarium specimens in earnest, presumably sent to Jim Ross in MEL. They had begun with only a few *Acacia* collections in PERTH made in 1970 and 1971.

Basil was colour blind and would feign scorn when we exclaimed about spectacular red-flowered plants such as *Kunzea pulchella*. It didn't affect his abilities as a good field botanist or as a pilot. His plane was a Cessna 150, kept in a shed at one end of the dirt strip that ran alongside a fence on the farm. He was also a radio ham, with a large circle of contacts.

They had a much younger ute [than that pictured in Fig. 1], a 1960s Holden that once survived a fire in one of their paddocks. Basil was unable to move it in time, but the fire, in low pasture, moved so quickly that it passed beneath the ute without it catching alight!

In Elizabeth George's book on *Verticordia* there's a nice photo of Mary with *V. gracilis*, a species that she discovered near Mt Holland.

Alex indicates that his collection that Mike Crisp chose as type of *Eucalyptus synandra* was



gathered in 1981 on an outing with Basil and Mary.

Mary and Basil Smith are noted as contributors of 25 photographs to the popular book *Wildflowers of Southern Western Australia* (editions 1996, 1997 and 2009) by Margaret Corrick and Bruce Fuhrer.

Eds.

Vicki Funk

November 26, 1947 – October 22, 2019

Australian and New Zealand botanists will be saddened to hear that Vicki Funk lost her battle with cancer in October. Vicki had lots of links with botanists here, not least because of her involvement with Compositae, but also because she numbered students and post-docs from here amongst her students and associates. In addition, she attended and presented at a number of ASBS meetings. Tributes came from many sources with just a selection linked to here (Web ref. 1-4). We have lost a passionate advocate for herbaria and their specimens (see Web ref. 5), for women scientists (Web ref. 6) and for Compositae through her initiation of the International Compositae Alliance (Web ref. 7), as well as a leader in plant systematics in general.

Web references

- 1: <https://www.iaptglobal.org/single-post/2019/10/24/Vicki-Funk>
- 2: https://www.aspt.net/news-blog/2018/obituary-dr-vicki-funk#.Xh_ekvZuJ4A
- 3: <https://rothfelslab.berkeley.edu/2019/10/23/dr-vicki-funk-1947-2019/>
- 4: https://en.wikipedia.org/wiki/Vicki_Funk
- 5: <https://herbariumworld.wordpress.com/tag/vicki-funk/>
- 6: <https://womenshistory.si.edu/news/2019/11/because-her-story-funk-list>
- 7: https://nrmh.typepad.com/the_plant_press/2006/10/international-compositae-alliance-meets-in-barcelona-vol-9-issue-4.html

Book reviews

Looking to the sky: documenting the tree diversity of Papua New Guinea

Review by: Shelley A. James, National Herbarium of New South Wales, Sydney
(after Dec 2: Western Australian Herbarium, Perth)

Trees of Papua New Guinea

By Barry J. Conn and Kipiro Q. Damas, 2019

Volume 1: Introduction and Gnetales to Fabales (softcover \$109.99; hardcover 119.99; e-book \$4.99) 416 pages

Volume 2: Rosales to Huerteales (softcover \$106.99; hardcover 116.99; e-book \$4.99) 406 pages

Volume 3: Malvales to Paracryphiales (softcover \$95.99; hardcover 107.99; e-book \$4.99) 354 pages

Published by Xlibris

My first intensive exposure to the *Trees of Papua New Guinea* project was in 2010 when Dr Barry Conn and several staff from the Papua New Guinea National Herbarium travelled to TepTep Station, Madang Province to undertake fieldwork with me as part of a US National Science Foundation project to document the diverse flora of Papua New Guinea (Fig. 1a). I was introduced to

the extensive standardized field sheets used to document each fertile tree species we encountered, helped to capture digital images of each of the characteristics of the species, and spent many hours helping to process the voucher collections. Years of field work and curatorial herbarium work has now resulted in the three-volume series *Trees of Papua New Guinea*, a collaborative project of the Royal Botanic Garden Sydney, Australia and the Papua New Guinea Forest Research Institute, LAE, Papua New Guinea (with assistance from many others), and it is a testament to the efforts and dedication of the authors, Barry Conn and Kipiro Damas (Fig. 1b). With beginnings in 2003, the *PNGtrees* digital project (Web ref. 1) aimed to develop interactive identification tools

for the common trees of Papua New Guinea. This led to a simplified and structured method of documenting the tree flora, and helped to train the next generation of indigenous scientists to be experts on the taxonomy of the flora of Papua New Guinea. Using *DiversityDescriptions* software, the data could be exported as *DELTA*-formatted files for export into electronic identification tools and online resources, and ultimately used to develop this three volume series.

Volume 1 begins with an introduction to the work completed to date to document

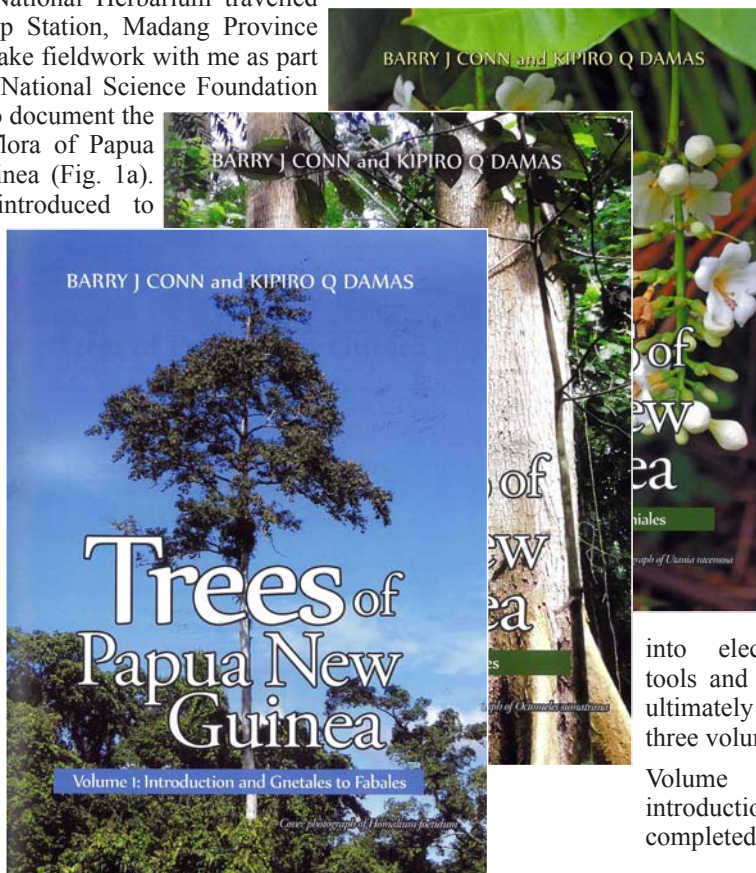




Fig 1. a (left), Barry Conn and Kaigube Fazang compiling data for the PNG Trees project, TepTep Station, Madang Province, Papua New Guinea, 2010; b, Co-authors Kipiro Damas and Barry Conn.

Photos: a, Shelley James; b, back cover of book;

the flora of Papua New Guinea, and a description of the *PNGtrees* project. It documents the key features of each family, subfamilies, and genera covered within the series. Simple keys are provided for families and genera, which is useful for initial triage identification. The alphabetical arrangement simplifies the use of the books for those with limited taxonomic and systematic knowledge. Volume 1 covers the Gnetales to Fabales; Volume 2 continues with the Rosales to Huerteales; and Volume 3 the Malvales to Paracryphiales, completing the descriptions of 675 tree species. Volume 3 concludes with a data dictionary with illustrations and an example of the standardized field data sheets used to compile the descriptive information. Each volume also provides an index and references. The layout of the books is simple and would seem to be easily updatable, along with the *PNGtrees* website.

For each species, field characters, and descriptions of the indumentum, leaves, inflorescence, and fruits are provided, and the species distribution is described, as well as other timber and nomenclatural information. A wealth of colour images show the characteristics of each of the tree taxa described. Anyone who has worked in tropical forests knows the difficulty with identifying tree species where diagnostic characters are high in the canopy, and the images of bark and wood provide informative features available at eye level, particularly during the majority of the year where the lack of flowering/fruiting provides no clues.

One of the most intriguing aspects of each taxon page is a map showing the distribution of the species at the province level for the region

bounded by the eastern part of the island of New Guinea, plus the islands of the Bismarck Archipelago, Buka, and Bougainville, overlaid with the distribution of voucher collections available within herbaria generated from the *PNGplants* database (Web ref. 2) hosted by the National Herbarium of New South Wales. This very visual illustration of the limited number of vouchered specimens of the tree species is disturbing, despite the early focus on the study of timber trees, for economic reasons. It highlights how little we know about the distribution and frequency of these species, particularly in areas historically and currently harvested for timber products. Conversely, as a field botanist with a keen interest in the region, it provides much inspiration for seeking resources to continue the collection effort and to increase the knowledge of this critical element of the biodiversity of Papua New Guinea.

One of the most valuable aspects of the series is the print-on-demand availability of the books in soft and hard cover, but more importantly their availability as several extremely affordable different e-book formats allowing for mobile reading and use in the field. The *Trees of Papua New Guinea* is an invaluable resource for the identification of common tree species in Papua New Guinea, for botanists, natural resource managers, environmental scientists, non-government agencies, for the people of Papua New Guinea and those simply interested in the biological diversity of the region.

Web references

1. <http://www.pngplants.org/PNGtrees/>
2. <http://www.pngplants.org/>

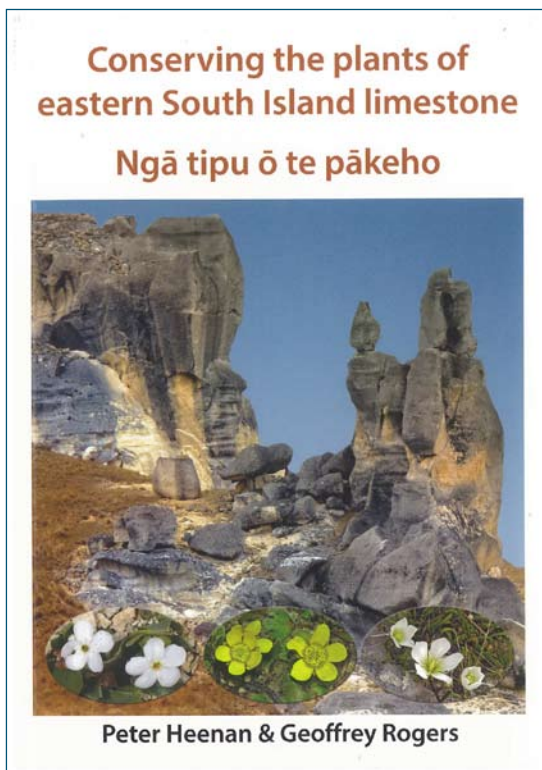
New books

Conserving the plants of eastern South Island limestone
By Peter Heenan & Geoffrey Rogers
Canterbury Botanical Society; 2019
230 pp;

This newly published book was being given away at the recent ASBS-NZPCN conference, but this in no way reflects on its value and importance. It more than achieves its aim of

Filling a knowledge void about the specialist limestone plants of the eastern South Island by bringing together information into standardised plant profile fact sheets, thereby improving access to information for their recognition, distribution, habitats and conservation status.

Following a very informative introductory chapter on the why's and where's and the importance of these vulnerable limestone habitats (maps are available as 3 appendices), there are 75 plant profiles, including many taxa yet to be formally described. Almost all of the taxa have a conservation rating of concern, some of them being data deficient. Each profile has a brief description and a comment on how the taxon can be distinguished from others in the genus; *Craspedia* taxa are the exception since this is a difficult genus still being actively worked on. Flowering times, distribution and habitat statements are provided in each of the profiles and there are extra notes providing points of clarification where necessary. Each profile, with the text on the left page, is accompanied by a selection of superb photographs on the right hand page.



An exemplary and attractive book, as well as informative, it will hopefully achieve its goal of informing its target audience, mostly private land owners, of the value and uniqueness of the land in their care.

Seeds of New Zealand monocotyledons
By Colin J. Webb
Manuka Press; November 2019
ISBN 978-0-9583299-7-2; 384 pp; A4
HB; RRP: NZ\$90.00
<https://manukapress.co.nz/monocots.html>

This second volume on the seeds of monocotyledons completes the coverage of the seeds of New Zealand native species. It was launched at the recent ASBS_NZPCN conference in Wellington (p. 62). An earlier, much admired, volume on the gymnosperms and dicotyledons was published in 2001.

Botanical revelation: European encounters with Australian plants before Darwin
By David Mabberley
NewSouth HB; Dec 2019.
ISBN:

9781742236476; HB; 384 pp; 300 x 240 mm; RRP: AUD\$89.99, NZD\$99.99
<https://www.newsouthbooks.com.au/books/botanical-revelation/>

Author David Mabberley provides a ground-breaking analysis of early European understanding of Australia's flora. Combining science, horticulture, art and economics, this lavishly illustrated book –

with many never before-published images – reveals the motives and complex networks that led to the international spread of knowledge and cultivation of hundreds of Australian plants in Europe in the late eighteenth and early nineteenth centuries.

Based on the superb Peter Crossing Collection, *Botanical Revelation* documents a revolutionary phase in the understanding of Australia's flora and science more generally. [Publisher's blurb]

It would appear that there has been some sort of delay with this book and some websites are now saying that it will be available in March 2020. No reviews have been found.

The extraordinary story of the Apple
By Barrie E. Juniper & David J. Mabberley
Kew Publishing; August 2019.
ISBN: 9781842466551; HB; 260 pp;
246 x 198 mm; RRP: AUD\$89.99,
NZD\$110.00 but shop around for lower prices

This book is a new edition of a 2006 publication, *Story of the Apple*, with a new title *The extraordinary story of the apple*. Written by two leading botanical experts, it's a complete natural and cultural history of the apple, using DNA evidence, from its origins in China, along the Silk Road to Europe and onto the Americas and Australia. Reviewed at Web ref. 1.

Review: <https://www.botany.one/2020/01/the-extraordinary-story-of-an-ordinary-fruit/>

Mallee country: land, people, history.
By Richard Broome, Charles Fahey,
Andrea Gaynor and Katie Holmes.

Monash University Publishing,
Melbourne, November 2019
ISBN: 9781925523126; PB; 416pp;
RRP: AUD\$39.95
ISBN (e-book): 978-1-925523-14-0

Mallee Country tells the powerful history of mallee lands and people across southern Australia from Deep Time to the present. Carefully shaped and managed by Aboriginal people for over 50,000 years, mallee country was dramatically transformed by settlers, first with sheep and rabbits, then by flattening and burning the mallee to make way for wheat. Government backed settlement schemes devastated lives and country, but some farmers learnt how

to survive the droughts, dust storms, mice, locusts and salinity – as well as the vagaries of international markets – and became some of Australia's most resilient agriculturalists. In mallee country, innovation and tenacity have been neighbours to hardship and failure. (Publisher's blurb)

Review: <https://honesthistory.net.au/wp/myrtle-john-weathering-the-mallee-over-nearly-two-centuries/>

Who owns history? Elgin's loot and the case for returning plundered treasure

By Geoffrey Robertson
Knopf Australia, November 2019
ISBN: 9781760893699; HB; 304 pp;
RRP: AUD\$39.99

The cultural heritage restitution debate is a difficult one and often polarising. So too the reviews of this work by a prominent Australian lawyer who lives in Britain. Questions about the Parthenon Marbles and where they should be held perhaps apply equally to many herbarium specimens.

The preface can be read on the web (Web refs 1, 2), the latter reference also reproducing the first chapter as well as the contents of the whole book. Reviews can be also seen on-line (Web refs 3–6).

A review and rebuttal of the arguments in the book was published in the *Financial Times* (Web ref. 7). Written by Richard Lambert, a former editor of the paper and presently chairman of the British Museum, one of the institutions most mentioned in the book, it is subtitled *A polemic against the British Museum plagued by inaccuracies*.

Web references

- 1: <https://www.penguin.com.au/books/who-owns-history-9781760893699/extracts/2174-who-owns-history>
- 2: https://www.amazon.com.au/dp/1760893692/ref=rdr_kindle_ext_tmb
- 3: <http://www.artnews.com/2019/11/05/british-museum-repatriation-debate/>
- 4: <https://eu.greekreporter.com/2019/11/13/new-book-blasts-british-museum-over-stolen-parthenon-marbles/>
- 5: <https://www.churchtimes.co.uk/articles/2019/29-november/books-arts/book-reviews/who-owns-history-elgin-s-loot-and-the-case-for-returning-plundered-treasure-geoffrey-robertson>
- 6: <https://www.smh.com.au/culture/books/colonial-powers-and-the-problems-of-cultural-heritage-20191226-p53mzc.html>
- 7: <https://www.ft.com/content/e4fd5eee-0629-11ea-a984-fbbacad9e7dd>

Bloom: from food to fuel, the epic story of how algae can save our world
By Ruth Kassinger.

Elliott & Thompson; July 2019.

ISBN: 9781783964413; HB; 416 pp;

RRP: \$35.00AU.

There are as many algae on earth as stars in the universe, and they have been essential to life on our planet for aeons. Algae created our oxygen-rich atmosphere, abundant oceans and coral reefs. Crude oil is made of dead algae, and algae are the ancestors of all plants.

Today, seaweed production is a multi-billion-dollar industry, with algae hard at work to make your sushi, chocolate milk, beer, paint, toothpaste, shampoo and so much more. Delving into science and history, in this revelatory book Ruth Kassinger takes readers on an around-the-world, behind-the-scenes, and into-the-kitchen tour. We'll meet the algae innovators working towards a sustainable future: from seaweed farmers in South Korea, to scientists using it to clean the dead zones in our waterways, to the entrepreneurs fighting to bring algae fuel and plastics to market.

They could be the future of our rapidly changing world. [Publisher's blurb]

Review: <https://www.botany.one/2019/10/three-kinds-of-algae-blooming-marvellous-news/>

Sunburnt country: the history and future of climate change in Australia

By Joëlle Gergis

Melbourne University Press: 2018.

ISBN: 9780522871548; PB, \$AU34.99;

ISBN: 9780522871555; eBook, 15.1

MB, \$16.99AU.

<https://www.mup.com.au/books/sunburnt-country-paperback-softback>

What was Australia's climate like before official weather records began? How do scientists use tree-rings, ice cores and tropical corals to retrace the past? What do Indigenous seasonal calendars reveal? And what do settler diary entries about rainfall, droughts, bushfires and snowfalls tell us about natural climate cycles? *Sunburnt Country* pieces together Australia's climate history for the first time. It uncovers a continent long vulnerable to climate ex-

tremes and variability. It gives an unparalleled perspective on how human activities have altered patterns that have been with us for millions of years, and what climate change looks like in our own backyard.

Sunburnt Country highlights the impact of a warming planet on Australian lifestyles and ecosystems and the power we all have to shape future life on Earth.

Joëlle Gergis is a climate change scientist. On-line there is a review of her book (Web ref. 1) and it is included in a list of seven books recommended by Australian climate change scientists (Web ref. 2). Gergis is also an author of a piece which appeared in *The Conversation* recently (Web ref. 3) debunking any thought that we have had worse bushfires than those we are presently experiencing.

Web references

- 1: <https://www.smh.com.au/entertainment/books/sunburnt-country-review-joelle-gergis-on-a-fraught-future-with-climate-change-20180412-h0yocv.html>
- 2: <https://www.australiangeographic.com.au/topics/history-culture/2019/09/here-are-7-books-australian-climate-change-scientists-recommend-you-read/>
- 3: <https://theconversation.com/some-say-weve-seen-bushfires-worse-than-this-before-but-theyre-ignoring-a-few-key-facts-129391>

Ludwig Leichhardt's ghosts: the strange career of a traveling myth
Studies in German Literature L
Volume 196 of Studies in German Literature Linguistics and Culture
By Andrew Wright Hurley
Boydell & Brewer; 2018
ISBN: 1640140131, 9781640140134;
350 pp. RRP: \$AU230:99 (reduced to \$59:50AU at Booktopia).

After the renowned Prussian scientist and explorer Ludwig Leichhardt left the Australian frontier in 1848 on an expedition to cross the continent, he disappeared without a trace. Andrew Hurley's book complicates that view by undertaking an afterlife biography of "the Humboldt of Australia." Although Leichhardt's remains were never located, he has been sought and textually "found" many times over, particularly in Australia and Germany. He remains a significant presence, a highly productive ghost who continues to "haunt" culture. Leichhardt

has been employed for all sorts of political purposes. In imperial Germany, he was a symbol of pure science, but also a bolster for colonialism. In the 20th century, he became a Nazi icon, a proto-socialist, the model for the protagonist of Nobel laureate Patrick White's famous novel *Voss*, as well as a harbinger of multiculturalism. He has also been put to use by Australian Indigenous cultures. Engaging Leichhardt's ghosts and those who have sought him yields a fascinating case study of German entanglement in British colonialism in Australia. It also shows how figures from the colonial past feature in German and Australian social memory and serve present-day purposes. Andrew Wright Hurley is Associate Professor in German Studies at the University of Technology Sydney. [Publisher's blurb]

The opening chapter is available in full on Google books (Web ref. 1) and there is a review, behind a paywall (Web ref. 2).

Web references

- 1: https://books.google.com.au/books?id=_n11DwAAQBAJ&dq
- 2: <https://onlinelibrary.wiley.com/doi/full/10.1111/ajph.12594> (not freely available)

Downloadables

This is what climate change looks like
By Professor Lesley Hughes, Dr An-nika Dean, Professor Will Steffen & Dr Martin Rice.

Climate Council of Australia;
September 2019.

ISBN: 978-0-6486793-0-1 (print);
ISBN: 978-0-6486793-1-8 (digital), 48
pp.

<https://www.climatecouncil.org.au/resources/ecosystems-report/>

A new report has been released by Australia's Climate Council, "an independent, crowd-funded organisation providing quality information on climate change to the Australian public."

The word "unprecedented" has been in regular use lately. As predictions about climate change increasingly become observations, we are witnessing first-hand the impacts of more frequent and severe weather events. These events are playing havoc with our health, our agricultural systems, our communities and our economy. But they are also having

devastating impacts on our natural ecosystems and unique wildlife.

The Climate Council's new report highlights recent examples of these impacts. In many cases, our ecosystems and species were already under threat from other human-associated causes – like land clearing, over-harvesting, and invasive feral animals and weeds. Climate change is adding to this litany of woes, in some cases providing what might be the last straw for species and systems already under grave stress. [Publisher's blurb].

This is just one of many recent reports available through the cited website. They cover the gamut of climate change topics including energy and renewables, extreme weather events, Australian and international politics as well as the effects on the economy and tourism. It is little wonder that the Climate Council has been used as an authoritative source of information for briefing politicians, providing updates to health and emergency services, teaching resources for schools and universities and as background research for the media.

Flora Malesiana associated publications available online

In case you hadn't yet caught up with it, all published *Flora Malesiana* treatments as well as other publications relating to the area (*FM Bulletin*, *Leiden Botanical Series*, *Blumea*, *Pacific Plant Areas*, *Persoonia*, etc) are now freely available from Naturalis' *Digital Academic Repository* (Web ref. 1).

Two regional orchid treatments, *Orchids of New Guinea* (Web ref. 2) and *Orchids of the Philippines* (Web ref. 3), as well as a *Flora Malesiana* treatment of *Caesalpinioideae* (Web ref. 4) are also available but don't appear on this site. These are all web versions of previously available CD-ROM's released by ETI Bioinformatics.

Flora Malesiana: orchids of New Guinea (Web ref. 2)

This website includes: 133 genera, 2,716 species and 51 taxa at lower rank, and 15,900 illustrations. All taxa are described and where possible illustrated. It is based on a series of 6 CD-ROM's published under the same name between 2001 and 2010, co-authored by André Schuiteman & Ed de Vogel; the sixth CD had as third co-author Jaap Vermeulen.

Flora Malesiana: orchids of the Philippines. Vol. I. (Web ref. 3)

Maribel Agoo, André Schuiteman & Ed de Vogel. This website presents a richly illustrated overview of the orchid flora of the Philippines, with descriptions of all the genera and a checklist of all the species.

Flora Malesiana: Leguminosae – Caesalpinioideae of SE Asia (Web ref. 4).

This CD-ROM contains the subfamily Caesalpinioideae and is based on the *Flora Malesiana* series I, Volume 12, part 2 *Caesalpiniaceae* (*Leguminosae – Caesalpinioideae*) by Hou, D., K. Larsen & S.S.

Larsen (1996). Where necessary corrections were made. Since 1996 some changes have been made in the taxonomy of the species treated in that volume.

Web references

- 1: <https://www.repository.naturalis.nl/>
- 2: https://orchids.naturalis.nl/linnaeus_ng/app/views/introduction/topic.php?id=136&epi=25
- 3: https://orchids-philippines.linnaeus.naturalis.nl/linnaeus_ng/app/views/introduction/topic.php?id=3428&epi=203
- 4: https://caesalpinioideae.linnaeus.naturalis.nl/linnaeus_ng/app/views/introduction/topic.php?id=3346&epi=117

Items of interest

New Zealand Christmas tree

The New Zealand Christmas tree, *Metrosideros excelsa*, also known as pohutakawa, is of considerable cultural significance in New Zealand, but it has been in decline for many years. One of the chief reasons for this decline is the Australian possum, although there are also others (Web ref. 1). Project Crimson Trust (Web ref. 2) has been active in conserving pohutukawa trees and other threatened native trees in New Zealand since 1990 and they might be an appropriate body to consider for the Australian ASBS donation in lieu of the Possum Tax (see p. 65).

Web references

- 1: <https://globaltrees.org/threatened-trees/trees/pohutukawa/>
- 2: <https://projectcrimson.org.nz/>

Why ecology matters

The British Ecological Society has brought together a selection of freely available articles from across their journals that showcase why ecological research matters on multiple levels and to a variety of people and interests. Michael Pocock introduces the selection of articles which cover a range of topics.

Web ref. <https://besjournals.onlinelibrary.wiley.com/hub/whyecologymatters>

Genetic strategies for improving crop yields

On the current trajectory for crop yields, by 2050 the world's population will not be able to be fed. This review article explores how crop production might be increased in a changing world.

Web ref. <https://www.nature.com/articles/s41586-019-1679-0>

Australia's environmental laws proving inadequate

Australia's flagship environmental legislation is inadequate for preventing habitat loss for terrestrial threatened species, terrestrial migratory species and threatened ecological communities. This significant loss of habitat has contributed to one of the worst extinction rates in the world, with no sign of slowing in the near future. Without strict, comprehensive application and enforcement, as well as explicit guidance and requirements, policies such as the EPBC Act will remain ineffective at regulating habitat loss and protecting biodiversity [Adapted from abstract].

These are the findings documented by Ward et al. (2019) with a discussion article in *The Conversation* (Web ref. 1).

References

- Ward, M.S. and 9 other authors (2019). Lots of loss with little scrutiny: The attrition of habitat critical for threatened species in Australia. *Conservation Science and Practice*. 2019;e117. <https://doi.org/10.1111/csp2.117>
- Web ref. 1: <http://theconversation.com/environmental-laws-have-failed-to-tackle-the-extinction-emergency-heres-the-proof-122936>

EPBC Act review

In view of the findings above this review is timely.

The statutory review of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) commenced on 29 October 2019. Professor Graeme Samuel AC has been appointed as the independent

reviewer. An Expert Panel will support and provide advice to Professor Samuel on specific issues.

Over the next 12 months, the review will look at how the EPBC Act has been operating, and any changes needed for Australia to support ecologically sustainable development into the future. All Australians are invited to participate in the review. [From the website]

Web ref. <https://epbcactreview.environment.gov.au/>

Genetic evidence for plural introduction pathways of the invasive weed Paterson's curse (*Echium plantagineum* L.) to southern Australia

Echium plantagineum L., native to Western Europe and northwest Africa, has been recorded in Australia since the 1800's and is now a major weed in pastures and rangelands. An understanding of its invasion pathway and subsequent genetic structure is critical to the successful introduction of biological control agents and for provision of informed decisions for plant biosecurity efforts. The authors sampled *E. plantagineum* from the Iberian Peninsula (native), UK (non-native) and Australia and South Africa (invasive) and analysed three chloroplast gene regions. Collectively, genetic evidence and historical records indicate *E. plantagineum* in southern Australia exists as an admixture that is likely derived from introduced source populations in both the UK and South Africa. [Adapted from abstract].

Web ref. <https://doi.org/10.1371/journal.pone.0222696>

Museomics

Museomics – is this a new word for what we do? One of the freely available papers mentioned in the last issue as part of the series on the use of herbarium collections in the *Frontiers of Plant Science* referred to the use of museomics for clarifying the classification of *Aloidendron* (Asphodelaceae) (Web ref. 1).

Apparently this word has been around for some time since it was awarded the “Worst new Omics Word Award” in 2009 and its origins are discussed on that site (Web Ref. 2).

It is defined in that paper as:

using improved methods for sampling DNA combined with the latest sequencing technology to analyze preserved museum samples.

Web references

1: <https://www.frontiersin.org/articles/10.3389/fpls.2019.01227/full>

2: <https://phylogenomics.blogspot.com/2009/01/worst-new-omics-word-award-museomics.html>

Revisiting those deep-rooted prairie plants

This article overturns some long held beliefs about those deep roots associated with prairie plants.

Web ref. <https://prairieecologist.com/2019/09/17/a-deep-rooted-prairie-myth/>

Alan Finkel's push to eradicate bad science

Australia's top scientist Alan Finkel says that too many poor quality research papers are being published in Australia, and the system may inadvertently be encouraging academics to behave badly.

Web ref. <https://theconversation.com/there-is-a-problem-australias-top-scientist-alan-finkel-pushes-to-eradicate-bad-science-123374>

Negative results are important too

Another item pointing out the value of negative scientific results, with links to further articles on the same subject.

Web ref. <https://www.nature.com/articles/d41586-019-02960-3>

Thoughts on succulents

A review of the current knowledge of xeromorphic succulent plants and their possible uses in a warming world.

Web ref. <https://nph.onlinelibrary.wiley.com/doi/full/10.1002/ppp3.25>

Banana disease found in Colombia

Panama disease, a global threat to bananas, and not just the Cavendish variety, has now reached the Americas.

Web ref. <https://www.nationalgeographic.com/environment/2019/08/banana-fungus-latin-america-threatening-future/>

Rooftop farms

Having watched an ABC Four Corners episode, Cracking Up (Web ref. 1), on the poor building practices and lax laws which have been a feature in the building of new apartment blocks in Australia over the last few years (aired 19th August) it was interesting to read the very next day of the use of 14000 square m (c. 3.5 acres) of rooftop on a 6 story building in Paris for farming.

With the plan to grow more than 30 different plant species, the site will produce around 1,000kg of fruit and vegetables every day in high season. Tended by around 20 gardeners, they will also be using entirely organic methods.

Presumably the building codes are much stricter than they are in Australia.

Web references

- 1: <https://www.abc.net.au/4corners/cracking-up/11431474>
- 2: <https://www.theguardian.com/cities/2019/aug/13/worlds-largest-urban-farm-to-open-on-a-paris-rooftop>

Sexy pavement lichen

Be careful what common name you give a plant. Sexy pavement lichen was the name given (possibly in jest) to *Xanthoparmelia scabrosa* by New Zealand botanists since it was discovered that it was being sold in Chinese medicine as a natural Viagra. You can read more about this online Web refs 1, 2).

Web references

- 1: <https://www.theguardian.com/world/2019/aug/15/new-zealanders-warned-about-the-consumption-of-sexy-pavement-lichen>
- 2: <https://www.stuff.co.nz/environment/114988649/dont-lick-sexy-pavement-lichen--heres-why>

Bigger was better in NZ

Giant penguin fossils have now been added to the list of oversized and extinct birds in New Zealand, joining parrots, eagles and moas.

Web ref. <https://www.theguardian.com/science/2019/aug/14/human-sized-penguin-fossil-discovered-in-new-zealand>

Trypophobia

I found this one a little hard to believe when I first heard about it but the phobia has only relatively recently been recognised and it has still to be listed in the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition, of the American Psychiatric Association (Web ref. 1).

Trypophobia is an aversion to the sight of irregular patterns or clusters of small holes, or bumps. The term is believed to have been coined by a participant in an online forum in 2005. On a website dedicated to “all of us weirdoes who have an irrational fear of HOLES,” Louise says she settled on trypophobia as a name for this fear, featuring the Greek word *trypa*, meaning “hole,” and the Greek combining form *-phobia*, meaning “fear”.

If you suffer from this phobia it might be sensible to steer clear of work with pollen and diatoms, and also crumpets, lotus heads and lots of other things visible in the reviews in Web ref. 1–3. And Apple’s iPhone 11 Pro may also be causing the same problem (Web ref. 4).

Web references

- 1: <https://www.self.com/story/trypophobia-fear-of-holes> (2019)
- 2: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5811467/> (2018)
- 3: <https://www.popsoci.com/trypophobia/> (2011)
- 4: <https://www.bbc.com/news/technology-49660765>

Not burning, planting

We keep hearing about the forests burning in the Amazon basin and in Indonesia but it is heartening to read of just how much tree planting is going on in other areas of the world. For instance have you heard about the “Great Green Wall” of trees being planted in Africa, the billion trees already planted in Pakistan with a further 5 billion to come in the next 5 years or the 66 million trees planted in Madhya Pradesh in 12 hours by 1.5 million volunteers. Using drones to plant trees in Myanmar makes it theoretically possible to plant 400,000 trees a day (Web ref. 1) but at the moment it would appear that the Ethiopians with their 350 million trees in 12 hours hold the record (Web ref. 2).

Meanwhile, it was being reported widely in the British media a few months ago that tree planting needed to be increased markedly if Britain was to meet its energy targets (Web ref. 3). Since then the Woodland Trust has agreed to work with the water companies (Web refs 4, 5) to identify planting sites and to manage a program referred to as the Big Climate Fightback, scheduled to begin on November 30, 2019.

Web references

- 1: <https://www.bbc.com/news/newsbeat-48884165>
- 2: <https://www.bbc.com/news/world-africa-49151523>
- 3: <https://www.bbc.com/news/uk-england-47541491>
- 4: <https://www.independent.co.uk/environment/trees-planted-england-water-companies-a9061296.html>
- 5: <https://www.theguardian.com/environment/2019/sep/23/call-for-1m-people-join-uk-biggest-mass-tree-planting-campaign>

A tale of two cities

A comparison of the restoration of urban forests in British-occupied Hamburg and Soviet-occupied Dresden after WW2. Urban forestry is becoming increasingly important in our cities of the future and perhaps something can be learnt from the past.

Web ref. <https://daily.jstor.org/regrowing-germanys-trees-after-wwii/>

Great Barrier Reef outlook report

The Great Barrier Reef Marine Park Authority recently released its latest five-yearly report (Web

ref. 1). The state of the reef has been downgraded from “Poor” to “Very Poor” (Web ref. 2).

Web references

- 1: <http://www.gbrmpa.gov.au/our-work/outlook-report-2019>
- 2: <https://theconversation.com/the-great-barrier-reef-outlook-is-very-poor-we-have-one-last-chance-to-save-it-122785>

Why reporters won't let scientists review their stories

Ever wondered why when you are interviewed on a topic you are not allowed to see the result before publication. Here's one explanation?

Web ref. <https://sciencecommunicationbreakdown.wordpress.com/2019/06/26/reporters-scientists-story-review/>

A special series on the use of CRISPR technology in China

The magazine *Science* has a special series on the use of the genome editing technology known as CRISPR in China. China has embraced the technology, particularly for its use in the modification of crops, even though the Chinese Government has apparently yet to decide on whether the technology is acceptable or not.

Web ref. <https://www.sciencemag.org/news/2019/07/feed-its-14-billion-china-bets-big-genome-editing-crops>

Historical papers dealing with botanical collections

The Hann Expedition

A thorough review of the work of the Hann Expedition has just been published in *Austrobaileya* by Dowe & Taylor (2019). The expedition searched for

gold, minerals and pastoral lands, and to ascertain suitability for settlement in the southern Cape York Peninsula area. In addition to the primary objectives, both botanical and palaeontological specimens were collected.

Official botanical collector on the expedition was Thomas Tate, a cousin of the better known Ralph Tate. However collections at Kew are almost invariably attributed to Hann. The authors also found a collection of plants made by the geologist Norman Taylor.

Reference

Dowe, J.L. & Taylor, P.I. (2019). The botanical collections of William Hann's Northern Expedition

of 1872 to Cape York Peninsula, Queensland. *Austrobaileya* 10(3): 506–538. https://www.qld.gov.au/_data/assets/pdf_file/0023/109076/dowe-taylor-austrobaileya-v10s3-506-538.pdf

Dehnhardt's Australian eucalypts in Naples

Neapolitan botanists, together with Tony Bean, have investigated the *Eucalyptus* species published by the botanist and head gardener, Friedrich Dehnhardt (1787–1870) of Naples, more especially, *E. camaldulensis* Dehnh. It had been thought that Dehnhardt's original description of *E. camaldulensis* applied to a different taxon than that recognised under this name in Australia and the name has been conserved with a conserved type since 2011. This work indicates that this conservation was unnecessary and in addition provides much background material on Dehnhardt as well as typifications for other *Eucalyptus* species he described.

Reference

Del Guacchio, E., Bean, A.R., Sibilio, G., De Luca, A., De Castro, O. & Caputo, P. (2019). Wandering among Dehnhardt's gums: The cold case of *Eucalyptus camaldulensis* (Myrtaceae) and other nomenclatural notes on *Eucalyptus*. *Taxon* 68 (2): 379–390; <https://doi.org/10.1002/tax.12058>

CSIRO plant collections from Papua New Guinea

During the period 1953–69, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) conducted fourteen integrated land resource surveys in the Territory of Papua and New Guinea with the aim of identifying areas suitable for accelerated development. The resulting reconnaissance-level regional survey reports and maps provided extensive baseline information for national development planning. Related disciplinary publications expanded scientific knowledge of land resources and resource use in the wet tropics more generally. Substantial botanical collections carried out during the surveys contributed to building the Papua New Guinea (PNG) national collection at the Lae Herbarium and to the establishment of what is now the Australian National Herbarium. [Abstract]

Part 1 of this historical review discusses the evolution, conduct and outcomes of the CSIRO integrated surveys over the period 1950–75, while Part 2 describes the subsequent research projects that arose from the surveys and concluded in 2000.

References

- Keig, G., Hide, R.L., Cuddy, S.M., Buettikofer, H., Bellamy, J.A., Bleeker, P., Freyne, D. & McAlpine, J. (2019). CSIRO and land research in Papua New Guinea 1950–2000: part 1: pre-Independence. *Historical Records of Australian Science* 30(2) 83–99 <https://doi.org/10.1071/HR18019>
- Keig, G., Hide, R.L., Cuddy, S.M., Buettikofer, H., Bellamy, J.A., Bleeker, P., Freyne, D. & McAlpine, J. (2019). CSIRO and land research in Papua New Guinea 1950–2000: part 2: post-Independence. *Historical Records of Australian Science* 30(2) 100–111 <https://doi.org/10.1071/HR18025>

Mueller article available in translation

Although best known as a descriptive botanist, Ferdinand Mueller published an early account of the South Australian Mallee in the style of his scientific hero, Alexander von Humboldt. This vegetation type is found across southern arid Australia and includes several distinctive botanical features that Mueller sought to highlight. While his article was republished twice, each issue was in German and consequently this work has tended to be overlooked in scholarship on the history of Australian botany. Mueller's article is introduced here along with a translation into English for the first time. [Abstract]

Reference

- Maroske, S. & Darragh, T.D. (16 May 2016). F. Mueller, 'The Murray-scrub, Sketched Botanically', 1850: a Humboldtian description of mallee vegetation. *Historical Records of Australian Science* 27(1): 41 – 46.

Climate emergency

World Scientists' warning of a climate emergency

Scientists have a moral obligation to clearly warn humanity of any catastrophic threat and to "tell it like it is." On the basis of this obligation and the graphical indicators presented below, we declare, with more than 11,000 scientist signatories from around the world, clearly and unequivocally that planet Earth is facing a climate emergency. [Opening paragraph of original article (Web ref. 1) published November 2019].

It's not too late to add your signature in support for this stance (Web ref. 2).

Web references

- 1: <https://academic.oup.com/bioscience/advance-article/doi/10.1093/biosci/biz088/5610806>
- 2: <https://scientistswarning.forestry.oregonstate.edu/>

Covering climate now

A lot has been happening recently in the climate change world and if you want to know more about it *The Conversation* has gathered together numerous articles from their global resources and made them available through Web site 1. *The Conversation, Australia*, has now also adopted a zero-tolerance approach to moderating climate change deniers, and sceptics. Not only will they be removing their comments, they'll be locking their accounts (Web site 2).

Web references

- 1: <https://theconversation.com/au/topics/covering-climate-now-75981>
- 2: <http://theconversation.com/climate-change-deniers-are-dangerous-they-dont-deserve-a-place-on-our-site-123164>

The remarkable Greta Thunberg

It seems like an age since 15 year old Greta Thunberg addressed the UN. Here's a background to her from *Time* on the announcement of her being recognised as their Person of the Year.

Web ref. <https://time.com/person-of-the-year-2019-greta-thunberg/>

Long term insect studies.

Butterfly decline in California

Art Shapiro "has meticulously tracked butterfly populations at 10 sites in north-central California, visiting each location every two weeks as long as the weather permits." Initially begun as a five year project, he has now been monitoring his sites for 47 years. And the numbers have decreased significantly in that time

Web ref. <https://www.latimes.com/science/story/2019-11-12/california-butterflies-scientist-art-shapiro>

Wild bees being replaced by honey bees

A contrasting long term study, this time appearing as a preprint (Web ref. 2), indicates that wild (native) bees are being replaced by honey bees in the Mediterranean basin.

Mean estimated proportion of wild bees at flowers roughly quadruplicated that of honeybees at the beginning of the period considered, the proportions of both groups becoming roughly similar fifty years later.

Since the area is a biodiversity hotspot for native bees and the plants that they pollinate this may well have implications for the future diversity of the region.

Web ref. <https://www.biorxiv.org/content/10.1101/828160v1>

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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

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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.

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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.

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