Taxonomy for Plant Conservation – *Ruia mai i Rangiātea*

Joint Conference of the Australasian Systematic Botany Society (ASBS) and the New Zealand Plant Conservation Network (NZPCN)

24 – 28 November 2019, Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

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Secretary: Jennifer Tate, secretary.asbs@gmail.com
President: Daniel Murphy, president.asbs@gmail.com
ASBS website: www.asbs.org.au

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NZPCN website: www.nzpcn.org.nz

Conference website: https://systematics.ourplants.org/
Conference email: plants2019nz@gmail.com

Conference organising committee

Heidi Meudt	Museum of New Zealand Te Papa Tongarewa	Conference Co-organiser
Rewi Elliot	Otari Native Botanic Garden	Conference Co-organiser
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Bill Campbell	New Zealand Plant Conservation Network	Logistics & Finances
Megan Ireland	Otari Native Botanic Garden	Social Media
Finn Michalak	Otari Native Botanic Garden	Workshops
Anita Benbrook	Wellington City Council	Field trips
Tim Park	Wellington City Council	Field trips
Matt Ward	RESTORE	Silent Auction
Jennifer Tate	Massey University	Scientific Committee
Alex Fergus	Manaaki Whenua – Landcare Research	Scientific Committee
Sarah Beadel	Wildland Consultants Ltd	Scientific Committee
Katharina Nargar	Australian Tropical Herbarium	Scientific Committee
Eleanor Burton	Otari Native Botanic Garden	Workshops
Jane Humble	Otari-Wilton's Bush Trust	Workshops

If you have any questions, or if problems arise during the conference while at Te Papa, please speak to a conference organiser or Te Papa staff. Conference organiser contacts re: Heidi Meudt 021 733 403 heidim@tepapa.govt.nz / Rewi Elliot 021 227 8169 rewi.elliot@wcc.govt.nz

Cover photograph: mānuka (*Leptospermum scoparium)* by Jesse Bythell

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Welcome and Conference Overview

Nau mai, haere mai ki Whanganui-a-Tara, ki Te Papa Tongarewa, ki tēnei hui, *Ruia mai i Rangiātea*. Tēnā koutou, tēnā koutou, tēnā koutou katoa!

On behalf of the Organising Committee, we are very excited to welcome you to the 2019 Joint Conference of the New Zealand Plant Conservation Network (NZPCN) and the Australasian Systematic Botany Society (ASBS) in Wellington.

This is the fourth time that ASBS has held a conference in New Zealand (previous conferences were in 1991 in Auckland, 2010 in Lincoln, and 2014 in Palmerston North). It is the first time the ASBS and NZPCN have come together for their conference, which means a bigger conference than usual for both societies! We are so pleased about that so many of you are attending this conference, including those coming from Australia and beyond, and we hope the programme we have on offer will not disappoint.

Our theme this year is, 'Taxonomy for Plant Conservation', which aims to capitalise on the strengths and expertise particular to each of our societies whilst making the most of our shared interests and passion for plants. We have a wonderful mix of talks covering many aspects of Australasian plant taxonomy, systematics, phylogenetics, genomics, biogeography, palaeobotany, and conservation.

We have three exceptional keynote speakers, who will start each of the three full days of talks: Monday – Hon Eugenie Sage, Minister for Conservation, Minister for Land Information New Zealand and Associate Minister for the Environment; Tuesday – Melanie Mark-Shadbolt, Kaihautū Chief Māori Advisor to the Ministry for the Environment, Director Māori of New Zealand's Biological Heritage National Science Challenge and CEO of Te Tira Whakamātaki; and Thursday – Kevin Thiele, founding Director of Taxonomy Australia, an organisation established to advocate and implement in Australia the recommendations of the 'Decadal Plan'. The special lecture on Tuesday afternoon by this year's winner of the ASBS Nancy T. Burbidge Medal, Barry Conn, will also be an event not to be missed.

This year we are offering six pre-conference workshops on Sunday, as well as five different field trips highlighting the interesting botany of the Wellington region on Wednesday. The diverse workshops offer upskilling in many valuable botanical skills, including using iNaturalist, fern identification, plant surveying, botanical illustration, and science communication. The five field trips are led by local botanists with extensive knowledge to areas of regional botanical interest ranging from lowland podocarp and beech forests, fresh water lakes, rugged coastal communities, Matiu/Somes Island, and—a little bit closer to home—Te Papa's Herbarium (WELT) and Art Store, and Otari Native Botanic Garden.

Te Papa is the premier conference venue in Wellington, situated right on the waterfront in the heart of the city. We encourage you to explore the exhibitions during your stay, which are open from 10–6 pm every day and mostly free of charge. There are six floors to explore, and for those with limited time we've highlighted some botanical "must see" items and insider tips for you later in this programme. Those attending the Welcome Function on Sunday evening will also have the opportunity to see our latest natural history exhibition, Te Taiao / Nature, at an after-hours private viewing just for us!

Please have a read of our conference code of conduct and do your part to make this a safe, enjoyable and productive conference experience for all. We hope you take home new ideas and inspiration from the varied programme, strengthen existing relationships with colleagues and friends, and develop new connections with other botanical colleagues throughout the country as well as across the Tasman.

Nā māua noa,
Nā Heidi Meudt & Rewi Elliot
Conference Co-Convenors, Wellington, November 2019

Ruia mai i Rangiātea

Ruia means to plant, to sow a seed, or to establish a foundation from which to develop. Ruia sets a direction for growth and represents the building blocks that contribute to realising potential.

Rangiātea is the origin of Māori migration. It represents the wider world, a place to put theory into practice and observe others who do the same. In literal terms Rangi-ātea is a "clear-sky". In abstract terms this relates to having a clear mind, or a state of enlightenment.

At this conference we hope to establish foundations from which to continue developing our shared taxonomic and conservation mahi. The opportunities to network, to observe, to share, and to give and receive knowledge are building blocks that will help us continue to grow together on our journey.

Conference Code of Conduct

He taonga rongonui te aroha ki te tangata—Goodwill towards others is a precious treasure

In the interests of all participants and supporters of this conference, and as guests of Museum of New Zealand Te Papa Tongarewa, we are dedicated to creating a positive, supportive and rewarding experience for everyone involved in this conference.

We aspire to a fulfilling conference experience for everyone, regardless of race, ethnicity, nationality, culture, religious beliefs, gender, gender identity and expression, sexual orientation, age, status, disability, physical appearance, political affiliation or technology choices. We will not tolerate harassment of conference participants in any form.

We believe everyone has an obligation to contribute. Here we have outlined appropriate and acceptable behaviours expected at the conference. We aim to influence helpful and constructive outcomes from the conference, and for everyone involved to feel supported to make positive choices, manage risk and have a great experience.

Everyone has a responsibility to speak up when there is, or could be, a situation that may breach or lead to a breach of this Code, or the law (see below for contacts).

We ask everyone involved with the 2019 ASBS–NZPCN Joint Conference to:

- Look out for one another and contribute towards a safe environment where people are treated with dignity and respect, feel comfortable and encouraged, feel their opinions are valued, and can speak without fear.
- Be conscientious about how your actions and comments might be perceived or misunderstood by others.
- Be mindful of how you use social media, remembering the internet is a public place and we can't control how long something will remain on the internet, or other people's access to the content.
- Aspire to perform at your best while attending the conference. Please refrain from using or abusing alcohol, or any other drugs, that could prevent you from being at your best, or that could create a dangerous situation.
- Have zero tolerance for unwanted verbal or physical conduct (sexual or otherwise) or degrading and disparaging statements related to race, ethnicity, nationality, culture, religious beliefs, gender, gender identity and expression, sexual orientation, age, status, disability, physical appearance, political affiliation, technology choices, and other categories protected by the law.

- Support the use of Treaty of Waitangi principles – 'partnership, protection and participation' – and te reo Māori throughout the conference.
- Embrace and value diversity so all people involved with this conference feel supported. We believe diversity of people and ideas inspires innovation, can provide alternative insights and perspectives, and help lead to our collective successes.
- Be mindful of behaviours or comments that intimidate, create discomfort, interfere with a person's participation, or reinforce social structures of domination (related to race, ethnicity, nationality, culture, religious beliefs, physical appearance, age, status, gender, gender identity and expression, sexual orientation, disability) or that might be construed as an abuse of power.
- Thank you for helping us to create a memorable and rewarding conference experience.

What to do if you feel that the behaviours outlined here have been breached

In the event that you feel that someone's behaviour is not in line with our Code of Conduct, or have any other concerns about safety and wellbeing, please contact Rewi Elliot, Heidi Meudt, or another member of the organising committee. This can be done in person, or via text, phone call, email, or written or typed letter. You may request anonymity during this process. The person you contact will discuss the situation with a small committee to determine the next steps. We have established written guidelines for managing any reported breaches of the code of conduct, which are based on the following principles:

- We will do our utmost to be fair and impartial when investigating reported breaches
- We will act with sensitivity and discretion appropriate to the circumstances
- We will endeavour to gather as much information to support reported breaches as we are able
- We will investigate and come to our conclusions with as much promptness as the matter allows
- Where reported breaches involve illegal activity, for example theft, assault, or illicit drug used, the police will be contacted immediately
- We will comply with all relevant New Zealand legislation, for example the Privacy Act 1993
- We will communicate any breaches of the Code of Conduct to all delegates with complete anonymity and confidentiality of the particulars of circumstances and individuals involved.

Heidi Meudt
021 733 403
heidim@tepapa.govt.nz

Rewi Elliot
021 227 8169
rewi.elliot@wcc.govt.nz

Where the committee is unable to resolve the matter, an impartial external advisor may be engaged.

The conference organisers and Te Papa staff reserve the right to bar any person who disregards the behaviours expected at this conference from attending the conference in its entirety or in part, and/or to cancel the registration or membership of the person without refund.

We would like to acknowledge the organisations and websites below for helpful advice when writing this code of conduct:

- itsmf.org.nz
- ted.com
- scanz.co.nz
- tepunahamatatini.ac.nz
- geekfeminism.wikia.org

Sponsors

Manaaki Whenua – Landcare Research
Sponsor: Welcome Function, and Sessions 5 and 7
www.landcareresearch.co.nz
Manaaki Whenua – Landcare Research is one of seven Crown Research Institutes (CRIs) formed in 1992. We aim to deliver exceptional science and research spanning a wide array of scientific disciplines, presented in an approachable and meaningful way for all New Zealanders to engage with. Our science contributes to a number of National Goals that are managed by other organisations.

Biosecurity NZ, Tiakitanga Pūtaiao Aotearoa, Ministry for Primary Industries (MPI)
Sponsor: Sessions 1 and 2
www.biosecurity.govt.nz/biosecuritynz/
Protecting the country. Reducing risks. Biosecurity New Zealand's focus is on stopping pests and diseases at the border, before they get to New Zealand, and eradicating or managing the impact of those already here. With the help of New Zealanders, we ensure our unique environments and the value of our primary industries are maintained.

Otari-Wilton's Bush Trust
Sponsor: Session 6 and Student Support
www.owbt.nz
Otari-Wilton's Bush Trust is a public charitable trust made up of people who care deeply about the preservation of this internationally significant New Zealand bush and forest reserve. Our 400 members, of whom over 100 are active regularly at Otari, are key to its success and ongoing development. The Trust advocates for native plant conservation, educates the community on native plants and ecosystems, and responds to Wellington City Council plans affecting Otari.

Wildland Consultants Ltd
Sponsor: Dinner
www.wildlands.co.nz
Wildland Consultants is a progressive ecological consultancy committed to providing high quality ecological information, advice and technical services to a wide range of clients. The company has a very strong focus on the planning and implementation of ecological restoration. Company staff are based in Auckland, Hamilton, Tauranga, Rotorua, Whakatane, Gisborne, New Plymouth, Wellington, Christchurch and Dunedin and work nationwide.

Queenstown Natural Perfumiers
Sponsor: Session 4
queenstownperfumiers.nz
Queenstown Natural Perfumiers is the result of our longstanding, combined personal passion for fine perfumes – a love of their intangible beauty. Our goal has been to create a perfume range of exceptional distinction and elegance with an authentic New Zealand character.

Coastlands Plant Nursery
Sponsor: Thursday Morning Tea
www.coastlandsnursery.co.nz
Coastlands Plant Nursery is New Zealand's National Coastal Sand Dune Revegetation Centre, stocking foredune and back dune plant species, and specialising in propagating, growing and supplying quality eco-sourced native plants for sand dune replenishment and coastal erosion. Coastlands Plant Nursery is based in Whakatane and has been supplying coastal plants for 14 years from Northland to Bluff, producing some 500,000 plants annually.

Museum of New Zealand Te Papa Tongarewa
Sponsor
www.tepapa.govt.nz
The Museum of New Zealand Te Papa Tongarewa is the venue for the conference and New Zealand's national museum, located at the waterfront in Wellington. Known as Te Papa, or "Our Place", Te Papa was recently named as one of Lonely Planet's top 500 places to see on the planet.

Te Papa Press
Sponsor
www.tepapapress.govt.nz
Te Papa Press is the publishing imprint of the Museum of New Zealand Te Papa Tongarewa. Founded in 1997, Te Papa Press publishes a wide range of catalogues, museum books and scholarly research titles based on collections and exhibitions, as well as richly illustrated contemporary and historical art books and award-winning popular books that represent New Zealand's unique national identity.

Wellington City Council
Sponsor
wellington.govt.nz
Wellington City Council (WCC) employs about 1500 people who administer public works, sanitation, land use and building consents, among other local services and parks, including four gardens in the city: Wellington Botanic Gardens, Otari-Wilton's Bush, Truby King Park, and Bolton Street Cemetery.

Conference Venue – Te Papa

The Museum of New Zealand Te Papa Tongarewa is New Zealand's national museum, located at the waterfront in Wellington. Known as Te Papa, or "Our Place", more than 1.5 million people visit every year to experience six floors of exhibitions, collections, cafés and gift shops dedicated to New Zealand's culture and environment.

Museum of New Zealand Te Papa Tongarewa
55 Cable Street, Wellington, 6011, New Zealand
p: +64 4 381 7000; w: www.tepapa.govt.nz

Te Papa is open every day from 10–6 (except Christmas Day), and entry is free, although charges do apply to some short-term exhibitions and activities.

A map of Te Papa can be found here: https://www.tepapa.govt.nz/sites/default/files/map-tepapa-may2019.pdf

The following rooms at Te Papa will be used for the conference:

- **Pounamu** (Level 2, back of house): ASBS Council meeting on Saturday
- **Hīnātore** (Level 4): Public event: Endangered species wiki-a-thon on Sunday
- **Icon** (Level 2): Welcome Function on Sunday evening; catering all day on Thursday

- **Te Taiao / Nature** (Level 2): Welcome Function on Sunday evening
- **Soundings Theatre** (Level 2): Public lecture on Monday evening; public panel discussion on Thursday evening
- **Oceania** (Level 3): Conference talks on Monday and Tuesday; catering all day on Monday and Tuesday; book launch, pre-dinner drinks and canapés on Tuesday evening
- **Rangimarie 1 & 2 (Te Huinga Centre)** (Level 3): Conference talks on Tuesday and Thursday
- **Rongomaraeroa (Te Marae)** (Level 4): Dinner on Tuesday evening

Conference talks will take place in two different rooms on Level 3: **Oceania** on Monday and Tuesday, and in **Rangimarie 1 & 2 (Te Huinga Centre)** on Tuesday and Thursday. Please note that there are parallel sessions on both Tuesday and Thursday. If you are moving between rooms during sessions, please be considerate of the speakers and other attendees.

Food & Beverages

All catering breaks (morning tea, lunch, and afternoon tea) will be held in **Oceania** (Level 3) on Monday and Tuesday, and in **Icon** (Level 2) on Thursday. Please refrain from eating food that is labelled with particular dietary requirements, as this is for those participants who noted this on their registration. Please note, no food or drinks are to be taken outside of **Oceania** or **Icon** at any time. No takeaway coffees can be brought from the Te Papa Café to the hired venue space after 10 am once the museum is open to the public.

Internet Access

Te Papa offers a complimentary WiFi internet service to all function attendees. To access, connect to "Te-Papa-Events" on your device. A Te Papa internet page will pop up when you open your browser; simply type in the access code – "events" – and accept the terms and conditions. Please note there is a maximum of 2GB per 24 hours allowed per user. Please do not set up personal WiFi hotspots via WiFi Hubs/Routers as this interrupts our servers and may cause an outage across the museum.

Coat & Bag

All personal items such as coats, bags, umbrellas, etc. can be left inside **Oceania** or **Rangimarie 1 & 2** (please do not use the museum bag check on Level 1). It is the responsibility of each individual and conference organisers to manage and look after any items left inside the hired room space. Any items that are left behind will be removed and stored at the Information Desk on Level 2 or phone +64 4 381 7000 for any lost & found query.

Toilets & Accessibility

The toilets closest to **Oceania** are at the first left before the staircase as you come out of the room. There is also another set of toilets just after the bridge towards **Rangimarie 1 & 2**. **Rangimarie 1 & 2** and **Icon** also have their own dedicated toilets.

Children's changing rooms are available on Levels 1, 2, 4 and 5. Most toilets are accessible, and there are accessible toilets available on Levels 1, 3, 4 and 5. Please ask a member of the Visitor Services team for any assistance required.

Certified assistance dogs have the right to access Te Papa when assisting a disabled person. Please ensure the dog wears the appropriate coat and carries a valid ID card.

Smoking

Te Papa is a non-smoking environment. Smoking is only permitted outside the confines of the building and away from the main entrance doors. All types of electronic smoking devices are also not permitted inside the museum building.

Earthquakes

Please "drop, cover and hold" until all tremors have finished. Should the alarm go off during an earthquake, please remain under the shelter or in the venue. Follow instructions from any Te Papa Visitor Services team members or the emergency warden.

To protect the building from earthquake, the building sits on 150 base isolators. It will sway up to half a metre which is normal. Te Papa is designed to withstand an 8.5 earthquake and is a designated civil defence centre.

Te Papa would be among the safer places in Wellington in a major earthquake.

Tsunami Alert

The museum's visitor services team will ensure all guests are advised and guided to the higher levels in the building. This will be on Level 4 and above.

Fire Evacuation

Continuous sound of fire alarms will be activated all throughout the building and all occupants should leave the building immediately. Egress is available from all floors and areas in the building via the marked emergency exits or by the main staircase.

Evacuation is essential even if you cannot see or locate the fire. Te Papa Visitor Services team will take full charge of the evacuation and will ensure the building has been fully evacuated. Our trained staff members will follow procedures to assist disabled visitors in the case of an evacuation.

The building is fitted with an automatic sprinkler system, manual fire alarms, fire hose reels and extinguishers on each floor.

The assembly points are either in front of Te Papa near Circa Theatre or on Barnett Street corner Cable Street next to Waitangi Park. The Te Papa Visitor Services team will advise all guests when the building has been cleared for re-entry.

Other Emergencies

The emergency services number for police, fire and ambulance in New Zealand is 111.

If you need to contact the police for an issue that is not an emergency please ring 105.

The Te Papa Emergency Assistance/Security number is: +64 4 381 7747. For any other emergencies, please follow instructions from any Te Papa Visitor Services team members or the Te Papa Emergency Wardens.

Transport Options

For those visiting from Australia, there are direct flights to Wellington from Sydney, Melbourne, Brisbane and Gold Coast. https://www.wellingtonairport.co.nz/services/international-travel/international-flights-wellington/

Domestic flight times between the main centres, as well as a list of all airports in New Zealand, can be seen here: https://www.newzealand.com/int/domestic-flights/. There are also connections via tourist train and ferry (https://www.greatjourneysofnz.co.nz/) between Auckland, Wellington, Picton, Christchurch and Greymouth.

The following website is helpful for travelling to and from Wellington Airport: https://www.wellingtonairport.co.nz/transport/. The Airport Flyer bus (https://www.nzbus.co.nz/airportflyer/) is comfortable, easy to use and will take you direct to Courtenay Place or to other locations in downtown Wellington or further afield into the Hutt Valley. There is a taxi stand just outside the main entrance to Te Papa.

Because of its central location, there are many ways to get to Te Papa, including on foot or by bike/scooter, train or car: https://www.tepapa.govt.nz/visit/plan-your-visit/getting-here. Courtenay Place is one of the main bus stops in the city, and it is the closest one to Te Papa, only about a five-minute walk away.

If you plan to use the local buses, trains or ferries frequently during your stay, it may be worth purchasing a Snapper card (https://www.snapper.co.nz/) for discounted travel on public transport, but you can also pay with cash. Or you might happen upon one of the city's dockless bikes (https://onzo.co.nz/) or e-scooters (https://flamingoscooters.co.nz/ and https://nz.jump.com/nz/en/) which you can hire with your smartphone.

There is ample public parking at Te Papa at a special day function attendees' rate of $12.00 from 6am to 6pm and a special evening rate of $6.00 from 6pm to 2am the next day. The maximum charge on a 24-hour period is $18.00.

A small car parking validator machine is available inside the hired room. Please bring your parking ticket from the barrier arm to the validator and pass it through the machine. On departure, go to a parking pay station and the special function attendees rate will apply. There are five mobility parking spaces available on site – two spaces at uncovered and three spaces at covered parking lot close to the ground floor entrance.

Registration

Registration will be available at the Welcome Reception in **Icon** on Sunday evening from 4:30 pm, in **Oceania** on Monday and Tuesday from 8 am, and in **Rangimarie 1 & 2** on Thursday from 8am. Name tags will be provided on the day for the workshops on Sunday 24 November at the workshop venues.

Presentations and Posters

Here are some general guidelines and tips for oral presentations and posters at the conference.

Oral presentations

- Oral presentation slots are 15 minutes long in themed sessions on Monday, Tuesday and Thursday. We recommend planning to give a talk of 10–12 minutes. This allows for time for questions, as well as time to shift between talks. A rule of thumb is to plan to have about 1 slide per minute, or up to 12 slides in total.

- Here are some good tips for preparing and giving your conference talk:
    - https://www.apa.org/science/about/psa/2010/04/presentation
    - https://www.elsevier.com/connect/how-to-give-a-dynamic-scientific-presentation
    - https://www.wiley.com/network/researchers/promoting-your-article/6-tips-for-giving-a-fabulous-academic-presentation
- The conference talks will be held in two different rooms at Te Papa: **Oceania** and **Rangimarie 1 & 2**. Each of these rooms will have a standard AV setup including an installed presentation computer (PC), projection screens (two in **Oceania** and one in **Rangimarie 1 & 2**), remote slide advancer with laser pointer, lectern, several microphone options, and a monitor screen for the speaker.
- All our presentation computers run Windows and have the latest version of Microsoft Office. You are welcome to bring in your own laptops should you wish, as there is HDMI input at the lectern, a laptop plinth and audio input for your device (digital embedded or analogue 3.5 mm jack). We advise that you supply your own adapters.
- Most formats (e.g., ppt, pdf) are acceptable; if you have created your presentation on an Apple computer, please make sure it looks the same on a PC before uploading. The screens are 16:9 format.
- Please do **not** embed video in your presentation. If you would like to show a video in your presentation, upload this as a separate file.
- Please ensure you upload your talk to the computer in the correct room well before your designated session. Please bring your oral presentation on a USB data stick/flash drive to plug into the installed presentation computer. Conference volunteers will be available at each session to assist with this task.

Posters

Posters are great tools for communication and networking. A poster allows you to share your story visually and verbally through informal communication at the poster session. It should be thought of as a visual abstract, and a conversation starter (https://www.socialsciencespace.com/2018/05/4-steps-to-designing-an-award-winning-poster/).

- Posters can be any size that will fit our hired poster boards, which are 1200 mm wide x 2300 mm high. We will put one poster up on each side of the poster boards.
- Here are some good logistical tips for preparing your poster:
    - https://www.scientifica.uk.com/neurowire/how-to-make-your-scientific-posters-stand-out
    - https://www.nature.com/naturejobs/science/articles/10.1038/nj7614-115a
    - https://guides.nyu.edu/c.php?g=276826&p=1846154
- You may have additional material alongside your poster, for example, a handout or a business card, which can be made available by placing them in envelopes also attached to the poster board.
- At our conference, attendees presenting posters can put their posters up from 8:00 on Monday 25 November, and they will be on display until 18:00 on Tuesday 26 November, when they will need to be taken down. Posters will be able to be seen by conference attendees at any time on Monday and Tuesday during the first two days of the conference.
- There will also be a dedicated poster session (Session 8) on Tuesday afternoon from 3:05–4:45 pm, combined with afternoon tea. During this time, those who are presenting a poster will stand by their poster while other attendees can come around and talk to them about it. There are some good tips on how to present your poster at the poster session here: https://www.scientifica.uk.com/neurowire/tips-for-presenting-your-scientific-poster-at-a-conference

Awards and Student Support

The *Nancy T. Burbidge Medal* is the highest award of the Australasian Systematic Botany Society. First presented in 2001, it was established as a way for the Society to honour those who have made a longstanding and significant contribution to Australasian systematic botany. This year's presentation and Nancy T. Burbidge Memorial Lecture will be delivered on the late afternoon of Tuesday 26 November.

The *Pauline Ladiges Award* for best student oral presentation and the *Young Career Scientist* for best student poster award are proudly supported by CSIRO Publishing. Eligible student presenters will be assessed by the judges representing both societies over the course of the conference and presented on the final day of proceedings.

The *Bob Anderson Memorial Student Award* is awarded to a student from a developing country who presents a talk or poster. This award will also be presented on the final day of proceedings.

OTARI
WILTON'S BUSH TRUST

Student members of both the ASBS and NZPCN are eligible for a *student financial support* to reimburse of some of their conference costs if they present at the conference and have submitted an application to the respective societies prior to the deadline before the conference. Many thanks to ASBS, NZPCN and Otari-Wilton's Bush Trust for supporting our student attendees.

Social Programme

Wikipedia Edit-a-thon – endangered plant species

On Sunday 24 November, we will host a free public Wikipedia edit-a-thon on endangered plant species in Australasia in **Hīnātore** from 9 am to 5 pm (https://www.facebook.com/events/441187383159387/). The leaders are experienced 'wikimedians' Mike Dickison & Siobhan Leachman. This is a free event, but registration is required: https://www.eventbrite.co.nz/e/wikipedia-edit-a-thon-endangered-plant-species-registration-73770981993

Welcome Reception and after-hours viewing of Te Taiao / Nature exhibition – Sponsored by Manaaki Whenua – Landcare Research

The Welcome Reception starts at 5:30 pm and runs until 8:00 pm on Sunday 24 November in Icon. Around 6:30, the Te Taiao / Nature exhibition will be open to us for a private after-hours viewing until 8 pm. All drinks and food must remain in Icon and cannot be taken into the exhibition. Please make your own arrangements for

dinner; see below under "Eating Out" for nearby restaurant suggestions.

The Silent Auction

On Monday and Tuesday 25–26 November the Silent Auction will be running in **Oceania**! The silent auction is a fundraiser that the NZPCN has carried out successfully at our conferences since 2013. The auction will be silent, allowing some level of mystery as to whom you may be bidding against when you wish to win a must-have item. It's a fun and exciting way to support your societies!

The funds raised from the auction will be split 50/50 between our two societies and used to bolster the allocated research funds of each society. The NZPCN will split its share of the funds raised between the 'David Given Scholarship' and the 'John Sawyer Plant Conservation Fund'. The ASBS will use the funds raised to bolster its Scientific Research Awards, which currently include the 'Hansjörg Eichler Scientific Research Fund' and the 'Marlies Eichler Postdoctoral Fellowship'.

This is how the silent auction will work:

- The auction will open as soon as conference begins on Monday morning in **Oceania**.
- All items will be displayed on tables or boards and have a number on them. The number will correspond with a 'Bid Sheet' nearby.
- The 'Bid Sheet' will have a number at the top which corresponds with the relevant item.
- The 'Bid Sheet' will also have a description of the item; double check before you bid in case there has been a mistake, or the number has been moved/misplaced.
- The 'Bid Sheet' has two columns; one for your admission/bidder number (please use the number from your conference registration code), and one for the amount you are bidding.
- The 'reserve' amount in the bid column will already be present and can be used by the first bidder. This amount is 50–75% of the RRP of the item.
- All bids must be at least one dollar and can be as much as you like.
- If you bid on an item and are the highest at the time of close, you win it and are responsible for paying for it.
- Each auction will close at various times between 3pm and 7pm on Tuesday 26th November. This is also noted at the top of the 'Bid Sheet'. Please take note of this if you are keen to win the item.
- The highest bidder at the time of closing will win the item unless there is active bidding at that time.
- Upon winning an auction, please go to the silent auction area to pick up your item and arrange payment (cash or bank transfer; see Matt Ward for details).

We would like to thank the following people and organisations that donated books, artwork, merchandise and experiences to our silent auction this year: Marion Clarkson, Tanya Scharaschkin, Paula Warren, Matt Ward, Jane Gosden, Nicola Legat (Te Papa Press), Julian Fitter, Lydia White (Kew Publishing), John Clarkson, Katrina

Katopodis (Cambridge University Press), David Mabberley, Ian Clarke, Philip Smith (O2- Landscapes), Wayne Bennett (Forest Flora), Kevin Burns, Manaaki Whenua – Landcare Research, New Zealand Plant Conservation Network, Peter Jobson, Roy Slack (Otari-Wilton's Bush Trust), Wellington Gardens, Kate Brown (Biotopia Designs; c/o Juliet Wege), Tumbleweed Tees, Kate Miller (Zealandia), Brett Lindsay (Trik'n Tours), Ivan Lin (Vilo).

Please contact Matt Ward with any queries (mattdavidward@gmail.com), and happy bidding!

Friends of Te Papa public lecture

We are delighted to be able to co-host this public lecture, together with the Friends of Te Papa and the Swedish Embassy of New Zealand, on Monday 25 November at 6:30 pm in **Soundings Theatre** (https://www.facebook.com/events/903852529980281/). Dr Sverker Sörlin, who is Professor of Environmental History at the KTH Royal Institute of Technology, Stockholm, will present his talk on *Solander, Sparrman and the Anthropocene: Saving "the Environment" on a Planet made Unstable by Humans*. This is a paid event, and conference attendees get a discount! You can pay for a ticket on the day at the venue, or book your ticket in advance here: https://www.friendsoftepapa.org.nz/event/solander-sparrman-and-the-anthropocene/

Book launch: *Seeds of New Zealand Monocotyledons* – by Colin Webb, published by Manuka Press

You are cordially invited to attend the official launch of the publication *Seeds of New Zealand Monocotyledons* at 6:15pm on Tuesday 26 November in **Oceania**. The book launch will be opened by Manaaki Whenua – Landcare Research and Manuka Press, followed by a cash bar and canapés. This is a great opportunity for pre-dinner socialising and networking prior to the conference dinner!

This second volume of the "Seed Atlas" provides more than 700 illustrations, representing all the seed types in the monocotyledon plant group, as well as descriptions and keys to aid identification. This follows on from the first volume that covered the gymnosperms and dicotyledons, released in 2001. See www.manukapress.co.nz for ordering details.

Conference dinner

The conference dinner will be held on Te Papa's **Rongomaraeroa (Te Marae)**, with a programme starting at 7:15 pm. **Rongomaraeroa** is an authentic, contemporary, and inclusive marae (communal meeting place) on Level 4, with stunning views over Wellington's harbour. The dinner will include a starter, a choice of two mains (as well as catering to dietary requests), dessert and tea/coffee, and table wine, and there will be a cash bar. The programme on the night will include a 20 minute kapa haka performance by members of the Ngā Karere Māori Club in full regalia, who will perform a variety of songs.

For those with tickets to the conference dinner who are also attending the book launch, we will leave **Oceania** together at 7:10 pm to walk up to **Rongomaraeroa**. For those coming to the conference dinner who are not attending the book launch, please make sure you are at the museum's main entrance by 7:10 pm.

Informal social networking evening

On Wednesday 27 November, all early career researchers, students, young (and young at heart!) attendees are welcome to come to an informal social networking evening involving sampling some of Wellington's beers and eating dinner together. Our plan is the following:

- 6:00 pm – meet at Panhead (1 Tory St) for a pre-dinner drink
- 6:45 pm – leave Panhead and head to Mac's Brewery (4 Taranaki St) for 7:00 pm dinner
- 8:15 pm – after dinner drink at Fork and Brewer (upstairs at 20A Bond St).

Attendees are responsible for their own drink and food costs incurred. Please RSVP by contacting Todd McLay todd.mclay@csiro.au to register your interest. The above itinerary may be adjusted depending on numbers. We will endeavour to include everyone who wants to join in, even if you missed the RSVP date, but we may have to cap the numbers by 'first come, first served'.

Panel Discussion: *The Politics of Collecting – from Banks and Solander to Today*

A panel discussion not to be missed on Thursday 28 November at 6:30 pm in **Soundings Theatre**!
https://www.tepapa.govt.nz/visit/whats-on/events/panel-talk-politics-collecting-banks-and-solander-today
During the Endeavour's first voyage to Aotearoa, Joseph Banks and Daniel Solander collected plant specimens – some of which are in Te Papa's collections.

This panel discussion will feature two of our members, Leon Perrie and Peter de Lange, who together with Priscilla Wehi, Hēmi Whaanga and Tom Roa, will discuss the changing motivations for collecting specimens for museums, botanic gardens and seed banks, from Banks & Solander to today. How do these practices contribute to current research and the pressing conservation issues we face? This event is part of Te Papa's *Tuia 250* programme, acknowledging 250 years since the first onshore meetings between Māori and Europeans.

Note: this is a paid event, and conference attendees get a discount! You can pay for a ticket on the day at the venue, or book your ticket in advance here: https://www.tepapastore.co.nz/products/panel-talk-the-politics-of-collecting-from-banks-and-solander-to-today

Botany for Botanical Artists

Saturday 30 November – Sunday 1 December 2019 (two full days)
Venue: Leonard Cockayne Centre at Otari Native Botanic Garden and Wilton's Bush Reserve (Otari)
Leader: Tanya Scharaschkin – ASBS member, botanist (plant systematist), previously full-time research and teaching academic until mid-2017, now self-employed scientist and artist based in Tasmania, Australia.
Note: this is a paid event. You can see all the details for this event, and how to sign up, here: https://systematics.ourplants.org/programme/botany-for-botanical-artists/
You can also contact Eleanor Burton for more details: eleanor.burton@wcc.govt.nz

Visiting Te Papa's Herbarium (WELT) and Accessing the Collections

The Te Papa Herbarium (WELT) is located back of house on Level 2 behind current exhibitions Gallipoli and Te Taiao / Nature. Founded in 1865, it is one of 12 active, registered herbaria in New Zealand: http://www.nzherbaria.org.nz/.

WELT herbarium comprises the third-largest collection of botanical specimens in New Zealand: https://collections.tepapa.govt.nz/topic/2005. Our collection contains some 300,000 specimens, of which about 219,000 are databased, including algae (28,000), bryophytes (49,000), fungi/lichens (11,000), ferns (33,000) and seed plants (98,000). These collections are mainly from New Zealand, Australia, the Pacific, Europe, and North and South America. Important collectors include: J Banks, W Colenso, A Cunningham, J Dawson, T Kirk, C Knight, VW Lindauer, WRB Oliver, D Petrie, GOK Sainsbury, DC Solander, among others.

The Te Papa Botany team comprises Leon Perrie (Curator Botany), Carlos Lehnebach (Curator Botany), Antony Kusabs (Kaitiaki Taonga Collection Manager Botany), Patrick Brownsey (Research Fellow Botany), Heidi Meudt (Researcher Botany), Bridget Hatton (Research Technician), and Peter Beveridge and Barry Sneddon (Research Associates).

If you would like to view or study specimens at Te Papa's Herbarium (WELT) while you are in Wellington for the conference, please contact Antony Kusabs to arrange access (antony.kusabs@tepapa.govt.nz).

Most of the staff at WELT will be attending the conference on Monday, Tuesday and Thursday, so access may be limited on those days. However, we will have staff available to provide access on Wednesday (field trip day) and Friday (the day after the conference finishes), as well as weekdays during the weeks prior to and following the conference. Please let Antony know when you would like to access the herbarium, and what your requirements are. If you would like access outside of these times, please discuss this with Antony.

You may wish to consult online databases help you prepare for your visit. Many of the collections at WELT are databased and can be seen on Te Papa's Collections Online (https://collections.tepapa.govt.nz/) or the Australasian Virtual Herbarium (https://avh.ala.org.au/).

Workshops

Six workshops will be held on Sunday 24 November. Note that morning tea, lunch and afternoon tea are generally not included in the price of these workshops, so you'll need to bring your own lunch and snacks. See the links below to learn more about these workshops, what to bring, and how to get to the venue. All workshops are ticketed events. Note Workshop 1 has now become a free public event (see "Social Programme" above).

Workshops 2 & 3 – Botanising with iNaturalist

Leaders: Jon Sullivan & John Barkla (beginners, morning and advanced users, afternoon)
Venue: **Wellington Botanic Garden Treehouse Seminar Room**. https://systematics.ourplants.org/programme/workshops/#Workshop%202

Workshops 4 & 5 – Plant Identification

Leaders: Patrick Brownsey & Jeremy Rolfe (ferns, morning); Alex Fergus & Rowan Hindmarsh-Walls (plant surveys, afternoon)
Venue: **Otari Native Botanic Garden and Wilton's Bush Reserve** https://systematics.ourplants.org/programme/workshops/#Workshop%204

Workshop 6 – Basics of Illustration

Leader: Tanya Schraschkin (full day)
Venue: **Otari School Hall** https://systematics.ourplants.org/programme/workshops/#Workshop%206

Workshop 7 – Science Communication Skills for Botanists

Leaders: Kevin Thiele, Andrea Wild, Alison Ballance (full day, plus virtual activities prior to the conference)
Venue: **Giant Squid Meeting Room**, 169 Tory St. https://systematics.ourplants.org/programme/workshops/#Workshop%207

Field Trips

Five full-day field trips will take place on Wednesday 27 November. All field trips depart from Te Papa between 8:00 and 9:15 am and return to Te Papa between 4:00 and 5:30 pm, and include lunch and transport (bus, ferry or 4WD).

In the unfortunate event of extreme or unsafe weather, some field trips may need to be cancelled or an alternative itinerary offered. In the worst case scenario of field trip cancellation, we will endeavour to refund the field trip cost to participants. Any decisions about field trips will be announced on the morning of Monday 25 November at the conference opening.

What to bring on all field trips:

- Sturdy, covered footwear (no uncovered feet, jandals or sandals please)
- Suitable clothing for rain, cool temperatures, and wind (Wellington's weather is incredibly unpredictable)
- Sunscreen and a sun hat
- A hand lens, if you have one
- Camera, binoculars
- Refillable water bottle

Field trip 1 – Wild Wainuiomata and Rugged Remutaka Forests

Please arrive at: 7.45 am Departure time: 8 am Return time: 5:30 pm
Leaders: Owen Spearpoint (Greater Wellington Regional Council) & Melody McLaughlan (Department of Conservation); https://systematics.ourplants.org/programme/field-trips/#field1
Location: Wainuiomata Water Collection Area – Remutaka Forest Park (Middle Ridge track and Five Mile Loop)

This trip offers a rare chance to see the most intact lowland podocarp forest in the lower North Island and visit Remutaka Forest Park where the local community have reintroduced kiwi. Wainuiomata Water Collection Area was initially protected as a water collection area and now is intensively managed for its natural values. Neighbouring Remutaka Forest Park has been restored through revegetation and community trapping which controls predators of native wildlife. Expect to see ancient towering conifers, stunning beech forest and hopefully some flowering orchids!

Note: A good level of fitness is required. This trip will be made by chartered bus.

Field trip 2 – Spectacular Coastal Parangarahu Lakes and Lowland Forest of Eastbourne

Please arrive at: 8 am Departure time: 8.15 am Return time: 5:00 pm
Leaders: Carlos Lehnebach (Te Papa Botany) and Barrett Pistol (Greater Wellington Regional Council)
Location: Pencarrow light house – Parangarahu Lakes area – coastal area – Eastbourne; https://systematics.ourplants.org/programme/field-trips/#field2

The first stop on the trip is Pencarrow light house, which provides stunning views over the Wellington Harbour entrance. After walking up a reasonably steep rugged track, following the farm path back down, participants come to Parangarahu Lakes area, a fresh water lake system surrounded by rushes and sedges. Back out to the coast there's plenty of plants adapted to the rare shingle beaches in the area. Following this walk will be a site visit to Eastbourne to George Gibb's (renowned entomologist) private property with lowland beech forest, home to native mistletoes.

Note: A good level of fitness is required. This trip will be made by chartered bus.

Field trip 3 – Wellington's Rugged South Coast – Restoration of Nature in Te Kopahou and Oku Reserve

Please arrive at: 8.15 am Departure time: 8.30 am Return time: 5:00 pm
Leaders: Brian Thomas (Wellington City Council Coastal Ranger) and Anita Benbrook (Wellington City Council Restoration Advisor)
Location: Oku St Reserve (Island Bay) – Te Kopahau Reserve and Red Rocks Scenic Reserve – fur seal colony – Brooklyn Hill; https://systematics.ourplants.org/programme/field-trips/#field3

Wellington's coast is unusual in that it has many plants living at or near sea level that are typically alpine. This is thought to be due to sometimes harsh exposure of the sites. This presents challenges for ecological restoration, and we will explore how work to restore both rural and urban areas has been undertaken at Oku Street Reserve and Te Kopahou Reserve, in partnership with our local communities. This trip, which will be undertaken in 4WD vehicles along the rugged coast, also includes visits to the local fur seal colony and the Brooklyn wind turbine, offering stunning views over the Cook Strait, Wellington Harbour entrance, and Wellington city.

Note: This trip requires low to moderate fitness, but note it will be undertaken in 4WD vehicles on rough and steep terrain. Be prepared for a bumpy ride on occasion.

Field trip 4 – Experience the Emerald in our Harbour – Matiu / Somes Island

Please arrive at: 9 am Departure time: 9.15 am Return time: 4:15 pm
Leaders: Gemma Wright (Department of Conservation Kaitiaki Ranger) & Jon Terry (Jon Terry Ecology and Wellington Botanical Society).
Location: Matiu / Somes Island; https://systematics.ourplants.org/programme/field-trips/#field4

Matiu / Somes Island is a 24.9 ha Scientific and Historical Reserve in Te Whanganui-a-Tara, Wellington Harbour. The island has is very fascinating place: culturally, economically and ecologically. Many of its values have been restored by volunteers, local iwi and the Department of Conservation. Its pest-free status has resulted in flourishing plants and wildlife. This trip will include an introduction to the island by the leaders, and will allow participants to explore the island and observe tuatara, Cook Strait wētā and numerous bird species. Restoration is ongoing on the island, and the vegetation is recovering well with many coastal Wellington species.

Note: Moderate levels of fitness are required. Travel to/from Matiu / Somes Island is by East by West Ferry.

Field trip 5 – Discover the Collections at Otari-Wilton's Bush and Te Papa

Please arrive at: 8.45 am Departure time: 9 am Return time: 4:15 pm
Leaders: Finn Michalak (Otari-Wilton's Bush), Patrick Brownsey (Te Papa Botany) & Rebecca Rice (Te Papa Art)
Location: Te Papa collection stores in Botany (WELT herbarium) and Art – Otari-Wilton's Bush; https://systematics.ourplants.org/programme/field-trips/#field5

Take a chance to see behind the scenes and hear from the experts who care for Wellington's native plant collections – both preserved and living.

Start the tour at Te Papa, the national museum of New Zealand, where participants will spend the morning on two back of house tours in the herbarium (WELT) and the art store. The one-hour herbarium visit will be led by Patrick Brownsey, who will give a general overview of the WELT herbarium, as well as examine the contributions of early New Zealand plant collectors such as Joseph Banks and Daniel Solander, William Colenso, John Buchanan, Thomas Kirk and others. The herbarium tour will also focus on the trade in fern albums that developed in the late 19th century to supply the obsession with ferns in Victorian England, sometimes known as a period of pteridomania, and the use of cyanotypes to provide cheap identification guides for native ferns at this time. The one-hour art store visit will be led by Rebecca Rice (Curator of Historical New Zealand Art, Te Papa) and will look at a variety of New Zealand botanical art work including prints from Banks' Florilegium, and paintings by John Buchanan, Sarah Featon and Nancy Adams.

Participants will then get on a bus and head to Otari Native Botanic Garden and Wilton's Bush Reserve (Otari), and first have lunch. For the next few hours, Otari Collection Curator Finn Michalak will then lead a walk around the plant collections at New Zealand's only public botanic garden dedicated to native plants. It is also home to the largest forest remnant in Wellington City. Participants will experience this national treasure and will be able to see, identify, and look closely at many native New Zealand plants along the trails at Otari.

Note: This field trip is a fully accessible trip for participants of all fitness and accessibility levels. Travel between Te Papa and Otari will be by chartered bus.

Botany Content in Current Te Papa Exhibitions

We encourage all conference attendees to visit Te Papa's exhibitions this week. Here's a list of some botanical content on every floor of the building that you won't want to miss! All are free and open to the public:

Iwi planting area (access via the external ramp to the Marae on the NE side of the building, outside)

- Plants of significance to different iwi, gifted and planted before the opening of Te Papa in 1998

Gift shop (Level 1)

- A good selection of botanical, natural history and other books are available for purchase
- Also check out their botanically-inspired jewellery, perfumes (from one of our sponsors!), crafts, etc.

Te Taiao / Nature (Level 2)

- Endemic seed plants, ferns, bryophytes, lichens (and other fungi), and seaweeds (on the Endemic Wall)
- Banks' Florilegium print (in the far corner of the Treehouse)
- Vegetable caterpillar (in the Moko section of Active Land)
- Many others including the 'boring' flowers drawing table, divaricating plants (near the moa skeletons), weedy plants (in the Pests section), and *Hiya* fern reclassification (in the Treehouse)

Bush City (access via the Treehouse in Te Taiao / Nature, Level 2)

- A living, outdoor exhibition which includes some 170 vascular plant species native to New Zealand (a few are shown here: https://collections.tepapa.govt.nz/topic/2986)
- Several ecosystems are represented: wetland, Wellington forest, and alpine
- Can you find *Tecomanthe speciosa* and mānuka (a trans-Tasman species)?

Blood, Earth, Fire (in between Oceania and Rangimarie 1 & 2/Te Huinga Centre, Level 3)

- Displays on pest plants, kauri (*Agathis australis*), and deforestation in New Zealand

Tupaia and the mistletoe (take the stairs or lift to Tangata o le Moana, Level 4)

- Tupaia was a priest and navigator from Ra'iatea in the Society Islands who joined the first voyage of Captain James Cook
- See a specimen of the native mistletoe *Tupeia antarctica*, whose name pays tribute to Tupaia: https://collections.tepapa.govt.nz/topic/10675

Great views of plants, part one (start behind the Information Desk on Level 2 and walk up the ramp to Level 4)

- Views of cabbage trees, tree ferns, flax and other plants in Bush City on the way up
- Spectacular view at the top of the Harbour, Tararua Mountains and surrounding vegetation (best vantage point inside the museum)
- Plants of the Marlborough rock daisy (*Pachystegia insignis*) in the external courtyard

Featon's Flowers (take the lift to Toi Art, Level 5)

- See the paintings by New Zealand botanical artist Sarah Featon (1848 –1927)
- Her paintings were the basis for *The Art Album of New Zealand Flora (1887-1889)*, the first colour guide to New Zealand plants
- Their aim was to dispel the notion that New Zealand did not have any flowers!
- Adjacent to the paintings is a large and colourful modern installation by Nike Savvas inspired in part by the colours in Featon's artwork: https://www.tepapa.govt.nz/visit/exhibitions/toi-art/nike-savvas-finale-bouquet

Great views of plants, part two (take the lift to Level 6 and walk outside onto the roof)

- Views of the city, western half of the harbour, and surrounding vegetation (highest vantage point from the museum)
- Look down on Bush City

Eating Out

Wellington has a myriad of options for eating out. The city boasts approximately 850 restaurants, bars and cafes for its approximately 200,000 residents – one for every 240 people (for comparison, New York City has one per 340!). The Te Papa Botany team has compiled a list of some of our favourites which are very near Te Papa, but there are many other options, especially along Courtenay Place and Cuba St.

Unique to Wellington

The Tasting Room – 2 Courtenay Place – https://www.thetastingroom.co.nz/
Sweet Mother's Kitchen – 5 Courtenay Place – https://sweetmotherskitchen.co.nz/
Boat Café – 139A Oriental Parade – https://boatcafe.co.nz/
The Green Parrot Café – 16 Taranaki St – http://www.greenparrot.co.nz/
Press Hall – 80 Willis St – https://www.presshall.co.nz/ (Food court with numerous eateries)
Left Bank – 212 Cuba St – https://www.zomato.com/wellington/restaurants/in/left-bank-cuba-street (Several eateries)
Southern Cross Garden Bar Restaurant – 39 Abel Smith St – https://www.thecross.co.nz/

Vegetarian/Vegan

Aunty Mena's – 167 Cuba St – https://www.zomato.com/wellington/aunty-mena-vegetarian-te-aro-wellington-city
Herbivore – 203-205 Cuba St – http://herbivorewellington.co.nz/
Higher Taste – Old Bank Arcade, Customhouse Quay – https://www.highertaste.co.nz/

Asian

Monsoon Poon – 12 Blair St – https://www.monsoonpoon.co.nz/ (SE Asian)
Thai's Chef – corner of Wakefield and Blair Sts – https://thaichef.co.nz/wellington/ (Thai)
Masala – 12 Allen St – https://masala.gen.nz/ (Indian)
Aroy Thai – 13 Courtenay Place OR 101 Cuba St – https://aroy.co.nz/ (Thai)
Kera-la-cart – 25 Courtenay Place – https://keralacarte.co.nz/ (Kerala, SW Indian)
KC Café – 39A Courtenay Place – https://www.zomato.com/wellington/kc-cafe-takeaway-te-aro-wellington-city (Chinese)
Kazu – 13 Tory St – https://kazu.co.nz/ (Japanese)
Dragons – 25 Tory St – https://www.wellingtondragons.co.nz/ (Chinese, including Yum Cha)
Chow – 45 Tory St – http://www.chow.co.nz (Chinese)
Grand Century – 84 Tory St – https://www.wellingtonnz.com/discover/eat-and-drink/grand-century/ (Chinese, including Yum Cha)
Restaurant 88 – 88 Tory St – https://www.restaurant88.co.nz/ (Vietnamese)

Phu Thai – corner of Tory & Vivian Sts OR 35 Cambridge Terrace – https://phuthaiesarn.co.nz/ (Thai)
Country House – 57-59 Manners St – https://www.zomato.com/wellington/korean-country-house-te-aro-wellington-city (Korean)
Great India – 141 Manners St – http://greatindia.co.nz/ (Indian)
Apache – 122 Wakefield St – http://www.apache.kiwi/ (northern Vietnamese)
Rasa – 200 Cuba St – http://www.rasa.co.nz/ (Malaysian and Indian)
KK Malaysian – 54 Ghuznee St – http://www.kkmalaysian.co.nz/ (Malaysian)
Tatsushi – 19 Edward St – https://tatsushi.nz/ (Japanese)
Roti Chenai – 120 Victoria St – https://www.rotichenai.co.nz/ (Malaysian and Indian)
Little Penang – 40 Dixon St – https://www.zomato.com/wellington/little-penang-te-aro-wellington-city (Malaysian)
Ghengis Khan – 25 Majoribanks St – https://www.genghiskhanrestaurant.co.nz/ (Mongolian BBQ)

Mediterranean

Fratelli – 15 Blair St – https://www.fratelli.net.nz/ (Italian)
Nicolini's – 26 Courtenay Place – http://www.nicolinis.co.nz/ (Italian)
Tommy Millions – 105 Courtenay Place – https://www.tommymillions.co.nz/ (Pizza)
Abrakebabra – 90 Manners St – https://www.kebabcentral.co.nz/ (Turkish)
1154 Pastaria – 132 Cuba St – https://www.1154.co.nz/ (Italian)
Ombra – 199 Cuba St – https://ombra.co.nz/ (Venetian Italian)

Mexican

Los Banditos – 19 Blair St – https://www.losbanditos.co.nz/
Zambrero – 59 Courtenay Place – https://www.zambrero.co.nz/locations/courtenay
Flying Burrito Brothers – 180 Cuba St – http://www.flyingburritobrothers.co.nz/
Viva Mexico – 210C Left Bank – https://www.vivamexico.co.nz/
Mexico Wellington – 41 Dixon St – https://www.mexico.net.nz/wellington

Fish & Chips

Fish n Chips on Tory – 5/100 Tory St – https://www.wellingtonnz.com/discover/eat-and-drink/fish-n-chips-on-tory/
Wellington Sea Market – 220 Cuba St – https://www.wellingtonseamarket.com/fish-and-chips/
Mt Vic Chippery – 5 Majoribanks St – https://www.thechippery.co.nz/

Fine dining $$$

Hippopotamus – 90 Cable St – https://www.qthotelsandresorts.com/wellington/eat-drink/hippopotamus/
Le Samourai – 45 Tory St – http://lesamourai.co.nz/ (French wine bar)
Logan Brown – 192 Cuba St – https://www.loganbrown.co.nz/
Shed 5 – Queens Wharf – https://www.shed5.co.nz/
Whitebait – Clyde Quay Wharf – https://www.white-bait.nz/ (Seafood)

Beer

Panhead Brewery – 1 Tory St – https://www.facebook.com/panheadtory/
Hawthorn Lounge – 2/82 Tory St – http://www.hawthornlounge.co.nz/

The Malthouse – 48 Courtenay Place – http://www.themalthouse.co.nz/
Mac's Brewbar – 4 Taranaki St – https://www.zomato.com/wellington/macs-restaurant-and-brew-bar-wellington-central-wellington-city/info
St Johns Bar & Eatery – 5 Cable St – https://www.stjohnsbar.co.nz/
Little Beer Quarter – 6 Edward St – https://littlebeerquarter.co.nz/
Black Dog – 216 Cuba St – http://www.blackdogbrewery.co.nz/contact/
Whistling Sisters – Cnr Ghuznee & Taranaki Sts – http://www.whistlingsisters.co.nz/

Self-catering

If you plan to self-cater, a New World supermarket is only a two minute walk from Te Papa, situated between Wakefield and Cable Sts.

Social Media

Follow the ASBS–NZPCN Conference on our social media channels:

- Instagram: https://www.instagram.com/asbs_nzpcn2019/
- Facebook: https://www.facebook.com/plants2019nz
- Twitter: https://twitter.com/asbs_nzpcn_2019

When posting about the conference on social media, please use the hashtag **#asbs_nzpcn2019** or Twitter handle **@asbs_nzpcn_2019** to link to the conference social media channels.

Sign up to our society Facebook channels for updates:

- Australasian Systematic Botany Society (ASBS) Facebook public group: https://www.facebook.com/groups/434955569922530/
- New Zealand Plant Conservation Network (NZPCN) Facebook page: https://www.facebook.com/NZPCN/

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<tr><td>NZPCN AGM – Oceania</td><td>ASBS AGM – Rangimarie I</td></tr>
<tr><td colspan="2">Nancy T. Burbidge Memorial Lecture: Barry Conn – Oceania</td></tr>
<tr><td rowspan="2">Evening</td><td rowspan="2">Welcome Function – Icon</td><td>Public lecture – Soundings</td><td colspan="2">Book launch, cash bar & canapés – Oceania</td><td rowspan="2">Social networking (RSVP); or own arrangements for dinner</td><td colspan="2">Public panel discussion – Soundings Theatre</td></tr>
<tr><td>Own arrangements for dinner</td><td colspan="2">Conference dinner – Rongomaraeroa (Te Marae) (ticket required); or own arrangements for dinner</td><td colspan="2">Own arrangements for dinner</td></tr>
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Conference programme at a glance

Sunday 24 November 2019

- Workshops: 8:30 am – 5:00 pm. Ticketed events.
- Public Wikipedia edit-a-thon: 9:00 – 5:00 pm. **Hīnātore**. Free but registration required.
- Registration: from 4:30 pm & Welcome Function: 5:30 – 8:00 pm. **Icon** and **Te Taiao / Nature**.

Monday 25 November 2019

- Registration: from 8:00 am; please be seated by 8:20 am for mihi whakatau (formal welcome). **Oceania**.
- Keynote speaker: 9:05 – 10:05 am. **Oceania**. Hon Eugenie Sage.
- Session 1: 10:45 am – 12:30 pm. **Oceania**. Conservation genetics, genomics and ecology.
- Session 2: 1:30 – 3:15 pm. **Oceania**. The contribution of citizen science, and Conservation in response to environmental change.
- Session 3: 4:00 – 5:30 pm. **Oceania**. Aligning western science with mātauranga Māori for better conservation outcomes, and Celebrating 250 years of advances in botanical science and conservation since Banks & Solander.
- Public lecture: 6:30 – 7:30 pm. **Soundings Theatre**. Ticketed event.

Tuesday 26 November 2019

- Registration: from 8:00 am & Announcements: 8:45 am. **Oceania**.
- Keynote speaker: 8:50 – 9:50 am. **Oceania**. Melanie Mark-Shadbolt.
- Session 4: 10:30 am – 12:15 pm. **Oceania**. Decoding the green: Combating plant blindness, Ecological restoration, and Recovery of threatened plants: success stories?
- Session 5: 10:30 am – 12:15 pm. **Rangimarie 1**. Recent progress in taxonomy and phylogeny of Australasian plants I.
- Session 6: 1:15– 3:00 pm. **Oceania**. Recovery of threatened plants: success stories?
- Session 7: 1:15– 2:45 pm. **Rangimarie I**. Recent progress in taxonomy and phylogeny of Australasian plants II.
- Session 8: 3:05 – 4:45 pm. **Oceania**. Poster session and afternoon tea.
- NZPCN AGM: 3:45 – 4:45 pm. **Oceania**. All NZPCN members welcome!
- ASBS AGM: 3:45 – 4:45 pm. **Rangimarie I**. All ASBS members welcome!
- Nancy T. Burbidge Memorial Lecture: 4:50 – 5:50 pm. **Oceania**. All welcome.
- Book launch: 6:15 – 7:15 pm. **Oceania**. Cash bar and canapés. All welcome.
- Dinner: from 7:15 pm. **Rongomaraeroa (Te Marae)**. Ticketed event.

Wednesday 27 November 2019

- Field trips: 8:00 am – 5:30 pm. Ticketed events.
- Informal social networking event: 6:00 – 10:00 pm. RSVP to Todd McLay todd.mclay@csiro.au

Thursday 28 November 2019

- Registration: from 8:00 am & Announcements: 8:45 am. **Oceania**.
- Keynote speaker: 8:50 – 9:50 am. **Rangimarie 1 & 2**. Kevin Thiele.
- Session 9: 10:35 – 11:35 am. **Rangimarie 2**. Hybridisation: an ongoing dilemma for conservation.
- Session 10: 10:35 am – 12:20 pm. **Rangimarie 1**. Australasian Biogeography, and The Decadal Plan and the future of taxonomy in Australasia.
- Session 11: 1:30 – 3:00 pm. **Rangimarie 2**. What is the fossil evidence for extinction, adaptation and diversification in the assembly of the floras of the SW Pacific?
- Session 12: 1:30 – 3:00 pm. **Rangimarie 1**. Phylogenomics.
- Awards and Wrap up: 3:50 – 4:50 pm. **Rangimarie 1 & 2**.
- Informal Australasian Virtual Herbarium meeting. 4:50 – 5:50 pm. **Rangimarie 1 & 2**. All invited!
- Public panel discussion: 6:30 – 7:45 pm. **Soundings Theatre**. Ticketed event.

Detailed Programme

Note: Student presenters are indicated with an * in the programme

Saturday 23 November – ASBS Council Meeting

9 am – 5 pm: ASBS Council meeting – **Pounamu** (Level 2) – ASBS Council members only

Sunday 24 November – Workshops and Welcome Function

Workshops – https://systematics.ourplants.org/programme/workshops/ (tickets required)
9 am – 12 pm & 1 – 4 pm – Workshops 2 & 3: Botanising with iNaturalist – **Wellington Botanic Garden Treehouse**
9 am – 12 pm & 1 – 4 pm – Workshops 4 & 5: Plant identification – **Otari Native Botanic Garden**
8:45 am – 4 pm – Workshop 6: Basics of Illustration – **Otari School Hall**
8:30 am – 5 pm – Workshop 7: Science Communication Skills for Botanists – **Giant Squid**, 169 Tory Street
9 am – 5 pm: Wikipedia Edit-a-thon on Australasian endangered plant species – **Hīnātore** (ticket required)

From 4:30 pm – Registration – **Icon**
5:30 – 8:00 pm – Welcome Function – drinks and canapés (free with registration; ticket required for guests) – **Icon– Sponsored by Manaaki Whenua – Landcare Research**
6:30 – 8:00 pm– Special after-hours access to the new **Te Taiao / Nature** exhibition
Own arrangements for dinner

Monday 25 November – Day 1 of talks – Oceania

From 8:00 am – Registration – **Oceania**
8:30 am – Mihi Whakatau (formal welcome). *Please be seated by 8:20 am* – **Oceania**
8:45 am – Welcome by ASBS and NZPCN Presidents – **Oceania**
9:05 am – Opening keynote speaker: Hon Eugenie Sage – A new Biodiversity Strategy and Action Plan for Aotearoa New Zealand. Chair: Rewi Elliot – **Oceania**
10:05 am – Silent Auction announcement – Matt Ward – **Oceania**
10:10 – 10:40 am – Morning tea – Oceania

10:45 – 12:30 – Session 1 – Chair: Carol West; AV: Luke Liddell – **Oceania**.

Session 1: Conservation genetics, genomics and ecology
10:45 – 11:00 Dan Blanchon – Overlooked but not forgotten: Investigating lichen diversity within the Auckland Region
11:00 – 11:15 Sue Gardiner – Vulnerable Australian rhododendrons: One or two species?
11:15 – 11:30 Chrissen Gemmill – A case for taxonomy before conservation: New Caledonian Lauraceae and *Pittosporum*
11:30 – 11:45 Juliet Wege – Within striking distance: A digital Flora to aid conservation of Australian triggerplants and allies (Stylidiaceae)
11:45 – 12:00 *Zoe Lunniss – *Tupeia antarctica*: A precious parasite
12:00 – 12:15 Peter Heenan – Taxonomic novelties, restoration opportunities and conservation of limestone ecosystems in eastern South Island
12:15 – 12:30 David Orlovich – Using genomics tools to understand beech forests and their fungi

12:30 – 1:25 pm – Lunch – Oceania

1:30 – 3:15 pm – Session 2 – Sponsored by Biosecurity NZ – Chair: Lalita Simpson; AV: Todd McLay – **Oceania**

Session 2: The contribution of citizen science
1:30 – 1:45 pm *Amelia-Grace Boxshall – FungiSight: Using social media to assist phylogenetic and chemical investigations of Australian yellow-staining *Agaricus*
1:45 – 2:00 pm Jon Sullivan – Crowd-sourcing the discovery of new plant naturalisations in Canterbury using iNaturalist NZ

Session 2 (cont.): Conservation in response to environmental change
2:00 – 2:15 Darren Crayn – Securing the future of Australia's climate-threatened endemic tropical montane flora: An ex situ conservation approach based on multidisciplinary science and multi-institutional partnerships.
2:15 – 2:30 Bill Lee – Conservation and the ecological context for speciation in New Zealand
2:30 – 2:45 Kate Roud – "Some don't like it hot": Safeguarding the New Zealand collection at Melbourne Gardens, Royal Botanic Gardens Victoria
2:45 – 3:00 *Cara-Lisa Schloots – Variability in water regimes and vegetation within an alpine wetland complex in Central Otago, New Zealand
3:00 – 3:15 *Taylor Davies-Colley – Investigating the decline of the threatened bladderwort *Utricularia australis* in New Zealand, and genetic evidence for a new Australian species *Utricularia* sp. 'Choc-a-bloc'

3:15 pm – Silent Auction announcement – Matt Ward – **Oceania**
3:25 – 3:55 pm – Afternoon tea – Oceania

4:00 – 5:30 pm – Session 3 – Sponsored by Biosecurity NZ – Chair: John Barkla; AV: Jesse Bythell – **Oceania**

Session 3: Aligning western sciences with mātauranga Māori for better conservation outcomes
4:00 – 4:15 Jessica Beever – Te Hokingamai ō Kaikōmako Manawatāwhi: The restoration of *Pennantia baylisiana*
4:15 – 4:30 Monica Gerth – Mātauranga guided biodiscovery of anti-*Phytophthora* compounds from New Zealand native plants
4:30 – 4:45 Graeme Atkins – The importance of community education and engagement in the Raukumara Ranges

Session 3 (cont.): Celebrating 250 years of advances in botanical science and conservation since Banks & Solander
4:45 – 5:00 *Helen Kennedy – Revising *Melichrus*: A deep dive into the past, present and future of the urn heaths
5:00 – 5:15 *Tim Collins – From a shipwreck to shipshape? Systematic botany of paper daisies in Australia from Banks and Solander to the present
5:15 – 5:30 Ewen Cameron – The vascular plants recorded and collected in New Zealand by Banks and Solander, 1769-1770

5:30 – Announcements – **Oceania**

6:30 – 7:30 pm – Public lecture (ticket required) – Prof Sverker Sörlin, invited guest speaker – Solander, Sparrman, and the Anthropocene: Saving "the Environment" on a planet made unstable by humans – **Soundings Theatre**
Own arrangements for dinner

Tuesday 26 November – Day 2 of talks – Oceania and Rangimarie 1

From 8:00 am – Registration – **Oceania**
8:45 am – Announcements – **Oceania**
8:50 – Opening keynote speaker: Melanie Mark-Shadbolt – Do hapū and iwi views and practices provide an alternative paradigm to Aotearoa New Zealand's biosecurity system to better protect our taonga species? Chair: Rewi Elliot – **Oceania**
9:50 am – Brief announcement by Matt Ward regarding silent auction – **Oceania**

9:55 – 10:25 am – Morning tea – Oceania

10:30 am – 12:15 pm – Session 4 – Sponsored by Queenstown Natural Perfumiers – Chair: Shannel Courtney; AV: Yumiko Baba – **Oceania**

Session 4: Decoding the green: Combating plant blindness
10:30 – 10:45 Sverker Sörlin – Conservation without nature: Environmental governance in a world of loss
10:45 – 11:00 Tim Park – Biophilic Cities Network and Singapore's integration of nature into their city
11:00 – 11:15 Maggie Hanes – The Taste of Life: Informal science education made delicious
11:15 – 11:30 Kelly Shepherd – Forensic botany: An under-utilised tool for crime scene investigation due to plant blindness

Session 4 (cont.): Ecological Restoration
11:30 – 11:45 Robyn Simcock – Healing the Tui Mine site, Te Aroha Maunga: Terrestrial rehabilitation methods co-developed with mātauranga Māori principles challenge and enhance conventional rehabilitation methods
11:45 – 12:00 Melissa Hutchison – Planting a billion trees: The good, the bad, and the Hinewai of ecological restoration

Session 4 (cont.): Recovery of threatened plants: success stories?
12:00 – 12:15 Ashley Field – UneXtinct

10:30 am – 12:15 pm – Session 5: Sponsored by Manaaki Whenua – Landcare Research – Chair: Rob Simssen; AV: Weixuan Ning – **Rangimarie 1**

Session 5: Recent progress in taxonomy and phylogeny of Australasian plants I
10:30 – 10:45 *Duncan Nicol – The spatial patterns in a diverse endemic lineage
10:45 – 11:00 *Patricio Saldivia – Systematics of the *Celmisia* group (Asteraceae, Astereae) with an emphasis on *Celmisia* subgenus *Lignosae*
11:00 – 11:15 Rachael Fowler – Phylogenetic exploration of emu bush (*Eremophila*, Scrophulariaceae), with a focus on the *Eremophila glabra* complex using ddRAD
11:15 – 11:30 Andrew Thornhill – A dated molecular perspective of eucalypt evolution
11:30 – 11:45 *Harvey Orel – Phylogeny and phylogeography of flat-peas (*Platylobium*, Fabaceae) in south-eastern Australia
11:45 – 12:00 *Anne Thomas – Resolving the phylogeny of the New Zealand *Veronica* (Plantaginaceae) species radiation
12:00 – 12:15 Kerry Ford – Genetic and morphological variation in *Trithuria inconspicua* (Hydatellaceae): A new subspecies and a hypothesis of apomixis arising from a predominantly selfing lineage.

12:15 – 1:10 – Lunch – Oceania

1:15 – 3:00 – Session 6 – Sponsored by Otari-Wilton's Bush Trust – Chair: Jon Sullivan; AV: Lalita Simpson – **Oceania**

Session 6: Recovery of threatened plants: success stories?
1:15 – 1:30 Carlos Lehnebach – Exploring mycorrhizal fungal diversity across sympatric forest orchids in New Zealand
1:30 – 1:45 Debra Wotton – Once in a lifetime: Why is recruitment so rare in dryland floodplains?
1:45 – 2:00 Jacqui Bond – Preserving our native Myrtaceae from myrtle rust: A germplasm approach
2:00 – 2:15 Karin van der Walt – Creating ex situ collections through biotechnology: Five case studies of threatened species conservation in New Zealand
2:15 – 2:30 Philippa Crisp – What is the regional threat status of Wellington's indigenous plants?
2:30 – 2:45 Paul Champion – *Juncus holoschoenus* var. *holoschoenus* and other septate rushes in New Zealand
2:45 – 3:00 Sarah Beadel – Conservation and ecology of *Juncus holoschoenus* var. *holoschoenus* and other threatened plant species at Rangitaiki Wetland, Central North Island

1:15 – 2:45 – Session 7 – Sponsored by Manaaki Whenua – Landcare Research – Chair: Peter Jobson; AV: Francis Nge. – **Rangimarie 1**

Session 7: Recent progress in taxonomy and phylogeny of Australasian plants II
1:15 – 1:30 Yumiko Baba – Cheeseman's hinau revisited
1:30 – 1:45 *Nick Weigner – Promiscuous pitcher plants. A phylogenomic investigation of Nepenthes systematics and introgression.
1:45 – 2:00 Juergen Kellerman – Transoceanic range expansion of *Ochetophila trinervis* (Rhamnaceae, tribe Colletieae) by avian dispersal
2:00 – 2:15 Bill Barker – A new view of the annual eyebrights (*Euphrasia*: Orobanchaceae) in New Zealand
2:15 – 2:30 Heidi Meudt – Taxonomic revision of native New Zealand forget-me-nots (*Myosotis*, Boraginaceae): An update
2:30 – 2:45 Matt Buys – How alignments and gaps can influence tree topology

3:00 pm – Announcements – **Oceania**
3:05 – 4:45 – Session 8: Poster session and afternoon tea – Oceania

Session 8: Posters
*Jennifer Alderton-Moss – Conservation efforts to protect New Zealand native orchid species
*Francis Nge – Biogeography of *Pomaderris* (Rhamnaceae) across the ditch: Multiple dispersal events from Australia to New Zealand (poster presentation)
*Raees Khan – Game of cones: Evolutionary trends and taxonomic significance of female cones in Podocarpaceae
*Sophie Newmarch – Origins of polyploidy and diversification in *Libertia* (Iridaceae)
*Seoljong Kim – A population-genomic and taxonomic study of *Eucalyptus argophloia* and *E. bosistoana*
Alexander Schmidt-Lebuhn – The unexpected taxonomic outcomes of assembling a biocontrol test list
Lara Shepherd – Molecular support for the recognition of *Schoenus caespitans* Petrie
Peter Beveridge – Taxonomic revision of the leafy liverworts *Cheilolejeunea* in New Zealand
Todd McLay – hyRAD for population genomics and identification of cryptic species
Briar Taylor-Smith – Significant Natural Areas in the Waikato – Prioritising karst ecosystems

3:45 – 4:45 – NZPCN AGM – All NZPCN members welcome! – **Oceania**
3:45 – 4:45 – ASBS AGM – All ASBS members welcome! – **Rangimarie 1**

4:50 – 5:50 – Nancy T. Burbidge Medal Presentation and Memorial Lecture – Barry Conn – Is Paradise Lost? Or not yet discovered? – Chair: Daniel Murphy – **Oceania**

5:50 – 6:00 – Last Announcements, Silent Auction finishes; attendees who wish to leave the museum prior to dinner must do so prior to closing at 6 pm; all materials including posters and Silent Auction items must be removed from room.

6:15 – 7:15 pm – Book launch – *Seeds of New Zealand Monocotyledons* – by Colin Webb, published by Manuka Press – with drinks & canapés (all welcome) – **Oceania**
7:15 – 10:00 pm – Conference dinner & kapa haka – Sponsored by Wildland Consultants Ltd – Ticket required – **Rongomaraeroa (Te Marae)**
Otherwise own arrangements for dinner

Wednesday 27 November – Field trips

Field trips – https://systematics.ourplants.org/programme/field-trips/ (tickets required)
All field trips depart and return from Te Papa. Please meet outside the main entrance to Te Papa 15 minutes prior to your departure time to pick up your lunch and meet your field trip leaders.

Field trip 1: Wild Wainuiomata and Rugged Remutaka Forests. *Please arrive at: 7.45 am. Departure:: 8 am.*
Field trip 2: Spectacular Coastal Parangarahu Lakes and Lowland Forest of Eastbourne. *Please arrive at: 8:00 am. Departure: 8:15 am.*
Field trip 3: Wellington's Rugged South Coast – Restoration of Nature in Te Kopahou and Oku Reserve. *Please arrive at: 8:15 am. Departure: 8.30 am.*
Field trip 4: Experience the Emerald in our Harbour — Matiu / Somes Island. *Please arrive at: 9:00 am. Departure: 9:15 am.*
Field trip 5: Discover the Collections at Otari-Wilton's Bush and Te Papa. *Please arrive at: 8:45 am. Departure: 9:00 am.*

6:00 – 10:00 pm – Informal social networking event – (see "Social Programme" above for more details; RSVP to Todd McLay todd.mclay@csiro.au)
Otherwise own arrangements for dinner

Thursday 28 November – Day 3 of talks – Rangimarie 1 & 2 (Te Huinga Centre)

From 8:00 am – Registration – **Rangimarie 1 & 2**
8:45 am – Announcements – **Rangimarie 1 & 2**
8:50 am – Opening keynote speaker: Kevin Thiele – Breaking through the barriers – taxonomy and systematics in the Anthropocene – Chair: Daniel Murphy – **Rangimarie 1 & 2**
9:50 – 10:30 am – Morning tea – **Sponsored by Coastlands – Icon**

10:35 – 11:35 – Session 9 – Chair: Ryonen Butcher; AV: Jonathan Frericks – **Rangimarie 2**

Session 9: Hybridisation: an ongoing dilemma for conservation
10:35 – 10:50 *Francis Nge – Hybridisation and deep reticulate evolution of an Australian plant genus – *Adenanthos* (Proteaceae)
10:50 – 11:05 *Chapa Manawaduge – Taxonomy, genetics and conservation of threatened native olives (*Notelaea* spp.) in Australia
11:05 – 11:20 Lars Nauheimer – Insights into the reticulate evolution of the sun orchids (*Thelymitra*, Orchidaceae): Resolving parental lineages using target capture and haplotype phasing
11:20 – 11:35 Peter Lockhart – Hybridisation and diversity of New Zealand alpine *Ranunculus*

10:35 am – 12:20 pm – Session 10 – Chair: Katharina Nargar; AV: Taylor Davies-Colley – **Rangimarie 1**

Session 10: Australasian Biogeography
10:35 – 10:50 Peter Jobson – The biogeography of central Australian flora
10:50 – 11:05 Rob Smissen – Was harakeke introduced to Norfolk Island by Polynesians?
11:05 – 11:20 *Lalita Simpson – Spatio-temporal evolution of Asian and Australasian *Bulbophyllum* (Orchidaceae)
11:20 – 11:35 *Luke Liddell – Whole genome duplication in *Veronica* and *Coprosma*: Support for a several-fold increase in biome-shifting among high ploidy lineages
11:35 – 11:50 KC Burns – Evolution in Isolation: The search for an island syndrome in plants

Session 10 (cont.): Australasian Biogeography, and The Decadal Plan and the future of taxonomy in Australasia
11:50 – 12:05 Jennifer Tate – Species Aotearoa

12:05 – 12:20 David Cantrill – Genomics for Australian Plants: An update on the GAP consortium project

12:20 – 1:25 pm – Lunch – Icon
1:30 – 3:00 pm – Session 11 – Chairs & AV: Daphne Lee & John Conran – **Rangimarie 2**

Session 11: What is the fossil evidence for extinction, adaptation and diversification in the assembly of the floras of the SW Pacific?
1:30 – 1:45 Hervé Sauquet – Integrating fossil flowers in angiosperm macroevolutionary analyses
1:45 – 2:00 Andrew Rozefelds – *Palissya*: absolutely incomprehensible or surprisingly interpretable: A new morphological model and phylogenetic insights
2:00 – 2:15 Daphne Lee – Fossil flowers from the Foulden and Hindon Konservat-Lagerstätte deposits: Insights into Miocene biodiversity, ecology and pollination in Zealandia
2:15 – 2:30 John Conran – '*Zealandia fructus*': Angiosperm diaspores in the New Zealand fossil record and their implications for paleoecology
2:30 – 2:45 *Matt Vanner – Cenozoic fossil wood: New evidence for diversification and extinction of forest trees in the New Zealand region
2:45 – 3:00 *Kia Matley – Southeast Australian palaeofloras of the late Pleistocene, and their implications for glacial palaeoclimate reconstructions

1:30 – 3:00 pm – Session 12 – Chair; Juliet Wege; AV: Kelly Shepherd – **Rangimarie 1**

Session 12: Phylogenomics
1:30 – 1:45 *Patrick Fahey – The phylogeography of *Eucalyptus behriana* (Bull mallee): A story of many signals
1:45 – 2:00 *Weixuan Ning – Phylogenomic analysis of New Zealand polyploid *Azorella* (Apiaceae)
2:00 – 2:15 Todd McLay – Investigating polyploidy in Malvaceae using target sequence capture
2:15 – 2:30 Alexander Schmidt-Lebuhn – A broadly sampled phylogenomic dataset resolves major clades of Australian Gnaphalieae (Asteraceae)
2:30 – 2:45 Katharina Nargar – Evolution of Australia's terrestrial orchid diversity in space and time: Phylogenomic insights from tribe Diurideae
2:45 – 3:00 Richard Winkworth – Chloroplast genome evolution in New Zealand mycoheterotrophic Orchidaceae

3:00 – 3:45 pm – Afternoon tea – Icon
3:50 – 4:50 – Awards & Wrap up – Rangimarie 1 & 2
4:50 – 5:50 – Informal meeting regarding Australasian Virtual Herbarium – Chair: Darren Crayn – All invited – **Rangimarie 1 & 2**

6:30 – 7:45 pm – Public panel discussion: The politics of collecting: From Banks & Solander to today – Invited expert panel: Leon Perrie, Peter de Lange, Priscilla Wehi, Hēmi Whaanga, Tom Roa; Facilitator: Bronwyn Labrum – **Soundings Theatre** (ticket required)
Own arrangements for dinner

Student presenters are indicated with an * in the programme

Programme with Abstracts

Saturday 23 November – ASBS Council Meeting

9 am – 5 pm: ASBS Council meeting – **Pounamu** (Level 2) – ASBS Council members only

Sunday 24 November – Workshops and Welcome Function

Workshops – https://systematics.ourplants.org/programme/workshops/ (tickets required)
9 am – 12 pm & 1 – 4 pm – Workshops 2 & 3: Botanising with iNaturalist – **Wellington Botanic Garden Treehouse**
9 am – 12 pm & 1 – 4 pm – Workshops 4 & 5: Plant identification – **Otari Native Botanic Garden**
8:45 am – 4 pm – Workshop 6: Basics of Illustration – **Otari School Hall**
8:30 am – 5 pm – Workshop 7: Science Communication Skills for Botanists – **Giant Squid**, 169 Tory Street
9 am – 5 pm: Wikipedia Edit-a-thon on Australasian endangered plant species – **Hīnātore** (ticket required)

From 4:30 pm – Registration – **Icon**
5:30 – 8:00 pm – Welcome Function – drinks and canapés (free with registration; ticket required for guests) – **Icon – Sponsored by Manaaki Whenua – Landcare Research**
6:30 – 8:00 pm– Special after-hours access to the new **Te Taiao / Nature** exhibition
Own arrangements for dinner

Monday 25 November – Day 1 of talks – Oceania

From 8:00 am – Registration – **Oceania**
8:30 am – Mihi Whakatau – Oceania
8:45 am – Welcome by ASBS and NZPCN Presidents – **Oceania**
9:05 am – Opening keynote speaker: Hon Eugenie Sage
A new Biodiversity Strategy and Action Plan for Aotearoa New Zealand. Chair: Rewi Elliot – **Oceania**
Eugenie Sage – e.sage@ministers.govt.nz

ABSTRACT
The development of a new Biodiversity Strategy and Action Plan for Aotearoa New Zealand is being led by the Department of Conservation (DOC) on behalf of all New Zealanders. The new strategy will replace *Our Chance to Turn the Tide*, the current biodiversity strategy that has been in place since 2000. The new strategy will not be confined to government action. Rather, we want it to ignite a groundswell of action and long-term behaviour change within New Zealand. Iwi/hapū/whānau, councils, landowners, non-governmental organisations (NGOs), community groups, businesses, individuals and the Government all have a responsibility in managing and enhancing biodiversity – we can all be part of the solution. The new biodiversity strategy will set out a vision and long-term outcomes for us all to work towards. The vision for 2070 is proposed as: *Nature in Aotearoa is healthy, abundant, and thriving. Current and future generations connect with nature, restore it, and are restored by it.* Amongst other things, this means that, in 2070 our species, habitats and ecosystems (especially those that are currently rare and threatened) are increasing, not declining, in number and extent, across private as well as public land and in the sea. A strong evidence base is crucial. We must invest in science to fill key knowledge gaps and ensure that science delivers the knowledge and tools we need to improve biodiversity management outcomes. There is also opportunity for better recognition of the value of mātauranga Māori and western science, to enhance depth of focus, and capture local and intergenerational knowledge held by hapū and whānau.

Ensuring we have the scientific capability we need is crucial that we retain, maintain and grow our scientific capability in organisations and research institutes. We need to plan ahead so that the biodiversity system, both now and into the future, provides support for science through sustainable career pathways and on-going capability.

BIO

Hon Eugenie Sage is the Minister for Conservation, Minister for Land Information New Zealand and Associate Minister for the Environment. She has been a Green MP since 2011. Before that she was an elected Environment Canterbury regional councillor. For much of her adult life she has worked to better protect Aotearoa/New Zealand's natural landscapes and seascapes, and the indigenous plants and wildlife that call them home, including 13 years with the conservation organisation, Forest and Bird.

10:05 am – Silent Auction announcement – Matt Ward – **Oceania**
10:10 – 10:40 am – Morning tea – Oceania

10:45 – 12:30 – Session 1 – Chair: Carol West; AV: Luke Liddell – **Oceania**

Session 1: Conservation genetics, genomics and ecology

Session 1: Monday 10:45 – 11:00
Overlooked but not forgotten: Investigating lichen diversity within the Auckland Region
Dan Blanchon – dblanchon@unitec.ac.nz – ASBS member

Andrew Marshall[1], Dan Blanchon[1], Glenn Aguilar[1], Linton Winder[1], Craig Bishop[2], Peter de Lange[1]
[1] Unitec Institute of Technology, Auckland, New Zealand
[2] Auckland Council, Auckland, New Zealand

ABSTRACT

Internationally, lichens are used as bioindicators of terrestrial ecosystem health, although in New Zealand their use is rare. The first step towards the usage of lichens as bioindicators is to understand the lichen diversity and composition within different vegetation associations. While the New Zealand lichenised mycobiota is reasonably well known, systematic studies of different habitat or substrate types are uncommon, and, despite their ecological importance, lichens are either not included in surveys for monitoring purposes or their documentation is limited. For example, the New Zealand Department of Conservation maintain an extensive series of permanent vegetation monitoring plots throughout the country, and for these records of some of the larger lichens present are made, though notably not the crustose taxa despite the fact that they contribute the most to New Zealand's lichen diversity. By contrast permanent vegetation plots placed across the Auckland Region by the Auckland Council do not record lichens at all. In response to this, a project was initiated by Unitec Institute of Technology and Auckland Council to do a complete inventory of the lichens present within a subsample of 50 of the 257 Auckland Council permanent vegetation monitoring plots (400m2). The 50 plots sampled encompass a wide variety of forest vegetation associations found in the Auckland region. From those plots we have collected nearly 3000 lichen specimens, the ongoing analysis of which has uncovered unexpectedly high lichen diversity, including a number of lichens that are either apparently new and require formal description, or are additions to the New Zealand lichenised mycobiota. In addition, data from this study is providing valuable insight into the ecology, distribution, population and population trends for some of the 1108 lichen species currently listed as being Data Deficient.

BIO

Dan Blanchon completed his MSc in Botany (1994, on lichens) and PhD (1999, on the New Zealand iris *Libertia*), both at the University of Auckland. He is an Associate Professor and head of the School of Environmental and Animal Sciences at Unitec Institute of Technology in Auckland. His main research focus is on the taxonomy, evolution, ecology and conservation of lichens, and the impacts and management of invasive plant species.

Session 1: Monday 11:00 – 11:15

Vulnerable Australian rhododendrons – one or two species?

Sue Gardiner – sue.gardiner@plantandfood.co.nz

Susan Gardiner[1], Claudia Wiedow[1], Cecilia Deng[2], Chris Kirk[1], Adrian Grande[1], Simon Begg[3], Benjamin Hall[4], Andrew Rouse[5], Stuart Warboys[6], Darren Crayn[6], Marion MacKay[7]

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ABSTRACT

Rhododendron L. is one of the world's 20 largest plant genera, with >1000 species. In 'big genera', species boundaries are often not readily distinguishable, making it difficult to set conservation priorities. *Rhododendron lochiae* F. Muell. (syn. *R. notiale* Craven) (section *Schistanthe*, formerly subgenus *Vireya*) is a rare species known only from mountain peaks in northern Queensland, south of Cairns. It has been hypothesized that plants from peaks north of Cairns represent a second species, *R. viriosum* Craven, distinguished inter alia by having straight floral tubes (vs curved in *R. lochiae* sensu stricto), stamens clustered (vs evenly distributed around the tube), and dark red anthers (vs yellow). However, *R. viriosum* is currently not recognised on the Australian Plant Census, due partly to insufficient evidence of genetic divergence. *Rhododendron lochiae* is Vulnerable on the *Rhododendron* Red List and is hence a conservation priority. Whether *R. viriosum* is genetically distinct and therefore worthy of species status and conservation attention in its own right is a key question. *Rhododendron* leaf samples were collected from across the known range of Australian *Rhododendron* (including the type locality), as part of a broader tropical mountain plant conservation project. These samples were subjected to sequence analysis using data derived from genotyping by sequencing, aligned to the *R. williamsianum* genome (Soza et al. in press), along with samples of ex situ origin and accessions of other *Schistanthe* rhododendrons with good provenance data. Initial analysis of relatedness indicates that accessions collected from north of Cairns are more closely related to each other, than to accessions collected from the south of Cairns. We will discuss the impact of our results on the systematics and evolution of Australian *Rhododendron*, and suggest conservation strategies, including maximising genetic diversity within ex situ collections.

BIO

Dr Susan Gardiner completed her PhD in Biochemistry in 1977 (University of Otago). She is currently a Principal Scientist at The New Zealand Institute for Plant & Food Research Limited. Her research speciality is the development of genomic technologies for facilitating the efficient development of new cultivars of a range of fruit crops, including apple and kiwifruit. She has had a life-long interest in rhododendrons and is a Past President of the New Zealand *Rhododendron* Association (NZRA), Chair of the NZRA Species Conservation Committee, and member of the New Zealand ex situ *Rhododendron* Conservation Project. She is a board member of the Rhododendron Species Foundation (USA) and the Pukeiti *Rhododendron* Trust.

Session 1: Monday 11:15 – 11:30

A case for taxonomy before conservation: New Caledonian Lauraceae and *Pittosporum*

Chrissen Gemmill – gemmill@waikato.ac.nz – ASBS member

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ABSTRACT

The remarkable biodiversity hotspot flora of New Caledonia is rich in endemism as a result of complex biogeographical histories and geographical heterogeneity. FLORICAL (http://publish.plantnet-project.org/project/florical) provides the most up to date checklist/taxonomy of the flora of New Caledonia. A precise evaluation of the taxonomic status of any species is of critical importance for biodiversity inventories and for developing successful conservation management plans at the local, provincial, national, and international levels. However, the current level of knowledge of most of these species is not sufficient to conduct a robust risk assessment using the IUCN Red List criteria, e.g., too few specimens are available and/or taxonomic delimitations remain unclear. We are using a holistic approach that combines molecular and morphological data to test the current classification and taxonomic delimitation of New Caledonian taxa, while concurrently reconstructing the evolutionary patterns and biogeographic histories. Specifically, our work will lead to refinements and improvements of the currently available taxonomy that, based on our current understanding of various groups, will likely lead to changes in the taxonomic framework. By using this integrated approach our results will contribute to multiple areas of research on New Caledonia's remarkable flora, including the fields of systematics, biogeography and conservation. Our work provides a robust information base for these taxa to the New Caledonian Plant RLA for application of the IUCN Red List criteria. In this talk we report on our studies focused on New Caledonian Lauraceae (*Cryptocarya, Beilschmiedia, Endiandra, Litsea, Adenodaphne*) and *Pittosporum* (Pittosporaceae). Our work highlights the importance of having an accurate taxonomic framework in order to underpin conservation in New Caledonia.

BIO

Chrissen began her journey as an evolutionary biologist at UC Irvine. She completed her PhD at Colorado Boulder, where she undertook conservation genetic studies of rare Hawaiian plants. She was a postdoctoral fellow at the Smithsonian Institution, working on molecular systematics of Hawaiian *Pittosporum*. She has been at the University of Waikato since 1997. She is part of an international team whose research focuses on plants of Zealandia, using morphology and molecular systematics to evaluate current taxonomy for applications in conservation. Current research focuses on *Pittosporum*, Lauraceae, Winteraceae, *Vitex*, and *Tapeinosperma*. Her team contributes to the New Caledonian Plant Red List authority.

Session 1: Monday 11:30 – 11:45

Within striking distance: A digital Flora to aid conservation of Australian triggerplants and allies (Stylidiaceae)

Juliet Wege – juliet.wege@dbca.wa.gov.au – ASBS member

Juliet Wege[1]

[1]Western Australian Herbarium, Department of Biodiversity, Conservation and Attraction, Perth, Australia

ABSTRACT

Australia's triggerplant flora (*Stylidium*; >300 spp.) has been the subject of a prolific phase of taxonomic research over the past two decades in which more than 100 new species have been recognised and described, many of which are rare or poorly known; however, a modern taxonomic account has yet to be completed. Although herbarium-based research and associated field work have improved our understanding of the distribution and rarity of many taxa, around one third remain poorly known (Data Deficient) and many collections in the Australasian Virtual Herbarium (n. > 24,500) are misidentified. There is a pressing need to provide an overarching synthesis of the group to facilitate accurate identification by conservation personnel, industry stakeholders and community members, and to stimulate further survey effort. An account of Stylidiaceae is currently being prepared on the online Flora of Australia platform and will bring together taxonomic information held across disparate sources while generating substantial new content, highlighting collection and research gaps, and taxonomically verifying a suite of herbarium collections. This treatment will be supplemented by bespoke identification guides and a series of identification workshops designated to maximise conservation outcomes.

BIO

Juliet Wege is a Senior Research Scientist at the Western Australian Herbarium where she undertakes taxonomic research on a range of plant groups (with an emphasis on threatened, rare or poorly known species) and helps to edit and publish the Herbarium's journal *Nuytsia*. Her main area of expertise is the triggerplant family Stylidiaceae, with her research encompassing taxonomy and systematics, nomenclature, pollination and fire ecology, and conservation. Past and present funding from the Australian Biological Resources Study is helping her to achieve a major research goal—an account of Stylidiaceae for the Flora of Australia.

Session 1: Monday 11:45 – 12:00

Tupeia antarctica: A precious parasite

*Zoe Lunniss – zoe.lunniss@postgrad.otago.ac.nz – NZPCN member

Zoe Lunniss[1], Janice Lord[1]

[1] Department of Botany, University of Otago, Dunedin, New Zealand

ABSTRACT

Mistletoes suffer from a polarised reputation: either the decorative prelude to a sweet Christmas kiss, or the tree-killing parasite that must be excised for the good of the forests. Yet mistletoes offer so much more. *Tupeia antarctica* is one of New Zealand's five extant native mistletoe species. It is phylogenetically distinct from any other mistletoe member within the Loranthaceae family and is currently classified as At Risk and Declining. In addition to largely fragmented populations on old host trees, *T. antarctica* is dioecous, likely disperser- and pollinator-limited and heavily affected by grazing. I am researching the current host and distribution range of *Tupeia* within the Otago region, examining whether *T. antarctica* acts as a 'sink' for invertebrates, and the effects of mammalian grazers. Observational and experimental field work was conducted on two of three known populations in Otago. In comparison to historical records from the region, this study found *T. antarctica* distribution to be restricted and regional host specificity relatively high. In addition, this work provides evidence of *T. antarctica* serving as a keystone resource accommodating a large variety of invertebrate species, many of which are formally undescribed and/or at risk. Finally, this study provides new evidence suggesting *T. antarctica* has the ability to survive in a dormant state when exposed to high drought stress or high levels of grazing. Additional research on North Island mistletoe populations will determine whether trends observed in Otago are consistent throughout New Zealand. This will establish a base line of information vital for conservation management.

BIO

Zoe Lunniss graduated from The University of Otago in 2017 with a BSc majoring in botany. She is now pursuing a MSc at The University of Otago, studying the at-risk mistletoe species *Tupeia antarctica*. Zoe is passionate about plant conservation and communicating scientific ideas to a wider audience.

Session 1: Monday 12:00 – 12:15

Taxonomic novelties, restoration opportunities and conservation of limestone ecosystems in eastern South Island

Peter Heenan – Peter.heenan@wildlands.co.nz – NZPCN

Peter Heenan[1], Geoff Rogers[2]

[1] Wildland Consultants Ltd, Christchurch, New Zealand

[2] Research Associate, Department of Conservation, Dunedin, New Zealand

ABSTRACT

New Zealand's limestone flora has been the subject of recent taxonomic and ecological research with the importance of the base-rich calcareous substrate and its associated flora increasingly recognised for its biodiversity, conservation and natural history values. Limestone ecosystems and their associated flora have historically been overlooked, but field work and studies since the 1980s show it is characterised by regional differentiation and specialisation. Limestone ecosystems comprise a number of vulnerable habitat types, and

many of the plant species from these habitats are assessed as Nationally Threatened. The situation is particularly serious for calcareous sites in lowland, eastern South Island. At the NZPCN conference at Hokitika in 2017 we outlined the geologically differentiated flora, regional distinctiveness, fragile ecosystem and taxonomic priorities, and we now provide an update to ongoing work. We draw attention to the threats to an already fragile and vulnerable ecosystem and its flora, update taxonomic progress, discuss ecological restoration opportunities, and promote future management options.

BIO

Peter Heenan is a plant systematist with a wide range of research interests on the New Zealand flora. He has published on the taxonomy of New Zealand plants over the past 25 years, including naming many new species and tackling the often difficult issues of generic boundaries. A focus of his taxonomic research has been on those plants that are unnamed, including threatened species and the limestone plants of eastern South Island. Peter is also interested in the phylogeny and biogeography of New Zealand alpine plants, and has undertaken research on the evolutionary history and origins of the New Zealand flora.

Session 1: Monday 12:15 – 12:30

Using genomics tools to understand beech forests and their fungi

David Orlovich – david.orlovich@otago.ac.nz – ASBS member

David Allan Orlovich[1], Andy Robert Nilsen[1], Tina Claire Summerfield[1], Christopher Michael Brown[2], Ralf Ohlemüller[3], Laura van Galen[1], Matthew Larcombe[1], Janice Lord[1]

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[3] Department of Geography, University of Otago, Dunedin, New Zealand

ABSTRACT

We used genotyping by sequencing to determine the genetic relationships between 93 silver beech (*Nothofagus menziesii*) trees across 32 sites in the South Island of New Zealand. We found that trees in south eastern South Island are genetically closely related to trees in Fiordland, south-western South Island, lending support to the hypothesis that silver beech found refuge in the southern South Island during the last ice age. We have sequenced the genome of silver beech to allow us to understand how this species has adapted to the extremes of its climatic range. However, beech trees haven't survived the millennia on their own—we are discovering many new species of ectomycorrhizal fungi in the genus *Cortinarius*, including both mushroom and truffle-like species. The distribution of these fungi is still poorly understood, and we are using amplicon sequencing of fungi in hyphal ingrowth bags to understand the ecology of these fungi and ultimately map species distributions. We aim to discover if barriers to beech tree dispersal are also barriers to the spread of beech-associated fungi. Finally, whole fungal genome sequencing is allowing us to understand the genetic basis for the incredible diversity of mushrooms and truffles in our forests, and I will give an update on our research that seeks to understand the mechanisms that give rise to truffles in the NZ bush.

BIO

David Orlovich completed his PhD in fungal cell biology at the University of New South Wales in 1994, postdocs in floral development and plant systematics at the University of Melbourne and bacterial evolution and cell biology at the University of Queensland before commencing at the University of Otago in 1999 as Lecturer. He is now an Associate Professor and Head of the Department of Botany at the University of Otago. He combines interests in the evolution of plants and fungi with genomic tools to understand how the New Zealand bush has come to be the way it is.

12:30 – 1:25 pm – Lunch – Oceania

1:30 – 3:15 pm – Session 2 – Sponsored by Biosecurity NZ – Chair: Lalita Simpson; AV: Todd McLay – **Oceania**

Biosecurity New Zealand
Ministry for Primary Industries
Manatū Ahu Matua

Session 2: The contribution of citizen science

Session 2: Monday 1:30 – 1:45 pm

FungiSight: Using social media to assist phylogenetic and chemical investigations of Australian yellow-staining *Agaricus*

*Grace Boxshall – amelia-grace.boxshall@unimelb.edu.au – ASBS member

Amelia-Grace Boxshall[1], Joanne Birch[1], Teresa Lebel[2]

[1] School of Biosciences, University of Melbourne, Melbourne, Australia

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ABSTRACT

How do you successfully conduct fieldwork for a target genus when you don't know where or when it will appear? Without accurate, up-to-date presence and phenology information, a well-planned collecting trip based on historical observations very easily becomes a frustrating (and often wet) scenic stroll. Unfortunately, fungi biodiversity data in herbaria are incomplete, with occurrence data for many species poorly sampled across their geographic distributions. Additionally, mushrooms – the reproductive fruit of the obscure hyphal growth form – are extremely ephemeral. Mushrooms are only produced for a brief period each year when the local environmental conditions are optimal, before maturing and decaying into mummified remains or maggot-riddled sludge within a week. For my master's research investigating both evolutionary history and toxicity variation of yellow-staining *Agaricus* in southern Australian, I was faced with just this dilemma. I needed eyes on the ground. So I developed the Facebook page, FungiSight, to improve the chances of success in my taxon-focused fieldwork. I asked contributors to document current sightings of target taxa by submitting location, photos of both the mushroom cap and the gills, and any additional information regarding staining colour or habitat. Twenty of the 51 *Agaricus* collections made were informed by contributions to FungiSight; including six collections that were suitable for chemical analyses. Via FungiSight, I was also able to survey the public regarding their foraged-mushroom eating habits to assist with dosage calculations. Since establishing the page in 2016, FungiSight has received messages from 29 contributors, 27 visitor posts and 31 emails. The Facebook page has 502 followers and 484 likes - with a core of committed citizen scientists. FungiSight will continue to be developed to involve the public in the research process as I work towards publication of the study and to provide opportunities for assistance with other mushroom research projects.

BIO

Amelia-Grace, known as Grace, was "inoculated" with a fascination for fungi during her Master of Science (BioSciences) based out of the University of Melbourne, Deakin Burwood and Royal Botanic Gardens Victoria. She completed her degree with Distinction in December 2018 and is in the midst of planning a PhD project for 2020. Grace's main focus is on Australasian fungal taxonomy (although she's definitely not opposed to plants), its applications, and inspiring others to be curious about the natural world. Her research has combined both phylogenetic and chemical analyses to elucidate the taxonomy and toxicity variation within one section of the mushroom genus *Agaricus*.

Session 2: Monday 1:45 – 2:00 pm

Crowdsourcing the discovery of new plant naturalisations in Canterbury using iNaturalist NZ

Jon Sullivan – jon.sullivan@lincoln.ac.nz – NZPCN member

Jon Sullivan[1], Colin Meurk[2], Murray Dawson[2], Melissa Hutchison[3]

[1] Department of Pest-Management and Conservation, Lincoln University, Lincoln, New Zealand

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[3] Wildland Consultants Ltd, Christchurch, New Zealand

ABSTRACT

Citizen science has greatly increased the rate of recorded botanical observations in New Zealand. Of all of NZ's plant observations from this century on the Global Biodiversity Information Facility, 81% are identified, wild

observations sourced from iNaturalist NZ — Mātaki Taiao. The challenge is how to use these observations in a timely manner to benefit weed control and plant conservation. As a case study, we assessed how many naturalised plant species on iNaturalist NZ had not been previously recorded in the Canterbury region. Ideally, all such first records would be rapidly flagged for voucher collection and control/eradication. This has proven difficult due to the inconsistent, out-of-date, and difficult-to-access knowledge of which plant species are currently naturalised in Canterbury. iNaturalist NZ contains hundreds of new candidates for casual and fully naturalised plants in Canterbury, many of them now collected and confirmed. Our difficulties in rapidly assessing which plants are new to Canterbury emphasises how well-curated and accessible botanical collection information provides an essential foundation for making the most of citizen botany. Regardless, crowd-sourced citizen botany is now a proven and increasingly powerful tool for discovering new plant naturalisations. A new NZ initiative, Find-A-Pest, is now leveraging iNaturalist NZ to focus users on which new weeds to look for in their regions and industries. Our hope is that this will further accelerate the prompt detection, and control, of new weeds.

BIO

Jon Sullivan is a senior lecturer at Lincoln University. Jon has a BSc (Hons) in botany and zoology from the University of Canterbury and a PhD in biology from the University of Pennsylvania. He is interested in the spread and impacts environmental weeds. He is also focused on combining technology with people to document how nature is changing in response to changing land use, species invasions, and climate change. He makes thousands of observations a week and is one of the founders and site admin of iNaturalist NZ, our branch of the global iNaturalist Network. https://inaturalist.nz/people/jon_sullivan

Session 2 (cont.): Conservation in response to environmental change

Session 2: Monday 2:00 – 2:15

Securing the future of Australia's climate-threatened endemic tropical montane flora: An ex situ conservation approach based on multidisciplinary science and multi-institutional partnerships

Darren Crayn – darren.crayn@jcu.edu.au – ASBS member

Darren Crayn[1], Stuart Worboys[1], Lydia Guja[2], Karen Sommerville[3], Arun Singh Ramesh[4]

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[4] College of Science and Engineering, James Cook University, Cairns, Australia

ABSTRACT

Plant species that are endemic to isolated tropical mountain peaks are particularly vulnerable to climate change, as upward migration to track climate is impossible. For the 70+ endemic plant species of Australia's Wet Tropics mountaintops (> 1000 m above sea level), environmental niche modelling indicates available habitat will contract by an average 63% for studied species by 2080, and for at least seven species, will disappear altogether. No suitable habitat is known to exist beyond the species' current range therefore precautionary conservation action is urgently required. This project aims to secure the future of Australia's climate-threatened tropical mountaintop plants by building a multi-strategy ex situ conservation reserve to 'backup' at-risk wild populations and support research, display and education. Our novel research on seed banking strategies, genetic diversity and plant tolerance of extreme climates will ensure that the reserve collections, distributed across multiple botanic gardens and seed banks along Australia's east coast, incorporate high redundancy, are genetically and physiologically diverse, and climatically matched to wild habitat. Communicating science and conservation messages will be achieved through an artist-in-residency, media and scholarly publications. This project brings together nine partners with specific and complementary skills, capabilities and infrastructure, in a broad and diverse consortium. These partners include three research centres, six public botanic gardens distributed across four States and Territories, and a statutory land manager – the Wet Tropics Management Authority. This talk will communicate some of the results from the first year of this 5 year program.

BIO

As Director of the Australian Tropical Herbarium (a CSIRO-JCU-Qld Govt-Aust Govt joint venture), Darren's role is roughly equal parts management/leadership and research. The latter involves studies of the origins, evolution and classification of plants and deals broadly with the questions: how many plant species exist, where do they occur, how are they related, and how have they evolved? Current research foci include the systematics and evolution of Ericaceae and Elaeocarpaceae, the Sunda-Sahul floristic exchange and its impact on the assembly of Australasian and Malesian biomes, and the biodiversity and conservation of tropical montane floras.

Session 2: Monday 2:15 – 2:30

Conservation and the ecological context for speciation in New Zealand

Bill Lee – Leew@landcareresearch.co.nz

Esther Dale[1,2], William Lee[2,3]

[1] Department of Botany, University of Otago, Dunedin, New Zealand

[2] Manaaki Whenua – Landcare Research, Dunedin, New Zealand

[3] School of Biological Sciences, University of Auckland, Auckland, New Zealand

ABSTRACT

Species are the focus of much conservation activity, but ecosystems and functional processes are also critical for maintaining enduring conservation outcomes that protect lineages and their evolutionary potential. Understanding the ecological context for past speciation may provide a framework for managing species and ecosystems in the future to achieve these broader goals. The New Zealand vascular flora is notable for the importance of indigenous plant radiations that expand the ecological niche of genera in our major biomes – alpine, forest and open areas below tree line. Diversification in many clades appears to be linked to ecological speciation with taxa restricted to distinctive habitats. We explore the ecological context for diversification in lineages in relation to biome and niche expansion, and the colonisation of islands. Using New Zealand's biome chronology and time-calibrated phylogenies, we investigate the speciation processes involved in the formation of the modern mainly woody flora. Two patterns are evident: remainers or explorers. Remainers largely stay in their ancestral biome, generate species through local endemism and/or parapatry, or within-biome habitat specialisation. Explorers shift into new biomes and subsequently diversify. Speciation was generally not directly associated with biome shifts for either type of lineage, but biome shifts of explorers facilitated subsequent diversification in these novel habitats. Generally, speciation was also not associated with major trait innovations, except for woody taxa entering the alpine zone. Unlike on the mainland, island colonisation frequently involved a biome shift and little subsequent within-island diversification in the lineages studied. Our results suggest that lineages have favoured biomes but also retain considerable evolutionary potential that facilitates exploration of new habitats, especially out of forest and from montane into upland areas. The modern conservation challenge will be ensuring their persistence in environments and circumstances now appearing that are outside of their evolutionary experience.

BIO

Bill is a conservation ecologist interested in eco-evolutionary processes shaping the New Zealand flora and ecosystems.

Session 2: Monday 2:30 – 2:45

"Some don't like it hot": Safeguarding the New Zealand collection at Melbourne Gardens, Royal Botanic Gardens Victoria

Kate Roud – kate.roud@rbg.vic.gov.au – NZPCN member

Kate Roud[1]

[1] RBGV (Royal Botanic Gardens Victoria) Melbourne Gardens, Melbourne, Australia

ABSTRACT

The New Zealand Collection at Melbourne Gardens began in 1906 and was the last notable landscape development by the renowned landscape designer and second Director, William Robert Guilfoyle. As such, it

enjoys great historical significance but its future is under serious threat from drying and warming under climate change. In this presentation, I will describe how we maintain this much-loved heritage landscape, alongside the challenges of selecting, sourcing and succession planting with taxa more suited to our projected hotter, drier climate for 2090. Studies and tools will also be outlined for informing the New Zealand collection's development into the future. I will also address some issues surrounding our target to increase wild-collected taxa, including my efforts to achieve recognition of traditional Māori values in a respectful and ethical manner. It is an exciting prospect that in spite of the challenges, we can offer our collection as a rich resource for exchanging knowledge, and as a research aim, gain some insight into the effects of climate change on New Zealand flora to inform conservation of plants under threat. So, step into the time machine with me and see what could happen to your amazing flora if nothing is done...

BIO

After fourteen years as a theatre stage manager, Kate began her horticulture career as an apprentice with the National Trust at Sissinghurst Castle Garden, England in 2002. This was followed by a stint at Sheffield Park, then three years as Gardener-in-Charge at Croft Castle. In September 2009, Kate immigrated to Australia for the position as Head Gardener for The Digger's Club at The Garden of St. Erth, Blackwood, Victoria. She had her first experience of working in a William Guilfoyle designed garden at Mawallok, a private garden and homestead in the Western District of Victoria. Kate took up her current post as a horticulturist and Curator of the New Zealand Collection at Guilfoyle's masterpiece, Melbourne Gardens, Royal Botanic Gardens Victoria in January 2014.

Session 2: Monday 2:45 – 3:00

Variability in water regimes and vegetation within an alpine wetland complex in Central Otago, New Zealand

*Cara-Lisa Schloots – cara-lisa.schloots@postgrad.otago.ac.nz – NZPCN and ASBS member

Cara-Lisa Schloots[1], Ralf Ohlemüller[2], Janice Lord[1]

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ABSTRACT

There is little research on the alpine wetland flora in New Zealand and rarely has variation in water regimes and vegetation within a wetland complex been investigated. Water regimes are a key component of wetland systems and distinguish this habitat from others such as forest and grassland. Wetland vegetation is specifically suited to grow in high moisture environments, and in alpine wetlands growth is further restricted by short growing seasons. The End Peak wetland complex is situated within the Mahu Whenua covenants near Wanaka at approximately 1800 m above sea level in a south-facing basin. It has a variety of vegetation types including uncommon species and a number of species not typically found at such high altitudes. It was snow free for five months of summer 2018–19. Cameras were set up at six locations within the wetland complex to record water level throughout the growing season from mid-December 2018 until mid-May 2019. Soil moisture was measured along vegetation transects and both were compared to the vegetation present at each location in order to establish if there was a relationship between plant assemblages and the water regime. Water level patterns were found to vary largely within the wetland complex, with some areas responding much more to rain and snowfall events than others. Plant assemblages also varied, although some species were consistently present at all locations. This shows how much variation there can be within a relatively small wetland area, and that wetlands are more likely to gradually change in plant composition and structure, with some areas more susceptible to the impacts of climatic changes on water regimes. Comparably stable environments within wetland complexes are likely to be more affected as the plants may be less adapted to change, and therefore species inhabiting these areas in particular are at risk.

BIO

Cara-Lisa Schloots completed her Bachelor of Science majoring in Botany and Ecology in 2016 at the University of Otago. Four summers of field work in Central Otago convinced her to begin a Masters in Botany for which

she is looking at habitat stability and the distribution of plants within an alpine wetland in Central Otago. She is particularly interested in alpine environments, plant identification, and any botanical field work whatsoever.

Session 2: Monday 3:00 – 3:15

Investigating the decline of the threatened bladderwort *Utricularia australis* in New Zealand, and genetic evidence for a new Australian species *Utricularia* sp. 'Choc-a-bloc'

*Taylor Davies-Colley – taylor.davies-colley@postgrad.otago.ac.nz – NZPCN and ASBS member

Taylor Davies-Colley[1], Janice Lord[1], Richard Jobson[2]

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ABSTRACT

The genus *Utricularia* is the largest of all carnivorous plants, and potentially the most interesting with its unique prey capture technique and varying form and habitat. Australasia contains seven species of *Utricularia* from the section *Utricularia*, with the habit for all members of the section either affixed or suspended aquatic. Due to their aquatic nature, changes in water quality and habitat loss can have large negative effects on this group. *U. australis* is native to Australasia as well as Europe but is suffering a large decline in New Zealand, as large as 70% in the last 10 years, meaning it is now classed as Nationally Critical. Analysis of historical water quality data indicates that the decline relates to changes in water chemistry, particularly nutrient concentrations when combined with invasive species rather than solely invasive species as previously thought. Understanding the taxonomy of these species is crucial to their long term conservation. Therefore we also present a molecular phylogeny based on two plastid and the nuclear ITS regions of the subgenus *Utricularia* representing all Australian and New Zealand species, including accession from across each of the distributions, along with closely allied species. The current study provides strong support for recognition of *Utricularia* sp. 'Choc-a-bloc' as a new species, rather than conspecific with *U. aurea*. We also provide molecular evidence for other relationships including the introduction/naturalisation of USA endemic *U. geminiscapa* into New Zealand, and a very low diversity of *U. australis* across its distribution adding to its potential conservation risk.

BIO

Taylor is a Masters candidate at the University of Otago. The focus of his Masters is the conservation of the threatened bladderwort species *Utricularia australis* in New Zealand. He has a great passion for New Zealand's native flora and fauna as well as conservation communication for these species.

3:15 pm – Silent Auction announcement – Matt Ward – **Oceania**

3:25 – 3:55 pm – Afternoon tea – Oceania

4:00 – 5:30 pm – Session 3 – Sponsored by Biosecurity NZ – Chair: John Barkla; AV: Jesse Bythell – **Oceania**

Session 3: Aligning western sciences with mātauranga Māori for better conservation outcomes

Session 3: Monday 4:00 – 4:15

Te Hokingamai ō Kaikōmako Manawatāwhi: The restoration of *Pennantia baylisiana*

Jessica Beever – beeverj@landcareresearch.co.nz – NZPCN member

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[4] Manaaki Whenua – Landcare Research, Wellington, New Zealand

ABSTRACT
As a potenial food supply in unlucky event of shipwreck, four goats were released, and flourished, on Manawatāwhi (Great Island, Three Kings Islands Group) in 1889. The island is recognised by Māori as the first resting place for spirits after leaving mainland New Zealand at Te Rerenga Wairua (Cape Reinga). Manawatāwhi had its vegetation, and its mana, devastated by the arrivial of the alien browsing mammals. Only one plant of the tree Kaikōmako Manawatāwhi (*Pennantia baylisiana*), a female, survived this onslaught. For a time it achieved fame in the western world's *Guiness Book of Records* as the "Rarest Tree in the World". This presentation describes how developing relationships between tangata whenua and government scientists, not without setbacks and anxieties, have enabled the recent return of over 240 seed progeny of this "lonely tree", the rākau mokemoke, to the rohe of the tangata whenua, Ngāti Kuri. Biosecurity concerns regarding possible accidental transfer of exotic ants, skinks, or pathogenic fungi with the young plants were all addressed by mitigating actions developed by science. Strengthening connections were developed through mutual planning and shared ceremony. Urban Ngāti Kuri were hosted on the Manaaki Whenua – Landcare Research site at Tāmaki, to meet the uri mokopuna saplings, before the plants' departure for the Far North. Tamariki at Ngātaki helped with planting the young trees – of similar age to themselves. Groves are now present on the marae and at the nearby kura. Exchange of taonga will also be described in this presentation. The whole process has helped cement a relationship, with enhanced mutual trust, between western science and mātauranga Māori.

BIO
Dr Jessica Beever has Pākeha and Māori (Ngāti Toa, Te Ati Awa and Ngāti Mutunga) ancestry. She has degrees in Botany from the University of Auckland and the University of Leeds, U.K. As a participant in the John Child Bryophyte Workshops, a member of the Department of Conservation's expert panel on threatened bryophytes, and, with her late husband Dr Ross Beever, a member of the Offshore Islands Research Group, she has specialised in the documentation of New Zealand's mosses. Currently she is a Research Associate of Manaaki Whenua – Landcare Research, principally working on the Flora of New Zealand: Mosses.

Session 3: Monday 4:15 – 4:30

Mātauranga guided biodiscovery of anti-*Phytophthora* compounds from New Zealand native plants

Monica Gerth – monica.gerth@vuw.ac.nz – NZPCN member

Scott Lawrence[1], Elaine Burgess[2], Chris Pairama[3], Amanda Black[4], Wayne Patrick[5], Ian Mitchell[6], Nigel Perry[2], Monica Gerth[5]
[1] Department of Microbiology & Immunology, University of Otago, Dunedin, New Zealand
[2] Plant & Food Research, University of Otago, Dunedin, New Zealand
[3] Te Taou, Ngati Whaatua, Waimauku, Aotearoa New Zealand
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[5] School of Biological Sciences, Victoria University of Wellington, Wellington, New Zealand
[6] Te Uri Taniwha, Ngāpuhi, Waima, Aotearoa New Zealand

ABSTRACT
Kauri (*Agathis australis*) is an important endemic species in New Zealand. However, the survival of kauri is being threatened by the microbial pathogen *Phytophthora agathidicida*. *P. agathidicida* is a member of the oomycete genus *Phytophthora*, other members of which cause diseases in thousands of economically and ecologically important plants worldwide. Often referred to as 'fungus-like', *Phytophthora* are actually more closely related to diatoms and brown algae. Practically speaking, this means *Phytophthora* are unaffected by most available agrichemical fungicides. There is an urgent need to discover and develop novel compounds that target the growth, survival and dispersal of *P. agathidicida*. In this talk, I'll present our work exploring the anti-*Phytophthora* potential of selected New Zealand native plants, using a collaborative approach that incorporates mātauranga Māori, microbiology and chemistry.

BIO
Monica Gerth is a Senior Lecturer in Microbiology at Victoria University of Wellington. Her research group explores microbial chemotaxis (how microbes navigate their environment), microbe-plant interactions, and

biodiscovery of new antimicrobials. A major focus of her group is kauri dieback disease and collaboration between mātauranga Māori knowledge holders and molecular researchers. In addition to her 'day-job', she is also the current President of the New Zealand Society for Biochemistry and Molecular Biology.

Session 3: Monday 4:30 – 4:45

The importance of community education and engagement in the Raukumara Ranges

Graeme Atkins – gatkins@doc.govt.nz – NZPCN member

Graeme Atkins[1]

[1] Department of Conservation, Ruatoria, New Zealand

ABSTRACT

The Raukumara Ranges feature strongly in my life. My first experience with the Ranges was as a 5 year old in the early 70s, following my father around as he poisoned possums for the fur trade. During those times the place was alive with birdlife and the trees dripped with birds. It was the norm to encounter twenty whio a day in the streams and rivers that flow from the Raukumara, plus hear many kiwi at night. Kākā, kererū and kākāriki were our most common birds. Fast forward forty years and the place has been brought to its knees. During my 25 years of service to the department we have monitored the place falling to bits, teetering on ecological collapse. From posting confronting images on social media of the catastrophic changes caused by high deer and possum numbers, to organising groups of locals and local leaders to view the damage first-hand, the realisation occurred to me that there has been a big disconnect between the tangata whenua and the Raukumara Ranges. As a consequence I have instigated a huge public/community education exercise focused on turning things around for the Raukumara Ranges involving our many iwi.

BIO

Graeme is a born and bred East Coaster, living at Tikapa, a small community situated on the coast near the Waiapu river mouth, half an hour northeast of Ruatoria. Graeme has combined his interests in natural history specialising in indigenous flora with his vocation. Employed by Te Papa Atawhai, Department of Conservation as a Ranger for 25 years. Graeme's focus is on rare and threatened flora. In 2009, he was awarded the Network's National Conservation individual award for his efforts caring for indigenous plants on the East Coast. Recently Graeme has activated his own interests in visual and social media to educate his community about the story of the extreme challenges facing the Waiapu River and the Raukumara Ranges.

Session 3 (cont.): Celebrating 250 years of advances in botanical science & conservation since Banks & Solander

Session 3: Monday 4:45 – 5:00

Revising *Melichrus*: A deep dive into the past, present and future of the urn heaths

*Helen Kennedy – hkenned6@myune.edu.au – ASBS member

Helen Kennedy[1], Ian Telford[1], Rose Andrew[1], Darren Crayn[2], Jeremy Bruhl[1]

[1] University of New England, Armidale, Australia

[2] Australian Tropical Herbarium, James Cook University, Cairns, Australia

ABSTRACT

In eastern Australia, *Melichrus* R.Br. (Ericaceae: Epacridoideae) comprises four named and five APC accepted putative species (Australian Plant Census, 2019) of shrubs. This taxonomy is the subject of a three year revisionary study, which aims to discover and describe the morphological and genetic diversity of *Melichrus* and its ecology and biogeography. Nine months in, we present this update in the context of the unique history of the taxonomy of *Melichrus*. The tale starts with Antonio José Cavanille's lovely, but wildly inaccurate illustration of the first described species of *Melichrus*, includes George Bentham's cutting critique of Allan Cunningham's species as "barely distinguishable as varieties" and concludes (for now) with disentangling 50 years of a

misapplied name. We finish by considering the planned outputs of this project, such as a Flora of Australia account for *Melichrus*.

BIO

Helen Kennedy is a PhD candidate at the University of New England studying the systematics of *Melichrus*. Helen combines analyses of morphology, anatomy and genetics to examine patterns of speciation and produce robust, descriptive and highly usable taxonomic classifications. Helen aims to contribute to the description and conservation of natural diversity.

Session 3: Monday 5:00 – 5:15

From a shipwreck to shipshape? Systematic botany of paper daisies in Australia from Banks and Solander to the present.

*Tim Collins – tcollins@myune.edu.au – ASBS member

Timothy Collins[1], Alexander Schmidt-Lebuhn[2], Rose Andrew[1], Ian Telford[3], Jeremy Bruhl[1]

[1] University of New England, Armidale, Australia

[2] CSIRO, Centre for Australian National Biodiversity Research, Canberra, Australia

[3] NCW Beadle Herbarium, University of New England, Armidale, Australia

ABSTRACT

Xerochrysum and *Coronidium* (Gnaphalieae; Asteraceae) paper daisies were collected by Banks and Solander in 1770 from the east coast of Australia. Gatherings from Endeavour River were named by Allan Cunningham as *Helichrysum banksii* MS, and published by de Candolle in 1838. Originally described as *Xeranthemum bracteatum* by Ventenat in 1803 from plants cultivated in the Empress Josephine's garden at Malmaison, the species was transferred by George Bentham in 1867 to *Helichrysum*, with *H. banksii* as a synonym. This taxonomic concept was maintained after transferral to the new genera *Bracteantha* then *Xerochrysum*, and the last combination was used in the recent partial revision of the genus by Wilson (2017). *Xerochrysum bracteatum* has been regarded as a species complex for over 60 years, and putative new narrow-endemic taxa in *Xerochrysum* and *Coronidium* have persisted for many years under phrase-names without taxonomic resolution. *Xerochrysum bracteatum* sens lat. currently includes populations from north Queensland to eastern South Australia, occurring in coastal and inland habitats, from tropical to cool temperate to Mediterranean climates. Online resources have greatly facilitated efficient field collections and ecological observations of targeted populations. We will present recently gathered molecular data from Next-Generation-Sequencing with morphological data derived from light microscopy and scanning electron micrographs of herbarium and cultivated live collections to resolve species limits and phylogenetic relationships.

BIO

Tim Collins is a PhD candidate at the University of New England, New South Wales. He has a broad range of interests including plant systematics, ecological restoration and conservation, with a focus on the Australian flora.

Session 3: Monday 5:15 – 5:30

The vascular plants recorded and collected in New Zealand by Banks and Solander, 1769–1770

Ewen Cameron – ecameron@aucklandmuseum.com

Ewen Cameron[1], Dan Hatch (1919–2008)[2]

[1] Paenga Hira, Auckland War Memorial Museum, Auckland, New Zealand

[2] A past West Auckland resident, Auckland, New Zealand

ABSTRACT

The scientific importance of the first plants collected in New Zealand by Joseph Banks and Daniel Solander is acknowledged as a benchmark for understanding the New Zealand flora. Except for a few Polynesian introductions, these collections clarify what is indigenous before the flood of European plant imports to New

Zealand began. However, a full checklist of what was recorded and collected has never been published. Our checklist is based on: the unpublished Solander MS, Primitiae Florae Novae Zelandiae, which contains 343 descriptions of New Zealand species, coined manuscript names, habitat descriptions and sometimes the Māori names; the Solander Slip collection (23 volumes of card files) held in the library of The Natural History Museum, London; the 204 sketches and finished drawings by Sydney Parkinson, 184 of which were later engraved for the *Banks' Florilegium*; and an estimated 2000 New Zealand herbarium specimens, 1600 seen across 16 herbaria, 1156 of them in New Zealand herbaria. The Solander MS lists 160 genera, and four more are added from the specimen data. Of these 164 genera 117 were existing (116 by Linnaeus), 47 were new, coined by Solander, and although never published by Solander, many were published later by others, particularly by J Gaertner and G Forster. Eight of these Solander MS genera are still in current use. The herbarium specimens have been invaluable in verifying MS names and proving what was collected. Only four records lack vouchers, and three of these are succulent species – which would have been almost impossible to dry with the methods that they used. Using present-day species concepts, this study recognises 379 vascular taxa recorded and collected: 61 ferns and lycophytes, 3 conifers and 315 angiosperms. Of the MS names: 19 represent more than 1 taxon, 6 names are lumped; and two of the filmy fern names were actually a thalloid liverwort.

BIO

Ewen Cameron has been the Curator of Botany at Auckland Museum for over 27 years. He has had a lifelong interest in natural history, especially botany and conservation. He has a particular passion for identifying and collecting wild plants (both indigenous and naturalised) of northern New Zealand, especially from the offshore islands. Over 17,000 of his collections are held in the museum's herbarium and he has documented the flora and vegetation of more than 60 islands and islets of the wider Hauraki Gulf.

5:30 – Announcements. **Oceania**

6:30 – 7:30 pm – Public lecture (ticket required) – Prof Sverker Sörlin, invited guest speaker – Solander, Sparrman, and the Anthropocene: Saving "the Environment" on a planet made unstable by humans – **Soundings Theatre**

Own arrangements for dinner

Tuesday 26 November – Day 2 of talks – Oceania and Rangimarie 1

From 8:00 am – Registration – **Oceania**

8:45 am – Announcements – **Oceania**

8:50 – Opening keynote speaker: Melanie Mark-Shadbolt – Do hapū and iwi views and practices provide an alternative paradigm to Aotearoa New Zealand's biosecurity system to better protect our taonga species? Chair: Rewi Elliot – **Oceania**

Melanie Mark-Shadboldt[1,2,3]

[1] Te Tira Whakamātaki, Aotearoa New Zealand

[2] NZ's Biological Heritage National Science Challenge, Lincoln, New Zealand

[3] Ministry for the Environment, Wellington, New Zealand

ABSTRACT

As New Zealand grapples with developing solutions to complex environmental issues, there is a growing recognition that mātauranga Māori could be 'unlocked' and used with great effect alongside western science to create unique solutions for Aotearoa New Zealand. Unfortunately, despite growing recognition of the benefits that can be derived from this type of collaboration, the quality of engagement between the two systems is not always satisfactory. This is in part because often indigenous knowledge, or mātauranga Māori in our context, is forced to compete with mainstream science for recognition, support and implementation. It is the belief of Te

Tira Whakamātaki, also known as the Māori Biosecurity Network, that mātauranga Māori has an increasingly important role in environmental management, including the protection of biological heritage from biosecurity risks and threats. In addition, we see increasing use of the term mātauranga Māori in government documents and strategies such as the Biodiversity Strategy and Biosecurity 2025, as signals that there is a desire to understand how mātauranga Māori can inform our interactions with the environment. However, we contend that the competitive nature of western science is excluding mātauranga Māori. In this presentation we attempt to explain, through stories of our work, how hapū and iwi views and practices provide an alternative paradigm to Aotearoa New Zealand's biosecurity system to better protect our taonga species, and how space can be made for that paradigm.

BIO

Melanie Mark-Shadbolt is of Ngāti Kahungunu ki Wairarapa, Ngāti Porou, Te Arawa, Ngāti Raukawa, Te Atiawa descent. She is an indigenous environmental sociologist and is currently the Kaihautū Chief Māori Advisor to the Ministry for the Environment, the Director Māori of NZ's Biological Heritage National Science Challenge, and the CEO of Te Tira Whakamātaki. She is a specialist in traditional knowledge issues as they relate specifically to biosecurity and sustainable natural resource management. Her work has covered research in stakeholder values, attitudes and behaviours, social acceptability of management practices and risk communication, and the wider human dimensions of environmental health. She currently serves on a number of national advisory bodies including the Myrtle Rust Governance Group, Kauri Dieback SSAG, Rauika Mangai and Ngā Pae o te Māramatanga Climate Change Programme.

9:50 am – Brief announcement by Matt Ward regarding silent auction – **Oceania**

9:55 – 10:25 am – Morning tea – Oceania

10:30 am – 12:15 pm – Session 4 – Sponsored by Queenstown Natural Perfumiers – Chair: Shannel Courtney; AV: Yumiko Baba – **Oceania**

Session 4: Decoding the green: Combating plant blindness

Session 4: Tuesday 10:30 – 10:45

Conservation without nature: Environmental governance in a world of loss

Sverker Sörlin – sverker.sorlin@abe.kth.se

Sverker Sörlin[1]

[1] KTH Royal Institute of Technology, Stockholm, Sweden

ABSTRACT

In this talk I will argue that advances in the Earth System sciences and related fields have brought a new understanding of the human-Earth relationship that has potential to also transform conservation. This emerging Weltanschauung is marked by an image of the Earth as a governable object which is fundamentally and irreversibly impacted by human societies, and where everything from species to glaciers disappear at an ever increasing pace. In this process, "Nature" has been gradually losing its centrality in discourse and practices about the Earth and life on it as other concepts such as "Environment", "Resilience", or "Anthropocene" have grown in significance. I will interpret these changes against a brief backdrop of the botanical project that naturalists such as Banks and Solander pursued in the South Pacific region. Does anything remain of the Nature whose Divine fullness was the object of their knowledge quest? How can we, friends of conservation in the twenty first century, relate to a world where loss is our companion? What can we conclude about the place of conservation in environmental governance?

BIO

Sverker Sörlin is Professor of Environmental History in the KTH Royal Institute of Technology, Stockholm. He is a member of the official Swedish Climate Policy Council since 2018 and has in the last decade been one of the

founding scholars in the rapidly growing research field of Environmental Humanities. In this talk he will draw chiefly on ideas developed in books such as *The Future of Nature* (Yale University Press 2013), T*he Environment – a History of the Idea* (Johns Hopkins University Press 2018), both with Libby Robin and Paul Warde, and in the article "Environing Technologies: A Theory of Making Environment" (*History & Technology*, 2018), with Nina Wormbs. Sörlin is also a well-known public intellectual and a prize-winning author of narrative non-fiction.

Session 4: Tuesday 10:45 – 11:00

Biophilic Cities Network and Singapore's integration of nature into their city

Tim Park – tim.park@wcc.govt.nz – NZPCN member

Tim Park[1]

[1] Wellington City Council, Wellington, New Zealand

ABSTRACT

Biophilic Cities acknowledges the importance of daily contact with nature as an element of a meaningful urban life, as well as the ethical responsibility that cities have to conserve global nature as shared habitat for non-human life and people. The Biophilic Cities Network is based on two fundamental premises. Firstly, humans co-evolved with plants and animals and therefore need "their daily dose of nature" for physical and mental health. Research shows this to be true for all ages and conditions. Secondly, cities are not necessarily antithetical to thriving vegetation and wildlife. Depending on good urban planning, inspired architects, sensitive engineers and supportive residents, many cities are now sanctuaries for threatened plants and animals. Biophilic Cities will flourish when their residents appreciate the different native species of plants and animals and feel they are part of a local solution not a global problem. Wellington City is a founding member of the Biophilic Cities Network. Others include San Francisco, Birmingham and Singapore. Key inspiration is provided by EO Wilson, Richard Louv, Tim Beatley and Lena Chan among others. Wellington City is a founding member of the Biophilic Cities Network. Others include San Francisco, Birmingham and Singapore. Singapore National Parks recently hosted a Summit of Partner Cities – Tim will report back on some of the highlights.

BIO

Tim Park is an ecologist who has been working with local government in New Zealand for 20 years. He has a background in applied restoration ecology and is focused on inspiring local communities to restore native forest, coastal ecosystems and wetlands. Working with partner organizations, Tim has been instrumental in establishing Predator Free Wellington and Forest in the Heart of Wellington projects, both of which are enabling restoration of urban ecosystems through community action.

Session 4: Tuesday 11:00 – 11:15

The Taste of Life: Informal science education made delicious

Maggie Hanes – Mkoopma2@emich.edu

Lauren Mohn[1], Maggie Hanes[2]

[1] Freelance Ethnobotany Educator, PA, USA

[2] Department of Biology, Eastern Michigan University, MI, USA

ABSTRACT

As biodiversity professionals, we are keenly aware of the extraordinary biodiversity that surrounds and inhabits us. However, despite interacting with and depending on biodiversity on a daily basis, much of society does not notice it. Of the many components of biodiversity to which society is blind, plants are a special and severe case. Our diets are largely composed of plants and plant-derived products, and food plays a special role in bringing people together and connecting us with the natural world. For these reasons we believe that food-based science outreach can be a celebratory and impactful method to engage communities about biodiversity, especially plant diversity, and empower them to protect it. In this presentation, we introduce our innovative food-based science outreach project, Taste of Life. This initiative is a cross-disciplinary, cross-institutional collaboration to develop and deliver food-based science outreach events in Southeast Michigan. Our meals have reduced plant and biodiversity blindness in the lives of hundreds of campus and community members. We will summarise our events and describe the planning process, event structure, and impact on participants, with particular emphasis on our commitments to community partnerships, affordability, adaptability, and accessibility. We will also discuss plans for future directions, including the creation of shareable curricula that can be easily adapted based on factors such as audience, resources, and cultural context.

BIO

Maggie Hanes is a professor in the Biology Department at Eastern Michigan University, USA. Her research focuses on the systematics and mechanisms of speciation in Malvaceae (*Hibiscus* s.l.). Though she has spent most of her time investigating plants on Madagascar, Maggie is on sabbatical this year at Massey University considering the biogeographic patterns of *Hibiscus* throughout the Indian and Pacific oceans. Maggie shares her enthusiasm for biodiversity with the public as often as she can. She has worked with colleagues to develop exciting food-based science outreach events about biodiversity. Our events engage participants in discussions of pollinator diversity, evolutionary relationships, biogeography and culinary traditions.

Session 4: Tuesday 11:15 – 11:30

Forensic botany: An under-utilised tool for crime scene investigation due to plant blindness

Kelly Shepherd – kelly.shepherd@dbca.wa.gov.au – ASBS member

Kelly Shepherd[1]

[1] Western Australian Herbarium, Department of Biodiversity, Conservation & Attractions, Perth, Australia

ABSTRACT

Plants are all around us. Consequently, they may be present at any given crime scene and could potentially provide clues for forensic investigation. Besides the numerous ways that plants can kill, botanical evidence can help establish the manner or time of death, determine if a crime scene is a primary or secondary scene, or link a perpetrator to a victim or place. Regardless of this potential, in most jurisdictions botanical evidence is limited to the seizure of prohibited plants such as *Cannabis* or Opium Poppy (*Papaver somniferum*) or other psychoactive plants or fungi from which an illegal drug has been manufactured. Yet there have been several criminal cases in Australia and New Zealand where botanical evidence has played a critical role in the prosecution of homicides. Despite this, the examination of plant material is rarely considered a useful line of enquiry. This is likely due to most forensic investigators lacking awareness of basic botany and as such, significant evidence may be overlooked. If only forensic investigators weren't blind to the plants present at crime scenes, they would realise that these silent and unobtrusive witnesses could prove critical to a case. With education, crime scene investigators learn that botanical evidence is easily and inexpensively obtained and preserved, and with support from experts can often be identified.

BIO

Kelly's day to day work involves taxonomic and systematic research at the Western Australian Herbarium primarily naming and describing new species of conservation concern (https://science.dpaw.wa.gov.au/people/?sid=241). However, she is also an 'Approved Botanist' under the WA Misuse of Drugs Act whereby she confirms the identification of any *Cannabis* seized by the WA Police. Through this role she has become involved

in several homicide cases, identifying plant evidence recovered from the scene or victims. She also regularly provides Forensic Botany training to the Police with the aim to increase their awareness about the usefulness of plants as potential forensic evidence.

Session 4 (cont.): Ecological Restoration

Session 4: Tuesday 11:30 – 11:45

Healing the Tui Mine site, Te Aroha Maunga: Terrestrial rehabilitation methods co-developed with mātauranga Māori principles challenge and enhance conventional rehabilitation methods

Robyn Simcock – simcockr@landcareresearch.co.nz – NZPCN member

Robyn Simcock[1], Pauline Clarkin[2], Jo Cavanagh[3], Alice Anderson[2]
[1] Manaaki Whenua – Landcare Research, Auckland, New Zealand
[2] Ngati Hako, Aotearoa New Zealand
[3] Manaaki Whenua – Landcare Research, Lincoln, New Zealand

ABSTRACT

Te Aroha Maunga, on the Kaimai Range, was mined for base metals until abandoned by Norpac Mining in 1973, leaving a geotechnically unstable dam on a steep mountainside holding about 90,000 m^3 of sulphide-rich tailings (pH<3), ore piles and mine tunnels. Water flowing through these areas mobilised metals which contaminated the Tui and Tunakahoia streams; sediments and leachate-affected soils had toxic levels of lead. Healing the Tui Mine site is an intergenerational process kick-started through a $21.7M and 160,000-hour Tui Mine Remediation Project. As part of the project, an Iwi Advisory Group (IAG) was established to lead the process to heal and accelerate the regeneration of Te Aroha Maunga (Anderson 2013); a landscape plan aimed to 'return the mauri of the site to its original condition where possible' (AECOM 2012). In general, terrestrial rehabilitation will be successful when the sites are stable and blended with the surrounding forest so that the scars are no longer visible. A dense plant cover was also integral to limiting contact with mine-affected soil and dust. This paper describes co-development and application of rehabilitation techniques that promote natural regeneration processes as a way of 'helping the maunga heal itself'. These techniques largely used materials that were already on the mountain, rather than nursery-raised seedlings. Techniques included salvage and relocation of wheki (*Dicksonia squarrosa*), epiphytes (particularly kiekie, *Freycinetia banksii*) and rewarewa (*Knightia excelsa*) a common adventive woody seedling; hand-seeding of mosses and herbs onto scarified foundations; and, creating stable surfaces favouring regeneration of native species but limiting competition from grasses. Rehabilitation practices guided by iwi differed from conventional engineering-led, 'fast' approaches. Although both approaches prioritised a native plant cover they differed in variability of surface topography and vegetation, reuse of onsite resources, treatment of 'edges', use of non-native grasses, and type of maintenance.

'I am the mountain and the mountain is me. Care for the land as one day the land will care for you'
From Stan: themes from the delivery process
1. Trust building – the initial out-reach from Oliver Sullivan and team to Ngāti Kuri
2. Whakapapa: DSIR and now MW-LR carry on the living legacy, Matua Koro and the family ties to Whaea Yvonne
3. Sharing of grief: Attendance at tangi of kaumatua / sharing of history of researchers
4. Sharing of science knowledge: the *Pennantia* discovery and rescue
5. Sharing of cultural knowledge: around repatriation of taonga
6. Resilience through collaboration: the relationship has been remained across the years and the miles
7. Aroha: facilitated and nurtured through cultural awareness and mutual respect.

BIO

An ecologist and soil scientist with Manaaki Whenua – Landcare Research researching and consulting ecosystem reconstruction in grossly disturbed places where entire soil is removed: roads, cities and mines.

Session 4: Tuesday 11:45 – 12:00

Planting a billion trees: The good, the bad, and the Hinewai of ecological restoration

Melissa Hutchison – melissa.hutchison@wildlands.co.nz – NZPCN member

Melissa Hutchison[1], Jon Sullivan[2]

[1] Wildland Consultants Ltd, Christchurch, New Zealand

[2] Department of Pest-Management and Conservation, Lincoln University, Lincoln, New Zealand

ABSTRACT

A wave of native restoration planting is sweeping New Zealand, spurred on by local government incentives, carbon credits, the One Billion Trees Programme, and public enthusiasm to play an active role in conservation of our native flora and fauna. The assumption is that planting natives is always a good thing, but do the ecological outcomes match our aims and expectations? We review the pros and cons of native restoration planting, including why we should plant (the good), why not all planting is benign (the bad), and why sometimes it's better not to plant at all (the Hinewai). We assess how to decide when and where planting is appropriate, and what type of planting approach is suitable for a particular site or vegetation/habitat type. We examine the spectrum of intervention options, from no planting/minimum interference, to planting only one or a few pioneer species to kick-start succession, to planting a wide range of plant species and life forms in order to quickly restore all the various elements of a focal plant community. We also discuss the overlooked components of restoration (invertebrates, bryophytes, lichens and fungi) and their role in ecological restoration. Appropriate ecosourcing is a key part of ecological restoration, but there is still confusion about what it means, and it is often regarded as a "nice-to-have" rather than indispensable. We provide examples of best, and worst, practice in ecosourcing in NZ. Restoration planting sites are seldom monitored after the first few years, and there is typically a lack of quantitative data on changes in species composition (flora, fauna, and fungi) over time. This means that we cannot easily assess (or predict) the long-term outcomes of restoration planting. In many cases, protection and management of existing native vegetation (e.g. through fencing, weed and pest control) will be more cost-effective, and provide greater long-term ecological benefits than planting.

BIO

Melissa has a PhD in Ecology (2009) from the University of Canterbury and has been a Senior Ecologist at Wildland Consultants in Christchurch since 2010, having previously worked as a ranger, technical support officer, tutor, and technician for the Department of Conservation, Banks Peninsula Conservation Trust, NZ Landcare Trust, Manaaki Whenua – Landcare Research, and Massey University. Melissa has broad ecological interests and skills, with particular strengths in vegetation surveying, significance assessment, ecological restoration, assessment of effects, weed ecology, and cost-benefit analyses for Regional Pest Management Plans. Melissa has been an NZPCN Council member since 2013 and a Committee Member and Webmaster of Canterbury Botanical Society since 2011.

Session 4 (cont.): Recovery of threatened plants: success stories?

Session 4: Tuesday 12:00 – 12:15

UneXtinct

Ashley Field – ashley.field@jcu.edu.au – ASBS member

Ashley Field[1], Matt Renner[2], Rod Fensham[1], Jenny Silcock[3]

[1] Queensland Herbarium, Brisbane, Australia

[2] Royal Botanic Garden Sydney, Sydney, Australia

[3] University of Queensland, Brisbane, Australia

ABSTRACT

Concern about an extinction crisis in Australia is palpable. There are, however, a growing list of species that have become 'unextinct'. 'Unextinction' happens in three ways, through a species being rediscovered, through the

taxonomic validity of a species being revaluated or through the veracity of original records being reconsidered. This presentation explores the plant extinction record across Australian based on the recent reviews of Silcock et al. (2019, "To name those lost: assessing extinction likelihood in the Australian vascular flora"), which proposes a framework for validating records; and Field and Renner (2019, "Rediscovered or reconsidered: the presumed extinct ferns and lycophytes of tropical Queensland, Australia") which explores in detail the veracity of the record of fern extinctions in the north Queensland mountaintops, the area hitherto considered to have lost the most number of species of any plant group.

BIO

Ashley Field completed a PhD in Systematics at James Cook University in 2013 and is a Senior Botanist with the Queensland Herbarium, based at the Australian Tropical Herbarium. Ashley's areas of research interest are the evolutionary diversification, conservation biology and systematics of lycophytes and ferns. He completed a 2016 German-academic exchange, was a 2017 Queensland-Smithsonian Fellow and is a 2020 Churchill Fellow working at herbaria across the globe.

10:30 am – 12:15 pm – Session 5: Sponsored by Manaaki Whenua – Landcare Research – Chair: Rob Simssen; AV: Weixuan Ning – **Rangimarie 1**

Session 5: Recent progress in taxonomy and phylogeny of Australasian plants I

Session 5: Tuesday 10:30 – 10:45

The spatial patterns in a diverse endemic lineage

*Duncan Nicol – d.nicol001@gmail.com

Duncan Nicol[1]

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ABSTRACT

Biogeography aims to explore the natural processes that have led to the distribution of biodiversity. Geological and phylogenetic history as well as variation in abiotic factors at regional scales are associated with species assemblages and species distributions. Understanding how these factors contribute to species ranges has implications for biology and biogeography. This study aims to explore both the associations between species in geographic and environmental space and to test the role of climatic variables in determining species ranges. Spatial distribution patterns, climatic niches, and distribution models were investigated across all the species of a clade within the genus *Celmisia*. In particular, the subgenus *Lignosae* was chosen because it is a wide-spread endemic lineage to New Zealand, containing 31 species distributed from Stewart Island to the Coromandel. Spatially referenced herbarium records from this group were used as the basic pieces of information to test biogeographic hypotheses. Firstly, distances between each species pair were calculated to analyse how species within a diverse

clade relate to one another within environmental and geographic space. Secondly, associative distribution models, which overlay climatic variables with record localities, were used to model climatically-suitable regions for each species. This second analysis was done to test the degree to which species occupy areas which are environmentally suitable.

BIO

Duncan Nicol is a masters student of Environmental Science at the University of Otago, with an emphasis on the spatial patterns of plants. His research uses taxonomically-revised, spatially-referenced herbarium records to analyse patterns within a clade relative to other members, their natural history, and to current climatic variables.

Session 5: Tuesday 10:45 – 11:00

Systematics of the *Celmisia* group (Asteraceae, Astereae) with an emphasis on *Celmisia* subgenus *Lignosae*

*Patricio Saldivia – salpa810@student.otago.ac.nz – ASBS member

Patricio Saldivia[1], Janice Lord[1], David Orlovich[1]

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ABSTRACT

The *Celmisia* group was proposed in 1994 including the following genera: *Celmisia, Pachystegia, Olearia* pro parte, *Pleurophyllum, Damnamenia, Achnophora*, and *Pacifigeron*. All of them but *Pacifigeron*, which is endemic to Rapa Iti Island in French Polynesia, have an Australasian (New Zealand, Australia, and New Guinea) distribution. The taxonomy of the group has not been assessed as a whole, and only a few taxa have been included in phylogenetic works based on DNA sequences. Therefore, both its phyletic nature and internal classification remain unclear. In this talk, I will briefly show advances on the delimitation of the *Celmisia* group and its internal taxonomy. Then I will focus on my work towards a taxonomic revision of *Celmisia* subgenus *Lignosae*. *Lignosae* is the most species-rich subgenus of the five current recognised subgenera. It is a conspicuous element of the New Zealand alpine environment. It is almost restricted to the South Island, with only three species also present in the North Island, and two on Stewart Island. Based on molecular data, extensive fieldwork, and the morphological study of over 2000 herbarium specimens, this is the first in-depth taxonomic work within this subgenus. Nuclear rDNA internal and external transcribed spacers (ITS and ETS) sequence data were used for testing the limits of the subgenus. Preliminary results show that subgenus *Glandulosae* (monotypic) is nested within subgenus *Lignosae* and that subgenus *Caespitosae* (two species) is sister to it. Therefore, this revision focuses on the clade including these three subgenera, in which 27 species are given preliminary recognition. Examples of descriptions, photos, illustrations, and maps will be shown. Typifications, synonymisations, taxonomic status changes, morphology, ecology, and some conservation issues will be discussed.

BIO

Patricio Saldivia is a PhD Student at the Department of Botany, Otago University. His research focuses on the taxonomy of the genus *Celmisia* and related genera (i.e. the *Celmisia* group).

Session 5: Tuesday 11:00 – 11:15

Phylogenetic exploration of emu bush (*Eremophila*, Scrophulariaceae), with a focus on the *Eremophila glabra* complex using ddRAD

Rachael Fowler – rachael.fowler@unimelb.edu.au – ASBS member

Rachael Fowler[1], Mike Bayly[1], Daniel Murphy[2]

[1] The University of Melbourne, Parkville, Australia

[2] Royal Botanic Gardens Victoria, South Yarra, Australia

ABSTRACT

The Australian endemic genus *Eremophila* (Emu bush, Scrophulariaceae) contains over 230 species and is a significant component of the Australian arid biome. Recent phylogenetic work on *Eremophila* and the tribe

Myoporeae (including *Myoporum*, *Diocirea*, *Bontia*, *Calamphoreus*, *Glycocystis* and *Pentacoelium*), has revealed a number of taxonomic issues at generic, sectional and species levels of classification. One taxon of particular interest is the widespread and horticulturally significant species, *Eremophila glabra*, and closely related species in *Eremophila* section *Stenochilus*. Under current circumscription, *Eremophila glabra* contains nine formally described subspecies and further morphologically distinct informal entities. Phylogenetic reconstructions based on both whole chloroplast genomes and the nuclear ribosomal cistron do not support the monophyly of *Eremophila glabra*, with subspecies scattered amongst other species of section *Stenochilus*. This has a number of potential implications for conservation, as while *Eremophila glabra* subsp. *glabra* is distributed widely across Australia (all states except TAS and ACT), other subspecies are very restricted in their distribution, and many hold protected/priority status under Western Australian state and federal listings. To test the boundaries of *Eremophila glabra* and establish the relationships between all species/subspecies in section *Stenochilus* we have sampled individuals representing all species in the section, and glabra subspecies from widely across their geographic distributions. We have applied double digest Restriction Associated DNA (ddRAD) sequencing and will compare our phylogenetic findings with patterns previously revealed using a genome skimming approach. We will also discuss the conservation and taxonomic implications of our results, and the utility of ddRAD for broader application across other phylogenetic/taxonomic issues within the tribe Myoporeae.

BIO

Rachael Fowler completed her PhD in Botany at the University of Melbourne in 2018, and is continuing as a postdoctoral research fellow in the Bayly Systematics Lab. Rachael's main focus of research has been phylogentics and systematics of Australian plant groups, though she is also interested in plant-insect co-evolution, biogeography, Australian arid zone evolution and chemotaxonomy.

Session 5: Tuesday 11:15 – 11:30

A dated molecular perspective of eucalypt evolution

Andrew Thornhill – andrew.thornhill@gmail.com – ASBS member

Andrew Thornhill[1], Michael Crisp[2], Carsten Külheim[3], Kristy Lam[4], Leigh Nelson[5], David Yeates[5], Joseph Miller[4]

[1] State Herbarium of South Australia/University of Adelaide, Adelaide, Australia

[2] Division of Ecology and Evolution, Research School of Biology, Australian National University, Canberra, Australia

[3] School of Forest Resources and Environmental Science, Michigan Technological University, Houghton, MI, USA

[4] Centre for Australian National Biodiversity Research, National Research Collections, Black Mountain, CSIRO, Canberra, Australia

[5] Australian National Insect Collection and Taxonomic Research and Information Network, National Research Collections, Black Mountain, CSIRO, Australia.

ABSTRACT

The eucalypts – *Eucalyptus*, *Angophora*, and *Corymbia* – are native to Australia and Malesia and include over 800 named species in a mixture of diverse and depauperate lineages. We calibrated phylogenies with over 700 species against time using penalised likelihood and constraints obtained from fossil ages. Based on these trees, most major eucalypt subgenera arose in the Late Eocene and Early Oligocene. Bayesian Analysis of Macroevolutionary Mixtures (BAMM) rates of net species diversification accelerated in five sections of *Eucalyptus* subg. *Symphyomyrtus*, all beginning 2–3 Ma and associated with semi-arid habitats dominated by mallee and mallet growth forms, and with open woodlands and forests in eastern Australia. This is the first time that a calibrated molecular study has shown support for the rapid diversification of eucalypts in the relatively recent past; most likely driven by changing climate and diverse soil geochemical conditions.

BIO

I am currently in a joint position between the University of Adelaide (Bob Hill's lab and Michelle Waycott's lab) and the State Herbarium of South Australia. In my role I have been made curator of the bryophytes and continue to work on large spatial phylogenetic projects.

Session 5: Tuesday 11:30 – 11:45

Phylogeny and phylogeography of flat-peas (*Platylobium*, Fabaceae) in south-eastern Australia

*Harvey Orel – horel@student.unimelb.edu.au – ASBS member

Harvey Orel[1], Rachael Fowler[1], Mike Bayly[1]

[1] The University of Melbourne, Parkville, Australia

ABSTRACT

Platylobium Sm. is a genus of nine species of "egg-and-bacon" peas (Fabaceae: tribe Bossiaeeae) endemic to south-eastern Australia. Four of the species were first described based on morphology in 2011, and there is no molecular phylogeny for the genus. As well as this, two widespread species – *Platylobium obtusangulum* and *P. triangulare* – have distributions with significant disjunctions across each of their ranges. I will present the results of a phylogenetic investigation into the relationships between species, as well as a phylogeographic study of *P. obtusangulum* and *P. triangulare* based on whole chloroplast genomes and nuclear ribosomal DNA sequence data obtained via genome skimming.

BIO

Harvey Orel is a BSc (Hons) student at The University of Melbourne. He has previously worked on *Acacia* taxonomy at the Royal Botanic Gardens Victoria and the evolution and phylogenetics of *Bulbophyllum* orchids at the Australian Tropical Herbarium, Cairns.

Session 5: Tuesday 11:45 – 12:00

Resolving the phylogeny of the New Zealand *Veronica* (Plantaginaceae) species radiation

*Anne Thomas – at820@cam.ac.uk – ASBS member

Anne Thomas[1], Andrew Tanentzap[1], Javier Igea[1], Heidi Meudt[2], Dirk Albach[3], William (Bill) Lee[4]

[1] University of Cambridge, Dept. of Plant Sciences, Cambridge, UK

[2] Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

[3] Carl von Ossietzky-University, D-26111 Oldenburg, Germany

[4] Manaaki Whenua – Landcare Research, Private Bag 1930, Dunedin, New Zealand

ABSTRACT

Understanding the mechanisms of lineage diversification is a fundamental question of evolutionary biology, and the study of rapid species radiations can provide insight into speciation processes. New Zealand has a dynamic and well-understood geological history and is home to many plant species radiations. *Veronica* (Plantaginaceae), a globally distributed genus with a major centre of diversity in New Zealand, is an ideal system for investigating the eco-evolutionary context for diversification. Subgenus *Pseudoveronica* section *Hebe* originated in New Zealand 5–10 million years ago, forming a monophyletic radiation of c. 130 extant species mostly endemic to New Zealand but with a few species native to other Southern Hemisphere areas. The speciose group occupies diverse habitats and exhibits a range of traits and ploidy levels. *Veronica* sect. *Hebe* has been previously investigated using standard chloroplast and ITS markers, but these studies have been limited by poor species-level resolution and substantial missing taxa. To improve the resolution and completeness of the *V.* sect. *Hebe* phylogeny, with a focus on the New Zealand species, we used a target enrichment sequencing approach, capturing approximately 150 kilobasepairs (kbp) of 353 protein coding genes and an additional 200 kbp of flanking intron sequences in each of 115 species. These included 47 not sampled in previous published phylogenies. Leaf material for these species was sampled with permission from herbarium and silica-dried specimens from the Te Papa herbarium (WELT) and other sources. These sequences were used to infer the phylogeny of New Zealand *Veronica* with the goal of assessing support for monophyletic subclades identified in previous phylogenies and obtaining a fully resolved, time-calibrated tree at the species level. With a well-resolved phylogeny, comparing cladogenesis rates in biogeographical contexts can shed light on the global mechanisms of lineage diversification.

BIO

Anne Thomas is a PhD candidate in Plant Sciences at the University of Cambridge, where she is a Gates

Cambridge scholar. Supervised by Andrew Tanentzap and Bill Lee (University of Otago), her research focuses on the past and current responses of plants' phylogeography and niche properties to global change and environmental gradients, with an emphasis on the New Zealand flora. She has a BSc degree in Conservation Biology and Bioinformatics from Brigham Young University ('18), where she completed an Honors thesis about modelling plant functional group niches in the southwest American deserts. She is interested in addressing conservation questions at the intersection of evolution and ecology with both computational and field approaches.

Session 5: Tuesday 12:00 – 12:15

Genetic and morphological variation in *Trithuria inconspicua* (Hydatellaceae): A new subspecies and a hypothesis of apomixis arising from a predominantly selfing lineage.

Kerry Ford – fordk@landcareresearch.co.nz – ASBS and NZPCN member

Rob Smissen[1], Kerry Ford[1], Paul Champion[2], Peter Heenan[1,3]
[1] Allan Herbarium, Manaaki Whenua – Landcare Research, Christchurch, New Zealand
[2] NIWA, Hamilton, New Zealand
[3] Wildland Consultants Ltd, Christchurch, New Zealand

ABSTRACT

We assessed genetic and morphological variation within this species and its sister *T. filamentosa* Rodway from Tasmania. Samples were collected from lakes in the three disjunct geographic areas where the two species occur. Genetic variation in both species was assessed with simple sequence-repeat (SSR, microsatellite) markers and analyses of genetic distances. We also compared the morphology of northern and southern populations of New Zealand of *T. inconspicua*. Within *T. inconspicua*, plants from lakes in the North Island and the South Island formed discrete genetic groups diagnosable by subtle morphological differences. Low levels of heterozygosity in both species are consistent with a high level of selfing, as suggested for other co-sexual *Trithuria* species, but unusual for a putative apomict. On the basis of genetic and morphological variation, we recognised the northern New Zealand and southern New Zealand lineages of *T. inconspicua* at subspecies rank.

BIO

Kerry Ford is a monocot plant systematist at the Allan Herbarium, Manaaki Whenua – Landcare Research. Her main research focus presently is on the taxonomy and evolution of New Zealand *Carex* section *Echinochlaenae* and also flora treatments of *Carex* and Alismataceae for the NZ eFlora series. She has completed flora treatments on Centrolepidaceae, Nothofagaceae and Nymphaeales.

12:15 – 1:10 – Lunch – Oceania

1:15 – 3:00 – Session 6 – Sponsored by Otari-Wilton's Bush Trust – Chair: Jon Sullivan; AV: Lalita Simpson – **Oceania**

Session 6: Recovery of threatened plants: success stories?

Session 6: Tuesday 1:15 – 1:30

Exploring mycorrhizal fungal diversity across sympatric forest orchids in New Zealand

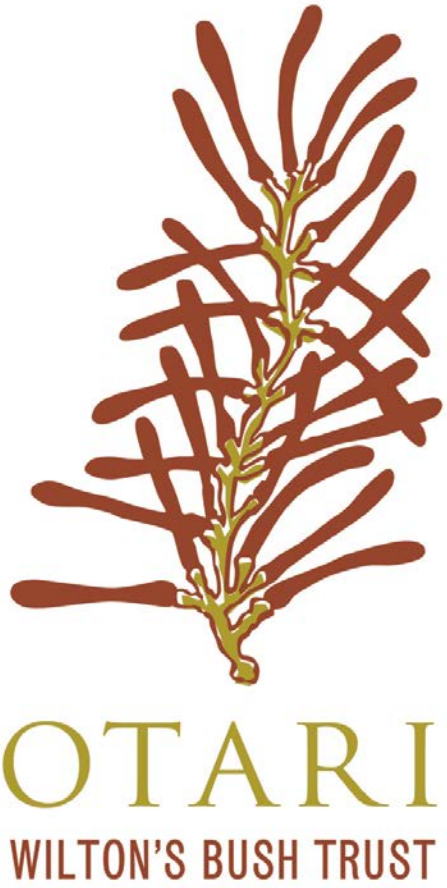
Carlos Lehnebach – carlosl@tepapa.govt.nz – NZPCN member

Carlos Lehnebach[1], Lara Shepherd[1]
[1] Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

ABSTRACT

Orchid-mycorrhizal interactions have been little studied in New Zealand and not much is known about what fungal groups are involved, levels of specialisation or how orchids' fungal preferences influence their distribution and local abundance. This lack of knowledge has created a significant gap in conservation efforts.

We aim to uncover the fungal preferences of sympatric orchids with distinct habit (terrestrial versus epiphytic) and trophic strategies (photosynthetic versus myco-heterotrophic) co-occurring under southern beech forest in the southern end of the North Island. To this end we have used Next-Generation Sequencing technologies and total root DNA to characterise the mycorrhizal fungal diversity found in 10 orchid genera (*Acianthus, Caladenia, Chiloglottis, Corybas, Cyrtostylis, Drymoanthus, Earina, Gastrodia, Pterostylis* and *Thelymitra*). Using the primer combinations ITS3 + ITS4OF & ITS86F + ITS4-Tul we have identified 14 fungal taxa across six orchid genera (2 Ascomycota and 12 Basidiomycota). We were unable to isolate fungal DNA from the epiphytic orchid species *Drymoanthus adversus* and *Earina automnalis*. Our preliminary results for terrestrial orchids suggest most sympatric species (two or three orchid species per site) exhibit divergent mycorrhizal associations except for the species *P. alobula* and *T. longifolia* which shared the same mycorrhizal fungal community (i.e. *Ceratobasidium* and *Rhizoctonia*). The next steps in our study are using a third primer combination, which is *Ceratobasidum* specific (i.e. CeTh1 + CeTh4), in all samples and collecting new roots of those epiphytic orchids in which isolation of fungal DNA failed.



BIO

Carlos Lehnebach completed his PhD in 2008 at Massey University in Palmerston North (NZ). Since then he has worked at Te Papa, first as a Postdoctoral Fellow and then as Curator of the botanical collections. His research interests include pollination, taxonomy and conservation of New Zealand plants. His current research focuses on pollination and mycorrhizal associations of NZ orchids and the implementation of seed germination methods to assist conservation of threatened orchids.

Session 6: Tuesday 1:30 – 1:45

Once in a lifetime: Why is recruitment so rare in dryland floodplains?

Debra Wotton – debra.wotton@moasark.co.nz – NZPCN member

Debra Wotton[1,2], Philip Grove[3], Dave Kelly[2]

[1] Moa's Ark Research, Kapiti Coast, New Zealand

[2] Biological Sciences, University of Canterbury, Christchurch, New Zealand

[3] Environment Canterbury, Christchurch, New Zealand

ABSTRACT

Olearia adenocarpa (dry plains shrub daisy, Asteraceae) is a critically endangered shrub confined to the Waimakariri and Rakaia River floodplains in Canterbury, New Zealand. *Olearia adenocarpa* seedlings have been observed only after invasive grasses were controlled with herbicide beneath adult plants. We investigated whether restoration of habitat (native shrubland) or the natural disturbance regime (river gravel deposition after flooding) can provide an alternative approach to promoting seedling establishment of *O. adenocarpa* and two common species also failing to recruit in river floodplain ecosystems (*Carmichaelia australis* and *Sophora microphylla*), without the use of herbicide. We used a field experiment to compare seedling establishment in untreated controls to three treatments: (1) shade cloth shelters, a proxy for native shrub cover; (2) river gravel addition, to simulate gravel deposition during flooding; and (3) herbicide application, to kill invasive grasses. For *C. australis*, provision of shade and shelter and herbicide application both promoted seedling emergence compared to controls, but few seedlings survived after two years. For *O. adenocarpa*, we found weak evidence that shade, herbicide and gravel increased seedling emergence, but the effects were small and few seeds germinated.

Establishment of *S. microphylla* seedlings was unaffected by shade and shelter, but gravel and herbicide treatments reduced seedling emergence compared to controls. Seed germination was also low for *S. microphylla*. Soil moisture was higher under shade cloth shelters, and lower in gravel plots, than in untreated plots in the open. We found no effect of herbicide on soil moisture. Our findings indicate that the loss of native shrublands and invasion by non-native grasses may limit the establishment of *C. australis* seedlings in dryland river floodplains. While *O. adenocarpa* seedlings cannot compete with invasive grasses, other factors also limited recruitment of this species, and *S. microphylla*, in this study. Opportunities for successful recruitment may occur infrequently in this stressful environment.

BIO

Debra Wotton founded Moa's Ark Research in 2013 and undertakes ecological research and consultancy services to protect and restore native biodiversity. She previously worked for Department of Conservation and Manaaki Whenua – Landcare Research. Debra is also a research associate at University of Canterbury, where she completed her PhD on seed dispersal by kererū (New Zealand wood pigeon). Debra's research interests include limits to plant recruitment, plant-animal interactions (e.g. seed dispersal, herbivory and seed predation) and threatened plants. Debra combines her background in field ecology with cutting-edge statistics, providing robust science to underpin biodiversity conservation.

Session 6: Tuesday 1:45 – 2:00

Preserving our native Myrtaceae from myrtle rust: A germplasm approach

Jacqui Bond – jabond@doc.govt.nz – NZPCN member

Fiona Thomson[1], Shannel Courtney[1]. Jacqui Bond[1], Jeremy Rolfe[1], Gina Aubia[2], Cris Winkworth[2], Craig McGill[2]
[1] Department of Conservation, New Zealand
[2] New Zealand Indigenous Flora Seed Bank, Palmerston North, New Zealand

ABSTRACT

Myrtle rust, a fungus known to kill plants in the Myrtaceae family, arrived in New Zealand in 2017. A large biosecurity response followed, led by the Ministry for Primary Industries and assisted by others including the Department of Conservation. Myrtle rust's arrival caused immediate concern that local or national extinctions of our native Myrtaceae species may occur. This led to 36 native Myrtaceae taxa being placed on the threatened plant list. To act as an insurance policy against extinctions, the Department of Conservation developed a germplasm strategy and nationwide seed collection programme. This talk will summarise the Department of Conservation's germplasm strategy and present the results of our seed collection work. Thirty-five Myrtaceae taxa were identified as being able to be stored through standard seed-banking procedures. Since 2017 three seed collection seasons have occurred with >400 seed collections now banked with the New Zealand Indigenous Flora Seed Bank (NZIFSB). Understanding long-term viability of stored seed and ongoing maintenance of collections are two of the key critical issues. Insights from developing a national seed collection project during a biosecurity response will be given and the future directions of the myrtle rust work discussed.

BIO

I am a technical advisor for "Seed Collection" with the Department of Conservation. My job started just after myrtle rust was found in New Zealand, with the creation of a nation team to help coordinate the collection of enough seed to protect the genetics of New Zealand Myrtaceae! Prior to this work I spent many years looking for "corner P" as part of DOC's Tier one monitoring and inventory team.

Session 6: Tuesday 2:00 – 2:15

Creating ex situ collections through biotechnology: Five case studies of threatened species conservation in New Zealand

Karin van der Walt – Karin.vanderwalt@wcc.govt.nz – NZPCN member

Karin van der Walt[1], Carlos Lehnebach[2], Megan Ireland[1]
[1] Otari Native Botanic Garden, Wellington City Council, Wellington, New Zealand
[2] Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

ABSTRACT

In situ conservation, as defined by the Convention on Biological Diversity, refers to the protection of integrated habitats and ecosystems in the wild, while ex situ conservation includes conditions under which individuals or their progeny are removed from their natural ecological processes and are managed on some level by humans. There is no question that the most effective conservation mechanism is habitat protection. However, ex situ collections can play a critical and fundamental role in combating extinction and for many species ex situ conservation via germplasm banking, living collections or tissue culture (in vitro) is the only viable strategy to prevent extinction.

We applied these conservation methods for five of New Zealand's threatened plant species. Seed obtained from either wild populations (*Lepidium banksii*, *Lophomyrtus obcordata* and *Syzygium maire*) or generated through hand pollination of plants in ex situ collections (*Metrosideros bartlettii*), were used to determine species specific desiccation profiles. Species which retained seed viability after desiccation (orthodox) were stored at sub-zero temperatures (conventional seed banking) and monitored for viability loss over time. Species showing viability loss after desiccation were classified as non-orthodox or recalcitrant and can only be secured through living collections, tissue culture, cryopreservation, or a combination of these methods. Options for species with limited or no seed (*Pimelea actea*) include the use of tissue culture for short term conservation followed by cryopreservation of vegetative shoots for long term conservation. Our work illustrates that biotechnological research combined with a variety of ex situ conservation methods such as hand pollination, tissue culture, conventional seed banking and cryopreservation are critical for preventing extinction of threatened plants. Integration of in situ and ex situ conservation strategies is a vital step towards the continued survival of some New Zealand's endangered plant species.

BIO

Karin van der Walt holds an MSc in Ecology from the University of Witwatersrand, South Africa and has been working in threatened plant conservation since 2006. Karin served on the panel for South Africa's response to the Global Strategy for Plant Conservation 2011–2020, as an expert on the Convention of International Trade in Endangered Species (CITES), Non Detriment Findings for cycads from South Africa and is a member of the IUCN's Seed Conservation Specialist Group. In her current role as Conservation and Science Advisor at Otari Native Botanic Garden (Wellington City Council), Karin is focussing on creating genetically representative ex situ collections of New Zealand's flora. Her work integrates pollination ecology, seed biology and plant physiology with biotechnology to create germplasm banks through conventional banking and cryopreservation.

Session 6: Tuesday 2:15 – 2:30

What is the regional threat status of Wellington's indigenous plants?

Philippa Crisp – philippa.crisp@gw.govt.nz – NZPCN member

Philippa Crisp[1], Owen Spearpoint[1], Jeremy Rolfe[2]
[1] Greater Wellington Regional Council, Wellington, New Zealand
[2] Department of Conservation, Wellington, New Zealand

ABSTRACT

National threat listings for indigenous species are of key importance for conserving biodiversity, but it has also been recognised that regional threat lists can provide a focus at a more local level. A methodology to identify

regionally threatened species is being trialled by Jeremy Rolfe and others at the Department of Conservation. The assessment technique involves the consideration of all species within a region, not just those with a national threat status. A nationally threatened species could be accorded a higher regional threat status, e.g. be designated regionally endangered, but have a nationally vulnerable status, however the regional threat ranking could not be lower than that of the national status. Consideration of the area of a region is taken into account when deciding the threat ranking of species that are not threatened nationally. Botanists from across the Wellington region took part in developing a list of species that are present in the region, then assessing each species using the regional threat criteria. In total, 72 plant species were identified as being Regionally Threatened: 48 Regionally Critically Endangered, 15 Regionally Endangered and 9 Regionally Vulnerable. Of those totals, the national rankings for those species were: 48 Threatened, 15 At Risk and 9 Not Threatened. This information is now being used to develop an action plan.

BIO

Philippa Crisp has worked in terrestrial ecology for the past 30 years. She has been involved in biodiversity management activities such as pest control and restoration planting in roles held at the Department of Conservation and Greater Wellington Regional Council. In more recent years, she has worked in the Environmental Science department at the Council and has focussed on ecological monitoring, wetlands, research and conservation planning for the Wellington region.

Session 6: Tuesday 2:30 – 2:45

***Juncus holoschoenus* var. *holoschoenus* and other septate rushes in New Zealand**

Paul Champion – paul.champion@niwa.co.nz – NZPCN member

Paul Champion[1], Sarah Beadel[2], Kerry Bodmin[3], Trevor James[4]

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[3] Department of Conservation, Hamilton, New Zealand

[4] AgResearch, Hamilton, New Zealand

ABSTRACT

There are fifteen septate-leaved *Juncus* (Section *Septati*, or Sections *Ozophyllum* and *Iridifolii*) species in New Zealand, with five indigenous species. Two of these species have a conservation status assessed as At Risk: Naturally Uncommon, the circumpolar Antarctic *J. scheuchzerioides* and the world's smallest, endemic *J. pusillus* (de Lange et al. 2017). Another species, *J. holoschoenus* var. *holoschoenus* R.Br. is a critically endangered, possibly endemic rush with a current known population of around 40 plants located in one wetland this year (see Beadel et al. in the following presentation). Previously, this species was widely distributed in both the North and South Islands, but there are few collections in the last 50 years that can be referred to this taxon, with apparent confusion with the closely related *J. fockei* that appear to have been ascribed to *J. holoschoenus* var. *multiflorus*. This presentation will outline the key features of the fifteen septate rushes and present information on the identity of recent New Zealand *J. holoschoenus* herbarium records.

BIO

Paul has specialist expertise in biosecurity, plant ecology and conservation of endangered plant species, especially in freshwater and wetland habitats. Focus research areas include assessment of weed potential of introduced plants, management of alien aquatic weeds (including surveillance, control techniques and strategies), assessment of environmental impacts of both freshwater pest invasions and weed control strategies and restoration of habitats impacted by invasive weeds. Paul joined NIWA in 1994 and was appointed Program Leader – Freshwater Biosecurity in July 2015. He has been a Principal Scientist – Freshwater Ecology since 2004. He previously worked with the Ministry of Agriculture and Forestry coordinating eradication programs for nationally important weeds.

Session 6: Tuesday 2:45 – 3:00

Conservation and ecology of *Juncus holoschoenus* var. *holoschoenus* and other threatened plant species at Rangitaiki Wetland, Central North Island

Sarah Beadel – sarah.beadel@wildlands.co.nz – NZPCN member

Sarah Beadel[1], Paul Champion[2], Jane Williams[3], Trevor James[4]
[1] Wildland Consultants Ltd – Rotorua, New Zealand
[2] NIWA – Hamilton, New Zealand
[3] DOC – Turangi, New Zealand
[4] AgResearch – Hamilton, New Zealand

ABSTRACT

Juncus holoschoenus var. *holoschoenus* R.Br. is a critical endangered, possibly endemic, rush. It is only known to occur at one wetland: Rangitaiki Wetland in the central North Island. Previously, this species was widely distributed in both North and South Islands, but there are only a few verified herbarium vouchers for this species in the last 50 years, with apparent confusion with the closely related *J. fockei* that appear to have been ascribed to *J. holoschoenus* var. *multiflorus* (see Champion et al. in the previous presentation). This presentation will outline the known ecology and conservation of *J. holoschoenus* var. *holoschoenus*, its history in New Zealand, threats and management issues at Rangitaiki wetland, and also discuss other Threatened and At Risk species present in the wetland, including: *Hypericum minutiflorum* (Threatened–Nationally Critical), *Carex rubicunda* (Threatened–Nationally Vulnerable), *Deyeuxia* aff. *quadriseta* (AK252511; Volcanic Plateau) (At Risk–Declining), *Prasophyllum hectorii* (At Risk–Declining), *Spiranthes novae-zelandiae* (At Risk–Declining), *Isolepis crassiuscula* (At Risk–Naturally Uncommon), and *Ranunculus macropus* (Data Deficient).

BIO

Sarah has specialist expertise as an ecologist and botanist throughout New Zealand, particularly with threatened plant survey and assessment, ecological restoration planning and implementation, vegetation surveys and mapping, evaluation of areas for significance and relative ecological significance, identification of management issues and options. Sarah established Wildlands in 1985, and is now a principal ecologist and botanist, and CEO, of Wildland Consultants Ltd.

1:15 – 2:45 – Session 7 – Sponsored by Manaaki Whenua – Landcare Research – Chair: Peter Jobson; AV: Francis Nge. – **Rangimarie 1**

Session 7: Recent progress in taxonomy and phylogeny of Australasian plants II

Session 7: Tuesday 1:15 – 1:30

Cheeseman's hinau revisited

Yumiko Baba – ybaba@aucklandmuseum.com – ASBS member

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ABSTRACT

Hinau, *Elaeocarpus dentatus* (J.R. Forst. & G. Forst.) Vahl, is one of two indigenous species for the genus in New Zealand, and currently has two varieties: var. *dentatus* and var. *obovatus*. *Elaeocarpus dentatus* var. *obovatus* Cheeseman (aka Cheeseman's hinau) was described by the first full-time director of Auckland Museum TF Cheeseman from a single specimen, consisting of fruiting material in 1906 without a full description. In contrast to the common, variable and widely collected type variety, Cheeseman's hinau appears to be range restricted, under-collected and under-studied. So far this name is represented by five individuals in three major herbaria in New Zealand (AK, CHR and WELT), and is listed as Data Deficient, but suspected to be threatened (de Lange

et al. 2017). The question remains, however, whether Cheeseman's hinau is discernible or part of the wide morphological diversity within the type variety. To test Cheeseman's hinau's taxonomic status, establish and document morphological circumscription, and subsequently assess its conservation status, I investigated a wide range of characters for existing herbarium specimens for traditional morphometric analyses. Additionally, landmark points were collected for geometric morphometric analyses. This talk summarises results from these analyses and discusses taxonomic implications.

BIO

Yumiko Baba is the Associate Curator at the herbarium of Auckland Museum Tāmaki Paenga Hira, New Zealand. Her research interests include taxonomy, systematics and documenting plant biodiversity in both tropical and temperate regions. She studied taxonomy and systematics of the tree genus *Elaeocarpus* in Australasia for her PhD, and this genus has become her life-long research interest.

Session 7: Tuesday 1:30 – 1:45

Promiscuous pitcher plants. A phylogenomic investigation of *Nepenthes* systematics and introgression.

*Nick Weigner – nicholas.weigner@my.jcu.edu.au – ASBS member

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ABSTRACT

Due to their fascinating ecology and evolutionary biology, few plants draw as much attention as tropical pitcher plants of the genus *Nepenthes* (Nepenthaceae). Species acquire nutrients via an extraordinarily diverse array of strategies, with modified leaves (pitchers) of different taxa specialised for the capture and consumption of fauna, leaf litter, or faeces. However, investigating the evolution of these strategies in this charismatic genus has been hampered by poor understanding of the phylogenetic relationships and contentious taxonomy. An historic reliance on morphological characters and molecular studies that have incorporated data from few markers has led to very limited phylogenetic resolution and considerable taxonomic uncertainty. In this study we used a target sequence capture approach to enable analysis of 331 nuclear loci producing a well-resolved and well-supported phylogeny representing the breadth of the genus. Additionally, we investigated the utility of a haplotype phasing approach for identifying and characterising evolutionary reticulation using diverse accessions of known hybrid parentage, and to explore the impact of this approach on phylogenetic reconstruction in the genus. The phasing approach was able to robustly identify hybrid parentage in all cases, and reconstructed a phylogeny with far higher resolution and support than any previously published study, in addition to revealing previously undocumented introgression of wild taxa.

BIO

Nick Weigner completed his undergraduate degree in Zoology and Ecology at James Cook University, Cairns/Townsville in 2017. During this degree a subject jointly run with the Australian Tropical Herbarium introduced him to the realms of botanical research. Since this he has undertaken an honours project investigating *Nepenthes*

systematics with the herbarium. His main interests lie in evolutionary biology and systematics across a range of taxa.

Session 7: Tuesday 1:45 – 2:00

Transoceanic range expansion of *Ochetophila trinervis* (Rhamnaceae, tribe Colletieae) by avian dispersal

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ABSTRACT

Colletieae is a smaller tribe of Rhamnaceae (20 species) and mainly occurs in South America, but one genus, *Discaria*, extends to New Zealand and Australia. In 2004, a single individual of an unknown shrub was discovered on sub-Antarctic Marion Island (one of the two Prince Edward Islands, South Africa). As flowers have never been observed, we examined it with morphological and molecular methods and confirmed the identity of this plant as *Ochetophila trinervis*, a species of Colletieae that is native to the southern Andes. Subsequently we examined how the plant could have established on Marion Island, over 7500 km from its native range. Our research shows that human activity can be excluded as method of introduction. Furthermore, seed morphology precludes wind dispersal or dispersal through oceanic currents. We show that avian dispersal is the most likely means that *O. trinervis* established on the island. Three bird species occurring in the southern Andes have also been observed on Marion Island and of these the barn swallow (*Hirundo rustica*) is the most common, i.e. the most likely vector for dispersing *O. trinervis* to this sub-Antarctic island.

BIO

Jürgen Kellermann completed his PhD at The University of Melbourne in 2007. For two years he worked as ABRS Research Fellow at the National Herbarium of Victoria. Since 2007 he has been employed at the State Herbarium of South Australia as Senior Botanist and editor of the institution's publications, e.g. the journal *Swainsona*. His research concentrates on the taxonomy and systematics of Rhamnaceae. Jürgen is currently working on a new phylogeny of the tribe Pomaderreae (endemic to Australia and New Zealand), a revision of the genera *Spyridium* and *Cryptandra*, and completion of the Flora of Australia treatment of the family.

Session 7: Tuesday 2:00 – 2:15

A new view of the annual eyebrights (*Euphrasia*: Orobanchaceae) in New Zealand

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ABSTRACT

Growing DNA evidence is showing that the radiations of *Euphrasia* into the southern hemisphere have been several, and that there is no unequivocal evidence of dispersal between Australia, New Zealand, Juan Fernandez

Islands and southern South America. Australia and New Zealand have multiple clades that are reflected in morphological and taxonomic evidence. The results of a revision of the annual members of the genus in NZ based on specimens from all NZ herbaria have realised many changes. Examples of the changes will be presented.

BIO

Bill's research interests include systematics, evolution, historical biogeography and biology of Australasian Scrophulariaceae in traditional sense (now segregated into Linderniaceae, Orobanchaceae, Phrymaceae, Plantaginaceae, Scrophulariaceae, etc.), the largely Australian Celastraceae subfam. Stackhousioideae, *Hakea* (Proteaceae, with Robyn Barker and Laurie Haegi), *Lawrencia* (Malvaceae, with Jen Tate et al.), and the family Theaceae in New Guinea. He was involved at the state and national level from their infancy in the development, management and delivery of data and information (eFloraSA, Australasian Virtual Herbarium).
With Robyn Barker and John Clarkson he is one of the current ASBS Newsletter editorial team.

Session 7: Tuesday 2:15 – 2:30

Taxonomic revision of native New Zealand forget-me-nots (*Myosotis*, Boraginaceae): An update

Heidi Meudt – heidim@tepapa.govt.nz – ASBS and NZPCN member

Heidi Meudt[1], Jessica Prebble[2]
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ABSTRACT

About half of the c.100 species of forget-me-nots (*Myosotis*, Boraginaceae) worldwide comprise the southern hemisphere lineage. Banks and Solander collected specimens of three of these species on Cook's first and second voyages. Today, New Zealand is a main centre of *Myosotis* diversity (45 species) with closely-related species also found in Australia (2), New Guinea (1), and southern South America (2). Taxonomic revision of *Myosotis* is a high priority in New Zealand, where most of the species are classified as Threatened, At Risk-Naturally Uncommon, or Data Deficient (New Zealand Threatened Classification System, NZTCS). The main aim of our research is to produce a taxonomic revision of all native southern hemisphere *Myosotis* species, and eventually a new New Zealand eFlora treatment (www.nzflora.info). We aim to answer the following questions: How many southern hemisphere species are there? How can they be identified? Where are they found? What is their conservation status? To date, we (together with collaborators) have revised just over half of the southern hemisphere species, with the remaining species to be studied over the next 2–3 years. Our analyses of morphological, pollen, genetic and field data have already contributed to the most recent NZTCS panel assessment. Our research also contributes fundamental data to biodiversity knowledge and databases. For example, of the c.1600 *Myosotis* specimens at Te Papa's herbarium (WELT), over 25% were collected since 2010, all are databased and imaged, many have been recently curated, and most are online (https://collections.tepapa.govt.nz/search/myosotis%20AND%20image/results). In this talk, we will give a broad overview of our *Myosotis* research results, discoveries, field work, and taxonomic implications to date, with a focus on testing species boundaries with data from morphology, pollen, and DNA in the species groups studied so far (bracteate-prostrate-, pygmy-, *M. petiolata*-, and *M. australis*-groups). We will also highlight work-in-progress and future directions.

BIO

Heidi Meudt is a Research Scientist in Botany at Te Papa (since 2006). She completed her PhD in Botany in 2004 at the University of Texas at Austin, and was also an Alexander von Humboldt Experienced Research Fellow at the University of Oldenburg, Germany from 2012–2014. Her main research focus is on the taxonomy and systematics of southern hemisphere plants, particularly Plantaginaceae and Boraginaceae. Her research integrates data from morphology, DNA, pollen, chromosomes and other sources to revise the taxonomy and better understand the geographical, morphological and phylogenetic patterns of species, especially New Zealand species radiations.

Session 7: Tuesday 2:30 – 2:45

How alignments and gaps can influence tree topology

Matt Buys – matt.buys@scionresearch.com – ASBS member

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ABSTRACT

A molecular phylogeny and infrageneric classification for *Kunzea* published by de Lange et al. (2010) has been foundational to recent revisions of *Kunzea* in New Zealand and Australia. In this talk we report on a review of the infrageneric classification based on a re-analysis of existing Genbank data complemented by newly generated sequences. Tree topologies are a product of, amongst other things, sequence alignments. We investigate the influence of different common alignment software packages and the presence/absence of gaps on tree topology. All of the previously identified clades in *Kunzea* are verified, but we find that the body of evidence points to the enigmatic Western Australian *Kunzea salina* to be sister to the western Australian subgenus *Salisia* and not sister to the Eastern Australian subgenus *Kunzea* as previously thought.

BIO

Matt Buys completed his PhD in 1997 at the University of Stellenbosch (South Africa). He then lectured plant systematics at the North West University. In 2006 he commenced as a systematist/curator of the Aizoaceae at the Compton Herbarium (Kirstenbosch Botanical Garden, South Africa). In 2011 he became the curator of the National Forestry Herbarium in New Zealand. Matt learned his taxonomic skills in the era of phenetics, cladistics and a multi-disciplinary approach to systematics, but tries to keep pace with developments in molecular techniques. His main taxonomic interest now encompasses Myrtaceae in the Pacific region.

3:00 pm – Announcements – **Oceania**

3:05 – 4:45 – Session 8: Poster session and afternoon tea – Oceania

Session 8: Posters

Session 8: Tuesday 3:05 – 4:45

Conservation efforts to protect New Zealand native orchid species

*Jennifer Alderton-Moss – j.aldertonmoss@gmail.com – NZPCN member

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ABSTRACT

Orchidaceae is one of the most widespread and diverse plant families in the world. In New Zealand it includes over 110 species, many are of conservation concern. Despite this, conservation efforts have not yet implemented techniques such as symbiotic and asymbiotic seed germination to propagate threatened orchids.

Our research aims to develop and implement methods to store orchid seeds (seed banking), test their viability and germinate them so we can establish ex situ collections and assist in situ conservation. We are focusing on two germination methods (symbiotic and asymbiotic) and also investigating staining procedures using Triphenyl Tetrazolium Chloride for a rapid assessment of seed viability. We have included six orchid genera in our studies which represent terrestrial and epiphytic orchids. These genera are *Acianthus*, *Corybas*, *Drymoanthus*, *Pterostylis*, *Spiranthes* and *Thelymitra*. For asymbiotic germination trials we are testing commercially available media such as Knudson C and Murashige & Skoog. Symbiotic trials, on the other hand, have involved isolation of the orchid mycorrhizal fungi, either by extracting pelotons from the roots or in situ fungal baiting using seed

packets. After 28 days seeds of *Drymoanthus adversus*, *D. flavus*, and *Thelymitra hatchii* growing asymbiotically on Knudson C media have reached stage three germination (defined by the appearance of rhizoids), and after 70 days seeds of *C. cheesemanii* growing on both media reached stage three germination. In general, Knudson C medium resulted in better germination than Murashige & Skoog medium. Symbiotic germination trials have been attempted with seed from a number of species but germination has only been observed in *T. hatchii*. Isolation of the mycorrhizal peloton has been difficult. For instance, isolates from two *Pterostylis* species have failed to establish on standard Fungal Isolation Media. Conversely, fungal isolates from *S. australis* have grown on FIM with no trouble and even promoted the germination of *T. hatchii* seeds.

BIO

Jennifer Alderton-Moss is currently a student at Victoria University of Wellington, set to complete her BSc in 2019 and planning to continue with postgraduate study in 2020. She was awarded a Summer Research Scholarship in 2018 to work in ex situ conservation of plants at Otari Native Botanic Garden and has continued her involvement over the last year. Her main research focus is the in vitro germination of New Zealand native orchids, particularly the epiphytic orchids *Drymoanthus adversus* and *D. flavus*.

Session 8: Tuesday 3:05 – 4:45

Biogeography of *Pomaderris* (Rhamnaceae) across the ditch: Multiple dispersal events from Australia to New Zealand

*Francis Nge – francis.nge@adelaide.edu.au – ASBS member

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ABSTRACT

Pomaderris Labill. (Rhamnaceae) is an Australasian endemic plant genus that contains c. 70 species, the majority of which are found in southeastern Australia, with several species found in southwest Western Australia and New Zealand. Here, we aim to: (1) assess the phylogenetic relationships, infrageneric classification and (2) biogeographic and evolutionary history of the genus. We utilised a Next Generation hybrid capture sequencing approach to obtain 40 nuclear loci and near complete plastid genome for all species within the genus. Our phylogenetic analyses indicate that current informal infrageneric sections within the genus are non-monophyletic. In addition, multiple dispersal events were detected from Australia to New Zealand across multiple species and clades within *Pomaderris*. The timing, significance, and drivers of these patterns are discussed.

BIO

Francis is currently undertaking a PhD in plant systematics at the University of Adelaide, with a focus on a few case study groups of the Australian temperate flora (Myrtaceae, Proteaceae, Rhamnaceae). His project focuses on the discovery of new species, macroevolution of the Australian temperate flora, and mechanisms that drive their diversification.

Session 8: Tuesday 3:05 – 4:45

Game of cones: Evolutionary trends and taxonomic significance of female cones in Podocarpaceae

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ABSTRACT

Conifers are known for hard and woody cones with needle-like leaves. Southern hemisphere dominant family Podocarpaceae (20 genera and 201 species) is different due to its fleshy cones and broad leaves. The female cone morphology varies among the genera. This study aimed to investigate the female cone evolutionary trends in

Podocarpaceae. The data was also used to evaluate the significance of female cone evolution in the systematics of Podocarpaceae. 39 macro- and micro-anatomical characters, including seed dispersal were included in this analysis and mapped on the phylogenetic tree. Some female cone morpho-anatomical characters (cone shape, cone size, receptacle, vascular traces and embryo shape) were found to be evolved multiple times. Other characters (seed number, shape, size, color, epimatium, arillus, fleshy bracts, non-fleshy bracts, resin canals, vascular traces, sarcotesta and sclerotesta layers) were more constant in all genera and of little systematic value for genus-level classification. Female cones were classified into five major functional morphotypes; 1. Podocarpoid cones, 2. Dacrydioid cones, 3. Prumnopityoid cones, 4. Phyllocladioid cones and 5. Saxegothoid cones. Despite the external morphological shapes of some genera looks different but their reproductive anatomy shows presence of similar anatomical layers.

BIO

Raees Khan is doing his PhD at the University of Adelaide. His PhD research project focuses on systematics and evolution of Podocarpaceae. He was working as taxonomist with Ministry of Climate Change, Pakistan before his PhD where his job was to study the effects of climate change on plants, do floristic surveys, help in establishing a Botanical Garden for endangered and threatened species. His research interests are anatomy, palynology, reproductive biology, NGS and conservation.

Session 8: Tuesday 3:05 – 4:45

Origins of polyploidy and diversification in *Libertia* (Iridaceae)

*Sophie Newmarch – sonew247@gmail.com – ASBS member

Sophie Newmarch[1], Dan Blanchon[2], Bee Gunn[3], Joanne Birch[4], Jennifer Tate[1]

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ABSTRACT

Whole-Genome Duplication (WGD) provides great opportunities for evolution. Consequently, species radiations often follow such events, adding to the diversity of life on earth. *Libertia* (Iridaceae) includes 12 species with a southern hemisphere distribution and is native to New Zealand, Australia, New Guinea and South America. New Zealand is thought to be the centre of diversification, due to the wide range of ploidal levels (diploid to dodecaploid with a base of x=19) found amongst the seven endemic species, which are broadly distributed across the North and South Islands. Based on cytological and morphological evidence, two distinct lineages within the genus were proposed: one consisting of diploids and tetraploids and the other of hexaploids and dodecaploids. Using a phylogenetic approach, our aims are to determine the biogeographic history of the genus and to identify the origins of the polyploid species. We are using nuclear and plastid data to reconstruct the evolutionary history of *Libertia*, including all seven species from New Zealand, *L. pulchella* (2x) from Australia, and *L. chilensis* (4x/6x) and *L. sessiliflora* (2x) from South America. *Orthrosanthus multiflorus* (6x), native to South Australia, was included as the outgroup. Preliminary analyses using plastid data support the two-lineage hypothesis. A genome skim approach was undertaken to retrieve nuclear loci as multiple bands resulted from single-gene PCR approaches. These nuclear data will be compared to the plastid data to determine if similar patterns emerge regarding the distinct evolutionary lineages of the polyploid taxa.

BIO

Sophie Newmarch is an undergraduate studying a Bachelor of Science, majoring in Plant Science at Massey University. Alongside her studies she works as a research assistant under Dr Jennifer Tate. Her primary research interest is in understanding how plants have spread and diversified across the earth's landscape. By combining genetic analysis with an understanding of biogeography, physiology and linguistics she attempts to solve phylogenetic puzzles. Currently, her focus is on floras that are connected across the Pacific with specific attention given to how polyploidy may have shaped their evolution. She plans to continue her research in postgraduate study.

Session 8: Tuesday 3:05 – 4:45

A population-genomic and taxonomic study of *Eucalyptus argophloia* and *E. bosistoana*

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ABSTRACT

The New Zealand Dryland Forests Initiative (NZDFI) aims to create plantations of high-value *Eucalyptus* timber species in dry environments on the east coasts of New Zealand. This would enable the sustainable production of naturally durable hardwood in New Zealand as a substitute for CCA treated pine and unsustainably harvested tropical hardwoods. For this purpose, Australian seed collections of five promising *Eucalyptus* species have been used since 2009 to establish progeny trials in New Zealand to select desirable growth and wood properties for the New Zealand environment. As part of this effort, we work on generating Single Nucleotide Polymorphism (SNP) data for *E. bosistoana* (Near Threatened) and *E. argophloia* (Vulnerable) using a newly developed *Eucalyptus* 65kSNP Axiom array to inform the NZDFI breeding programme and management of genetic resources. The specific goals of this project are to 1) resolve the taxonomic confusion between two morphologically similar species: *E. argophloia* and *E. bosistoana*, 2) determine patterns of genetic diversity and structure for *E. argophloia* and *E. bosistoana*, 3) determine the breeding system of *E. bosistoana*, and 4) inform the conservation management of *E. argophloia* and *E. bosistoana* in Australia.

BIO

I am from South Korea. I studied Plant Bioscience during my bachelors at Pusan National University in my home country, and Plant and Forest Biotechnology during my Masters degree at Umeå University in Sweden. My current PhD research project at the University of Canterbury is a genomic and taxonomic study of *Eucalyptus* species using SNP data to inform future genomic selection in breeding programmes.

Session 8: Tuesday 3:05 – 4:45

The unexpected taxonomic outcomes of assembling a biocontrol test list

Alexander N. Schmidt-Lebuhn – alexander.s-l@csiro.au – ASBS member

Alexander Schmidt-Lebuhn[1], Isabel Zeil-Rolfe[2], Brendan Lepschi[1], Ben Gooden[2]

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ABSTRACT

The Senecioneae are one of the largest tribes of Asteraceae, with more than 3,000 species and a cosmopolitan distribution. They also contain a large number of invasive weeds, e.g. *Senecio madagascariensis* (fireweed), *S. vulgaris*, *Jacobaea vulgaris*, and *Delairea odorata* (cape ivy). One of the management options for invasive species is biocontrol through the introduction of natural enemies from their native range. Before their release into a new environment, candidate control agents have to be tested against related native and useful species to ensure that they are sufficiently specialised to minimise the risk of unintended consequences. To inform the assembly of a test list for cape ivy, we collected all existing Genbank data of Senecioneae for four traditionally used sequence regions and generated new data for 32 Australian species. We found several newly sequenced species traditionally placed in *Senecio* to be distantly related to that genus. The results of our phylogenetic analysis, morphology, chromosome numbers and biogeography indicate three species to be the closest mainland relatives of the monotypic island endemic *Lordhowea*. Five other species require the description of a new genus, as they form a clade sister to *Lordhowea* and several Northern Hemisphere genera of Senecioneae. Our work demonstrates the potential of natural history and applied biocontrol research to work hand in hand and add value to each other: a knowledge gap identified for applied research led to taxonomic changes, and phylogenetic analysis informs biocontrol actions.

BIO

CSIRO scientist at the Australian National Herbarium in Canberra, Australia. Research interests include plant systematics, phylogenetics, biogeography, and polyploidy, in particular in Asteraceae (daisy family). In addition to his work on Australian native biodiversity Alexander has used his taxonomic and phylogenetics expertise to provide identification tools for biosecurity and assist with biocontrol research.

Session 8: Tuesday 3:05 – 4:45

Molecular support for the recognition of *Schoenus caespitans* Petrie

Lara Shepherd – lara.shepherd@tepapa.govt.nz – NZPCN member

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ABSTRACT

We examine the taxonomic rank of the sedge *Schoenus caespitans* using DNA chloroplast and nuclear sequences. This taxon has been alternatively recognised as a separate species or as a variety of *S. apogon* and no clear consensus on its rank has been reached. We found that *S. caespitans* and *S. apogon* are genetically distinct in sympatry and should therefore be recognised at species rank. *Schoenus caespitans* is endemic to New Zealand where it is found in coastal to subalpine habitats from the northwest Ruahine Ranges to South Canterbury. It is classified as Naturally Uncommon with the qualifiers sparse and data poor in the latest New Zealand Threatened Plant Ranking. There are few recent records of this species in herbaria and more research is required to determine its distribution and assess the threats it faces. Even in its narrower circumscription, *S. apogon*, which also occurs in Australia, New Guinea, Taiwan and Japan, remains morphologically and genetically variable, and deserves further investigation.

BIO

Lara is a Research Scientist based at Te Papa. She uses molecular techniques including DNA sequencing and genomics to study a wide range of organisms including plants, birds and amphipods. Within the plant kingdom she has interests spanning taxonomy, phylogeography, conservation and Māori plant use and movement. She has worked on a wide range of plant groups including *Alseuosmia*, *Sophora*, *Pseudopanax*, *Cheilolejeunea* liverworts and ferns.

Session 8: Tuesday 3:05 – 4:45

Taxonomic revision of the leafy liverworts *Cheilolejeunea* in New Zealand

Peter Beveridge – pbeveridge@xtra.co.nz – NZPCN member

Peter Beveridge[1], Lara Shepherd[1], David Glenny[2]

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ABSTRACT

New Zealand has the richest liverwort flora in the world for the size of the country and a high level of endemism. Overall the New Zealand liverwort flora is relatively well studied, however, the New Zealand members of the largely pantropical leafy liverwort genus *Cheilolejeunea* are not well known. Our research programme into New Zealand's *Cheilolejeunea* combines morphological and DNA sequence analyses and has resulted in the description of new species, plus the reinstatement of species from synonomy. Our study has revealed that the *C. mimosa* species complex contains forms with a high level of morphological divergence but with little genetic divergence.

BIO

Following an employment career in education, Peter Beveridge, in his retirement, is a research associate in the Herbarium at Te Papa (WELT). He has an interest in bryophyte diversity and distribution in New Zealand and a current research interest in the genus *Cheilolejeunea*.

Session 8: Tuesday 3:05 – 4:45

hyRAD for population genomics and identification of cryptic species

Todd McLay – todd.mclay@csiro.au – ASBS member

Todd McLay[1], Dave Albrecht[1], Alicia Grealy[2], Luisa Teasdale[3], Niccy Aitken[2], Kevin Murray[2]

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ABSTRACT

Leveraging the cost and quantity of DNA sequence output from high-throughput sequencing technologies with the enormous quantity of genetic material in herbaria has not been fully realised, especially for resolving species complexes. Part of the problem is that the two main methods of obtaining large amounts of nuclear genome sequence are sub-optimal for herbarium material. Restriction associated DNA sequencing, or RADseq, can obtain large amounts of nuclear DNA sequence but requires intact enzyme cut sites, which are not consistently conserved as material ages. Target-capture methods work well with old material but requires prior genomic information and a significant financial investment in baits. Enter hyRAD. This method converts a RAD library, for example from a living collection, into RAD loci probes that can then be used to capture those same sequences from degraded material. We used hyRAD to resolve the phylogeny of *Monotoca* (Ericaceae) and determine the extent of hybridisation between a named and unnamed species that occur on the east coast of Australia and developed a bioinformatic pipeline to analyse the data. Our results will help guide taxonomy and conservation and provide a laboratory protocol for applying hyRAD to degraded herbarium samples.

BIO

Todd McLay is a New Zealander who has lived in Australia for the past seven years. He is interested in the application of high-throughput sequencing methods to understand the evolutionary history of the Australian and New Zealand flora and to guide conservation.

Session 8: Tuesday 3:05 – 4:45

Significant Natural Areas in the Waikato: Prioritising karst ecosystems

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[3] Environmental Research Institute, Waikato University, Hamilton, New Zealand

ABSTRACT

Under the Resource Management Act (RMA), councils have a responsibility to identify and protect areas of significant indigenous vegetation. As such, Waikato Regional Council's (WRC) Regional Policy Statement (WRPS) provides criteria for determining the significance of indigenous biodiversity. It is imperative for WRC to establish a priority list of these ecologically valuable areas in order to manage biodiversity effectively. The prioritising process has been done in accordance with the criteria for national biodiversity assessments and under the Regional Policy Statement's framework. Karst ecosystems are "originally rare" ecosystems with unique flora and fauna habitats. As such, karst ecosystems are recognised by the WRPS as significant natural areas (SNA). Waikato Regional Council (WRC), in collaboration with key karst experts, have identified the top significant karst areas in the Waikato. In order to prioritise the sites of highest value and of the greatest need for conservation management action, WRC engaged Tonkin & Taylor Ltd (T+T) to develop a framework to rank the biotic values of these areas based largely on surface vegetation. T+T has developed criteria for assessing the value of indigenous vegetation of each karst SNA that can then be used to determine an overall ranking score for each SNA. In accordance with the Draft National Policy Statement on Indigenous Biodiversity (NPSIB 2018) and the WRPS, ecological ranking criteria are based on: representativeness; diversity and pattern; rarity and distinctiveness; and ecological context. Management criteria reflect the current vulnerability of the

SNA vegetation (e.g. fencing, legal protection). As some ecological and management attributes are of greater importance than others, each criterion is weighted. Confidence levels are also applied to each criterion to reflect the quality and quantity of information available for a given site. These criteria have been used to groundtruth and rank six example areas of karst vegetation throughout the Waikato and will provide WRC with the ability to prioritise conservation efforts and support willing landowners.

BIO

Briar has a PhD in biosystematics from Massey University and is currently employed at Tonkin + Taylor Ltd, Hamilton, as a consultant ecologist. She works on a range of projects involving the practical application of the RMA and Wildlife Act in assessing natural areas and monitoring threatened fauna and flora. Briar has a long standing interest in the indigenous plants and vegetation of New Zealand. She is a member of the Waikato Botanical Society and is currently restoring a gully site in Hamilton.

3:45 – 4:45 – NZPCN AGM – All NZPCN members welcome! – **Oceania**
3:45 – 4:45 – ASBS AGM – All ASBS members welcome! – **Rangimarie 1**

4:50 – 5:50 – Nancy T. Burbidge Medal Presentation and Address – Barry Conn – Is Paradise Lost? Or not yet discovered? – Chair: Daniel Murphy – **Oceania**

Barry Conn – tugiri1975@yahoo.com.au

Barry Conn[1]
[1] School of Life and Environmental Sciences, The University of Sydney, Sydney, Australia

ABSTRACT

The destruction of tropical rainforests is an impending disaster that is discussed at scientific, political and community levels. Although the rate at which the natural communities of Papua New Guinea are being destroyed is much less than in some other tropical regions, these forests are being irreversibly modified and destroyed. The development of a sound conservation strategy for the flora of Papua New Guinea requires the documentation of the flora of this region to be a priority. Unfortunately, our knowledge of the flora of Papua New Guinea is incomplete and fragmentary, often based on old publications, not aligned with current taxonomic principles and methodologies and reliant on the research of non-Papua New Guinean botanists. This presentation covers the current status of taxonomy and systematics in Papua New Guinea and discusses the potential future of taxonomic research by within-country botanists; the status of conservation, particularly the challenges of recognising threatened communities and species; and, as a case study, how to document the flora of this region, using the protocols and methodology of the Trees of Papua New Guinea project which was initiated in 2006.

BIO

Retired: previously Senior Principal Research Scientist (National Herbarium of New South Wales, NSW) and Associate Professor (The University of Sydney) specialising in the systematics and phylogeny of Malesian, Australasian and Pacific Droseraceae, Lamiaceae, Loganiaceae, Urticaceae, Verbenaceae and Xyridaceae. Principal researcher of the PNGtrees project; a collaborative project with the Papua New Guinea National Herbarium (LAE) to describe and document the trees of Papua New Guinea. Special interest in the development of standards for the electronic storage and transferral of herbarium and living collections data, plant descriptive data and distributional information.

5:50 – 6:00 – Last Announcements, Silent Auction finishes; attendees who wish to leave the museum prior to dinner must do so prior to closing at 6 pm; all materials including posters and Silent Auction items must be removed from room.

6:15 – 7:15 pm – Book launch – Seeds of New Zealand Monocotyledons – by Colin Webb, published by Manuka Press – with drinks & canapés (all welcome) – **Oceania**
7:15 – 10:00 pm – Conference dinner & kapa haka – Sponsored by Wildland Consultants Ltd – Ticket required – **Rongomaraeroa (Te Marae)**
Own arrangements for dinner

Wednesday 27 November – Field trips

Field trips – https://systematics.ourplants.org/programme/field-trips/ (tickets required)
All field trips depart and return from Te Papa. Please meet outside the main entrance to Te Papa 15 minutes prior to your departure time to pick up your lunch and meet your field trip leaders.

Field trip 1: Wild Wainuiomata and Rugged Remutaka Forests. *Please arrive at 7:45 am for 8:00 am departure.*
Field trip 2: Spectacular Coastal Parangarahu Lakes and Lowland Forest of Eastbourne. *Please arrive at 8:00 am for 8:15 am departure.*
Field trip 3: Wellington's Rugged South Coast – Restoration of Nature in Te Kopahou and Oku Reserve. *Please arrive at 8:15 am for 8:30 am departure.*
Field trip 4: Experience the Emerald in our Harbour — Matiu / Somes Island. *Please arrive at 9:00 am for 9:15 am departure.*
Field trip 5: Discover the Collections at Otari-Wilton's Bush and Te Papa. *Please arrive at 8:45 am for 9:00 am departure.*

6:00 – 10:00 pm – Informal social networking event – (see "Social Programme" above for more details; RSVP to Todd McLay todd.mclay@csiro.au)
Otherwise own arrangements for dinner

Thursday 28 November – Day 3 of talks – Rangimarie 1 & 2 (Te Huinga Centre)

From 8:00 am – Registration – **Rangimarie 1 & 2**
8:45 am – Announcements – **Rangimarie 1 & 2**
8:50 am – Opening keynote speaker: Kevin Thiele – Breaking through the barriers – taxonomy and systematics in the Anthropocene – Chair: Daniel Murphy – **Rangimarie 1 & 2**
Kevin Thiele – kevin.thiele@science.org.au – ASBS member

Kevin Thiele[1]
[1] Taxonomy Australia, Australian Academy of Science, Canberra, Australia

ABSTRACT
Taxonomy and systematics have an image problem. We are regarded as a useful but rather fringe discipline, best relegated to the back rooms of our institutions where we will be mostly harmless. We need to understand why this is so, if we are ever to achieve the significantly enhanced investment in taxonomy and systematics that is clearly warranted for such a foundational activity as documenting life on Earth. This talk will explore the reasons why we've failed to break through in the past, and the strategies we need to break through in the future. Along the way we'll explore a key and crucial question: what, if anything, is stopping us from discovering, documenting and naming all the species of plants and animals in Australia and New Zealand, in a time frame commensurate with the urgency of the need to do so.

BIO
Kevin Thiele is the inaugural Director of Taxonomy Australia and was the lead author behind the decadal plan for taxonomy and biosystematics in Australia and New Zealand 2018–2027. He is attempting to break through current barriers to a wider understanding and appreciation of the importance of taxonomy and systematics, leading to enhanced investment and funding for these foundational sciences.

9:50 – 10:30 am – Morning tea – **Sponsored by Coastlands – Icon**

10:35 – 11:35 – Session 9 – Chair: Ryonen Butcher; AV: Jonathan Frericks – **Rangimarie 2**

Session 9: Hybridisation: an ongoing dilemma for conservation

Session 9: Thursday 10:35 – 10:50

Hybridisation and deep reticulate evolution of an Australian plant genus – *Adenanthos* (Proteaceae)

*Francis Nge – Francis.nge@adelaide.edu.au – ASBS member

Francis Nge[1,2] Ed Biffin[1,2], Kevin Thiele[3], Michelle Waycott[1,2]

[1] School of Biological Sciences, the University of Adelaide, Australia

[2] State Herbarium of South Australia, Adelaide, Australia

[3] School of Biological Sciences, University of Western Australia, Australia

ABSTRACT

Reticulate evolution is well documented across many plant groups. Cytonuclear disordance from this process can be attributed to hybridisation events or incomplete lineage sorting (ILS). While deep reticulate incongruence have been demonstrated across multiple plant groups in the Northern hemisphere, similar studies on groups from the Southern hemisphere are currently lacking. Many of the Australian contemporary flora have origins dating back to the Cretaceous, older than much of the modern northern temperate flora. We reconstructed densely sampled molecular phylogenies for an Australian endemic plant genus – *Adenanthos* (Proteaceae), to infer its evolutionary history and assess for signs of reticulate evolution. We utilised a next-generation sequencing hybrid capture approach to obtain 40 nuclear loci and near complete plastid genomes for 30 out of the 31 species plus 2 putative hybrids. The relative effects of hybridisation and ILS on cytonuclear discordance were assessed using a Bayesian posterior predictive approach (JML) and coalescent simulations. These analyses indicate that strong incongruence detected across our plastid and nuclear topologies was not only the result of ILS, but also from at least four ancient introgression events, three chloroplast capture events, and three hybridisation events between extant species within *Adenanthos*. The ancient introgression events coincided with the rapid radiation of the group during the Miocene, when multiple other Australian temperate plant groups radiated in response the change in climate. Similar studies are warranted to investigate whether these radiations also exhibit similar patterns of deep reticulate evolution.

BIO

Francis is currently undertaking a PhD in plant systematics at the University of Adelaide, with a focus on a few case study groups of the Australian temperate flora (Myrtaceae, Proteaceae, Rhamnaceae). His project focuses on the discovery of new species, macroevolution of the Australian temperate flora, and mechanisms that drive their diversification.

Session 9: Thursday 10:50 – 11:05

Taxonomy, genetics and conservation of threatened native olives (*Notelaea* spp.) in Australia

*Chapa Manawaduge – chapagimhani.manawaduge@hdr.qut.edu.au – ASBS member

Chapa Manawaduge[1], Matthew Phillips[1], Susan Fuller[1]

[1] School of Earth, Environmental & Biological Sciences, Queensland University of Technology, Australia

ABSTRACT

With increasing threats to biodiversity, too many species require conservation management for the limited resources available. Therefore it is necessary to prioritise action for taxa most at high risk of extinction. Prioritisation is done by evaluating the conservation status of the taxon against a well-defined set of guidelines. However, a clear understanding of the taxonomic status of the taxon is required for conservation measures to be effective. Yet, resolving taxonomic boundaries may be challenging if cryptic species complexes exist. *Notelaea* is an endemic genus to Australia, with some taxonomic uncertainty surrounding species boundaries. Among the currently described twelve species, *N. ipsviciensis* and *N. lloydii* have been nationally listed as threatened species. Both these species are restricted to South-East Queensland, and occur in sympatry at the only known location where *N. ipsviciensis* is found. It has been suggested that *N. ipsviciensis* is a hybrid due to its close morphological affinities with *N. lloydii* and *N. ovata*. A recent genetic study, has supported the hybrid origin of

N. ipsviciensis, but still recognises it as a morphologically distinct species. However, further studies are required as there are still some taxonomic ambiguities surrounding these species. Therefore, we have reconstructed the molecular phylogeny of the genus *Notelaea* using both single-gene sequencing and SNP approaches. The cpDNA markers were not informative, while the SNP data strongly support the reticulate evolution of *N. ipsviciensis* raising doubts whether it is a distinct species and whether it should be given conservation priority. Our results also indicate that *N. microcarpa* falls within *N. lloydii,* suggesting that the two taxa may constitute a single species. Nevertheless, our population genetic analysis has revealed a high degree of genetic structure among the fragmented *N. lloydii* populations, emphasising the necessity of a broad conservation approach going beyond the species level.

BIO

Chapa Manawaduge holds BSc (Hon) special degree in Botany from University of Peradeniya, Sri Lanka. Her Honours research project was on the taxonomy and the conservation of the genus *Aponogeton* in Sri Lanka that resulted in the discovery of new species. She has been awarded a QUT Postgraduate Research Award and HDR Tuition Fee Sponsorship to undertake a PhD project at Queensland University of Technology on the conservation biology of threatened native olives in southern Queensland.

Session 9: Thursday 11:05 – 11:20

Insights into the reticulate evolution of the sun orchids (*Thelymitra*, Orchidaceae): Resolving parental lineages using target capture and haplotype phasing

Lars Nauheimer – lars.nauheimer@jcu.edu.au – ASBS member

Lars Nauheimer[1], Mark A Clements[2], Claire Micheneau[1], Rod Peakall[3], Darren Wong[3], Katharina Nargar[1]

[1] Australian Tropical Herbarium, James Cook University, Cairns, Australia

[2] Centre for Australian National Biodiversity Research, Canberra, Australia

[3] Australian National University, Canberra, Australia

ABSTRACT

Hybridisations, which occur frequently in plant lineages, present challenges for molecular phylogenetics. As result of their reticulated evolution, multiple alleles from divergent lineages can be present in a single taxon, which can lead to poor statistic support and/or erroneous tree topologies in phylogenetic reconstructions. Target capture methods enable sequencing of hundreds of nuclear genes and with it increase our understanding in formerly unresolved relationships. Although they face the same challenges with reticulated evolution, they also provide new opportunities. Target capture can recover all present gene alleles, which potentially provide information on the lineages involved in hybridisations, if they can be detected and separated (phased) successfully. Here we present a novel methodology that can detect reticulations by recording and measuring allele divergence and enables phasing of hybrid accessions into haplotypes by clade association using target capture sequencing of the sun orchids. *Thelymitra* is a genus of terrestrial orchids in the tribe Diurideae that comprises c. 120 species occurring in Australasia, for which hybridisation is frequently reported. Many natural hybrids have been recorded and described while molecular phylogenetic analyses revealed discrepancies between nuclear and plastid phylogenies suggesting additional hybridisation in *Thelymitra*. Further, chromosome counts of a small number of taxa revealed an unusual wide range of chromosome, indicating a complex cytological evolution in the genus. Here we present phylogenomic study based on 96 *Thelymitra* taxa and 749 nuclear gene loci obtained by target capture. We found 55 accessions with the majority of loci being heterozygous indicating a high proportion of reticulations. Of these accessions, 28 had considerable allele divergence and reads associating in multiple clades; they could be phased into multiple haplotypes and revealed their putative parental lineages. The resulting phylogenetic reconstructions resolved evolutionary relationships in *Thelymitra* in more detail and with higher support compared to prior studies, especially between main clades and many closely related taxa. The incorporation of hybrids as phased accessions into the phylogenetic analysis further revealed the origins of their parental lineages and provided insights into reticulate evolution in *Thelymitra*.

BIO

Lars Nauheimer completed his PhD in systematic botany in 2009 at the Ludwig-Maximilians University in Munich, Germany. From 2012 to 2015, he was postdoctoral research fellow at the University of Leipzig and University of Berlin. Since 2015, he is a research scientist at the Australian Tropical Herbarium in Cairns. His research focusses on molecular systematics and uses phylogenomic methods to investigate the temporal and spatial evolution of plants like orchids and pitcher plants.

Session 9: Thursday 11:20 – 11:35

Hybridisation and diversity of New Zealand alpine *Ranunculus*

Peter Lockhart – p.j.lockhart@massey.ac.nz – ASBS member

Peter Lockhart[1], Richard Winkworth[1], Trish McLenachan[1], Nicole Gruenheit[2], Claudia Voelckel[3], David Havell[4], Matthias Becker[1], Mehdi Mirzaei[5], David Bryant[6], Francoise Hennion[7], Bill Martin[2], Sofie Pearson[1], Lydia Turley[6], Alex Thomas[2], John Henry[1]

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[3] Max Plank Institute of Chemical Ecology, Jena, Germany

[4] Department of Conservation, Auckland, New Zealand

[5] Australian Proteomics Facility, Macquarie University, Australia

[6] Department of Mathematics and Statistics, University of Otago, Dunedin, New Zealand

[7] UMR ECOBIO, CNRS, Université de Rennes 1, Rennes, France

ABSTRACT

Fisher (1965) first described 14 species of alpine *Ranunculus* in the mountains of New Zealand. He also noted interesting patterns of morphological variation that he ascribed to hybrid origins and introgression between sympatric and reproductively compatible species. Some of our early DNA work suggested that many of Fisher's ideas - those that sought to explain ecological and morphological variation of alpine *Ranunculus* in New Zealand - appeared well founded, but difficult to test because of the strict criteria that is typically used to provide evidence for adaptive radiation. To try and gain insight we developed novel analytical approaches for transcriptome and proteome data that would quantify introgression and test predictions of adaptive diversification. In this talk, I will outline this methodology and our current work investigating some of our initial observations of non-monophyly in gene tree analyses of alpine *Ranunculus*. Important questions motivating our work are: How important are hybrids? and how important is hybridisation in facilitating ecological niche shifts and rapid adaptation to changing environmental conditions?

BIO

Peter Lockhart is Professor of Molecular Evolution in the School of Fundamental Sciences at Massey University. He is studying the adaptive potential of plants, pests and pathogens. Peter is coordinator of a UNESCO UNITWIN Network Science for Sustainability in Oceania, and with Francoise Hennion (Univ. Rennes) co-leads a French-New Zealand CNRS Laboratory without Walls (LIA) investigating adaptive diversification in New Zealand alpine and French Kerguelen Island plants.

10:35 am – 12:20 pm – Session 10 – Chair: Katharina Nargar; AV: Taylor Davies-Colley – **Rangimarie 1**

Session 10: Australasian Biogeography

Session 10: Thursday 10:35 – 10:50

The biogeography of central Australian flora

Peter Jobson – peter.jobson@nt.gov.au – ASBS member

Peter Jobson[1,2]

[1] Northern Territory Herbarium, Alice Springs, Northern Territory, Australia

[2] Department of Environment & Natural Resources, Alice Springs, Northern Territory, Australia

ABSTRACT

Contrary to what you would expect, the flora of central Australia is not poor in species number, but rather it consists of over 2300 species. This is due, in part, to the diverse landscape and soil types within this region. The most speciose part of central Australia is the MacDonnell Ranges with the highest level of endemism as well as a refuge to species more often associated with wetter climates. In contrast, the Simpson Desert is quite poor in species with under 100 species recorded and possibly only one endemic. Some surprising facts emerge when you look at the genera and number of species. The floristics are dominated by such genera as *Acacia* (110+ taxa) and *Eremophila* (- 44); whereas *Eucalyptus* (– 30) and bloodwoods (*Corymbia* - 17) are less significant. The dominant plant families for the region include grasses, daisies, peas, chenopods, and the hibiscus family s.lat. Some of these families consist of well represented genera such as *Eragrostis* and *Triodia* (grasses), or *Maireana, Atriplex* and *Sclerolaena* (chenopods); whereas in the case of the daisies and peas, although there are a few genera that have numerous species, most genera are represented by one or two species. Absences also tell an interesting story: well-known iconic Australian genera and orchids are absent. Speciose groups such as the egg-and-bacon peas, bearded heaths (*Leucopogon*) and guinea flowers (*Hibbertia*) are often represented by one or two species. So, if the species one normally thinks of as iconically Australian are missing, but there are still large numbers of taxa present, what is the likely origin of the central Australian plants? The answer is a complex, three pronged one. The three prongs are: temperate origin, tropical origin, and refugia from a wetter time. These three patterns shall be discussed with possible processes postulated.

BIO

Peter currently curates the Northern Territory Herbarium, Alice Springs – the only Australian herbarium specialising in the arid flora. He has many botanical interests: studying the arid flora; the biogeography of the sandstone flora of the Monsoon Tropics, and central Australia; native legumes of the tribe Mirbelieae; and botanical history. You will easily recognise him at the conference – he's the guy in the green kilt & knitting away at something. Say Hi – he doesn't bite (well, not anymore).

Session 10: Thursday 10:50 – 11:05

Was harakeke introduced to Norfolk Island by Polynesians?

Rob Smissen – smissenr@landcareresearch.co.nz – ASBS member

Rob Smissen[1], Sue Scheele[1]

[1] Manaaki Whenua – Landcare Research, Lincoln, New Zealand

ABSTRACT

Harakeke (New Zealand flax, *Phormium tenax*: Asphodelaceae) is a much-valued New Zealand plant highly significant in the pre-colonial Māori economy and also in the NZ colonial economy extending well into the twentieth century. Today it is still particularly prized by Māori for the utility of its leaves in weaving and as a source of versatile fibre, but also for its medicinal properties. New Zealanders generally consider the species to be unique to the country, but the botanical status quo has long held that it is also indigenous to Norfolk Island. It was present on Norfolk Island when HMS *Resolution* arrived there in 1774. The potential to exploit it in naval rope and sail making contributed to the British decision to colonise the island in 1788. However, the indigeneity of *P. tenax* on Norfolk Island has recently been challenged and an alternative hypothesis that Polynesian people translocated plants from New Zealand proposed. We addressed the question by examining near complete plastid genome sequences of *P. tenax* along with those of its sister species (*P. cookianum*) and more distantly related plants. DNA sequences of our sample of Norfolk Island plants were invariant and nested well within the diversity of *P. tenax*. We undertook a Bayesian estimation of the age of the divergence between Norfolk Island and New Zealand accessions. Estimates of divergence times did not exclude a common ancestor as recent as the second millennium CE and are therefore consistent with translocation of harakeke by Polynesian people. Although our analyses cannot exclude a Late Quaternary natural dispersal event which might result in similar genetic patterns, reconciling them with hypotheses invoking ancient geological processes to explain the distribution of *P. tenax*

require either several orders of magnitude variation in substitution rates across lineages of Asparagales or major departures from contemporary ideas of earth history.

BIO

Rob is a botanist with Manaaki Whenua – Landcare Research based at the Allan Herbarium working mostly on the molecular systematics of various flowering plant groups.

Session 10: Thursday 11:05 – 11:20

Spatio-temporal evolution of Asian and Australasian *Bulbophyllum* (Orchidaceae)

*Lalita Simpson – lalita.simpson@my.jcu.edu.au – ASBS member

Lalita Simpson[1, 2], Mark A. Clements[3,] Harvey Orel[1], Darren M. Crayn[4,5], Katharina Nargar[1,4]

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[2] College of Science and Engineering, James Cook University, Cairns, Australia

[3] Centre for Australian National Biodiversity Research, Canberra, Australia

[4] National Research Collections Australia, CSIRO, Canberra, Australia

[5] School of BioSciences, The University of Melbourne, Parkville, Australia

ABSTRACT

The hyperdiverse orchid genus *Bulbophyllum* (ca. 2,200 species) is the second largest genus of flowering plants and exhibits a pantropical distribution with a centre of diversity in tropical Asia. Due to the complex patterns of morphological variation found within *Bulbophyllum* and the large size of the genus, evolutionary relationships within the genus and its biogeographic history are only partly understood. Here we used a phylogenomic approach to infer broad-scale evolutionary relationships in *Bulbophyllum* and elucidate its biogeographic history, in particular within the Asian/Australasian region. To reconstruct infrageneric relationships, genome skimming with high-throughput sequencing was carried out for 71 *Bulbophyllum* species from Asia and Australasia, and outgroups from closely related genera. Maximum likelihood and Bayesian analyses based on 70 plastid protein-coding regions and the nuclear ribosomal ITS region resolved three well supported clades within the genus: 1) an Asian clade, 2) an Afrotropical/Neotropical clade and 3) an Australasian clade. Reconstructions of the spatio-temporal evolution of the genus using divergence dating in BEAST and ancestral range reconstructions based on the dispersal-extinction-cladogenesis model placed the origin of *Bulbophyllum* in the early Oligocene and showed a rapid divergence between the three major biogeographic lineages, which emerged in the Afrotropics, tropical Asia and Australasia during the late Oligocene. The divergence dates implicate transoceanic long-distance dispersal in the evolution of major biogeographic lineages within the genus and the divergence between the Australasian and Asian lineages, estimated to have taken place during the late Oligocene. Within the Asian clade, multiple independent long-distance dispersals were inferred from tropical Asia to temperate Asia, Australasia and the South Pacific and within the Tropical Asian region dispersal events were inferred westward across Wallacea to Papuasia. The divergence of a predominantly Papuasian clade and subsequent diversification within this clade was reconstructed to the late Miocene coinciding with the major uplift of the central range of New Guinea and mountain building that occurred during this time is identified as a likely driver of divergence within this lineage.

BIO

Lalita is a PhD candidate at the Australian Tropical Herbarium and James Cook University in Cairns. Lalita's research focuses on the evolution, biodiversity and classification of orchids and uses genomic data to elucidate evolutionary relationships, reconstruct historical biogeography and assess species delimitation in complex orchid groups. Lalita has been awarded the Australian Conservation Taxonomy Award and the Pauline Ladiges Prize for her research focused on tropical epiphytic orchids, in particular the most diverse orchid genus *Bulbophyllum* and Australian *Dendrobium* species.

Session 10: Thursday 11:20 – 11:35

Whole genome duplication in *Veronica* and *Coprosma*: Support for a several-fold increase in biome-shifting among high ploidy lineages

*Luke Liddell – llid035@aucklanduni.ac.nz – NZPCN member

Luke Liddell[1], Nick Matzke[1], William (Bill) Lee[1,2], Esther Dale[2,3], Heidi Meudt[4]

[1] University of Auckland, Auckland, New Zealand

[2] Manaaki Whenua – Landcare Research Otago, Dunedin, New Zealand

[3] University of Otago, Dunedin, New Zealand

[4] Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

ABSTRACT

Many New Zealand plant groups—including some of our most speciose genera—contain a range of different ploidy levels, the result of historic whole-genome duplication (WGD) events. However, little is known about the ecological and biogeographic significance of these events. Ancestral range estimation software, here applied to a simple biome scheme (forest, open, alpine) rather than geographic areas, provides a way to model the evolution of biome occupancy in these lineages. This approach also allows investigation into whether biome occupancy evolves differently depending on ploidy. *Veronica* and *Coprosma*, respectively New Zealand's first and fourth most speciose plant genera, are the focus of this research. Plants from different species in both genera exhibit a range of ploidy levels, occupy a variety of biomes, and have diversified through in situ species radiations (rather than multiple independent dispersals into NZ). Using published time-calibrated phylogenies, we have modelled the history of biome occupancy in these genera. By including ploidy as an explicit character state, we have found that models which allow ploidy to influence the rate of biome-shifting are more strongly supported than those which do not. Weighted averaging across all models tested shows a 3.6x increase in the rate of biome-shifting in *Veronica*, and a 4.7x increase in *Coprosma*. This may be an important factor in understanding how higher ploidy lineages in New Zealand are successful. Further research could look at other genera, especially different growth forms such as monocots or ferns. Alternatively, ploidy could also be compared to other factors such as niche breadth or geographic range.

BIO

Luke Liddell is a PhD candidate at the University of Auckland, supervised by Prof. Bill Lee and Dr. Nick Matzke, studying the ecology, biogeography, and evolution of polyploids in the New Zealand flora. His PhD is part of the Marsden Fund project "Whole-genome duplication in plants: what is the pathway to success?" Prior to starting his PhD, Luke completed a BSc (Hons) dissertation on the phylogeography of *Metrosideros*, supervised by Dr. Shane Wright. He is broadly interested in the diversity and ecology of the New Zealand flora, with a focus on understanding niche, trait, and biome evolution.

Session 10: Thursday 11:35 – 11:50

Evolution in Isolation: The search for an island syndrome in plants

KC Burns – kevin.burns@vuw.ac.nz – NZPCN member

KC Burns[1]

[1] Victoria University of Wellington, Wellington, New Zealand

ABSTRACT

Oceanic islands are storehouses for unique creatures. Zoologists have long been fascinated by island animals because they break all the rules. Speedy, nervous, little birds repeatedly evolve to become plump, tame, and flightless on islands. Equally strange and wonderful plants have evolved on islands. However, plants are very poorly understood relative to animals. Do plants repeatedly evolve similar patterns in dispersal ability, size, and defence on islands? Here, I will discuss the 'island syndrome' in plants, summarising our current understanding of whether plants repeatedly evolve similar patterns in dispersal ability, size, and defence on islands.

BIO

KC Burns is Professor of Biology at Victoria University of Wellington, New Zealand. He received an undergraduate degree from the University of California Berkeley, and a PhD from the University of California Los Angeles. He has published over 100 papers in scientific journals and is author of a new book on island plants published by Cambridge Press. He is fascinated by how plants evolve on oceanic islands and has worked on archipelagos across the globe, including New Caledonia, New Zealand, the Chatham Islands, the California Islands, and Lord Howe Island.

Session 10 (cont.): Australasian Biogeography, and The Decadal Plan and the future of taxonomy in Australasia

Session 10: Thursday 11:50 – 12:05

Species Aotearoa

Jennifer Tate – j.tate@massey.ac.nz – ASBS and NZPCN member

Jennifer A. Tate[1], Tom Trnski[2], Cor Vink[3], Wendy Nelson[4], Dean Peterson[5], Susan Waugh[5], Aaron Wilton[6], Aroha Mead[7], Nick Roskruge[1,7], Waitangi Wood[7], Ewan Fordyce[8], Lucia Roncaglia[9]

[1] Massey University Te Kunenga ki Pūrehuroa, Palmerston North, New Zealand

[2] Tāmaki Paenga Hira Auckland War Memorial Museum, Auckland, New Zealand

[3] Canterbury Museum, Christchurch, New Zealand

[4] NIWA Taihoro Nukurangi, Wellington, New Zealand

[5] Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

[6] Manaaki Whenua – Landcare Research, Christchurch, New Zealand

[7] Te Tira Whakamātaki Māori Biosecurity Network, New Zealand

[8] University of Otago Te Whare Wānanga o Otāgo, Dunedin, New Zealand

[9] GNS Science Te Pū Ao, Lower Hutt, New Zealand

ABSTRACT

Species Aotearoa (formerly the National Systematics and Taxonomic Collections Working Group) is a network of scientists promoting species discovery, taxonomy, systematics and the kaitiakitanga of taxonomic collections in New Zealand. This group is the New Zealand counterpart to Taxonomy Australia and as such we are dedicated to the implementation of the strategic goals and priorities of "Discovering Biodiversity: the decadal plan for taxonomy and biosystematics in Australia and New Zealand." Species Aotearoa is the steering group for New Zealand and includes members working in various sectors: indigenous knowledge and rights, Crown Research Institutes, regional museums, and universities; as well as representing diverse terrestrial and aquatic organismal groups. Since forming two years ago, the group has provided comment and input on high level strategic documents in New Zealand, as well as offering the New Zealand perspective on the Decadal Plan. This talk will outline our future plans, which include the formation of task groups to tackle specific objectives and developing better outward communications strategies to the public and to the sectors we serve.

BIO

Jennifer Tate is a Senior Lecturer in Plant Systematics at Massey University, where she teaches broadly in plant biology, supervises postgrad students, conducts research, and serves as curator of the Dame Ella Campbell Herbarium (MPN). Originally from the U.S., Jen's primary areas of research are the phylogenetics, systematics and taxonomy of Malvaceae from South America, New Zealand, and Australia, as well as plant genome evolution (especially polyploidy) of different plant groups. Jen is the current Chair of Species Aotearoa.

Session 10: Thursday 12:05 – 12:20

Genomics for Australian Plants: An update on the GAP consortium project

David Cantrill – david.cantrill@rbg.vic.gov.au – ASBS member

David John Cantrill[1] (and GAP consortium members)

[1] Royal Botanic Gardens Victoria, Melbourne, Australia

ABSTRACT

Genomics for Australian Plants is a BioPlatforms Australia Initiative to build genomic resources and capacity in the botanical community. The project has been developed by the botanical community and is supported by consortium members together with significant investment by BioPlatforms Australia, The Ian Potter Foundation and the Royal Botanic Gardens Foundation. The framework initiative has three components: reference genomes, phylogenomics and conservation genetics. This talk will update the community on progress to date and opportunities to join the consortium in the future.

BIO

David Cantrill is Executive Director Science at the Royal Botanic Gardens Victoria and responsible for the National Herbarium of Victoria and the State Botanical Collection. He is Treasurer for the Council of Heads of Australasian Herbaria.

12:20 – 1:25 pm – Lunch – Icon

1:30 – 3:00 pm – Session 11 – Chairs & AV: Daphne Lee & John Conran **– Rangimarie 2**

Session 11: What is the fossil evidence for extinction, adaptation and diversification in the assembly of the floras of the SW Pacific?

Session 11: Thursday 1:30 – 1:45

Integrating fossil flowers in angiosperm macroevolutionary analyses

Hervé Sauquet – herve.sauquet@gmail.com – ASBS member

Hervé Sauquet[1], Maria von Balthazar[2], Andrea Lopez-Martínez[3], Santiago Ramírez-Barahona[3], Jürg Schönenberger[2], Susana Magallón[3]

[1] National Herbarium of New South Wales, Royal Botanic Gardens and Domain Trust, Sydney, Australia

[2] Department of Botany and Biodiversity Research, University of Vienna, Vienna, Austria

[3] Instituto de Biología, Universidad Nacional Autónoma de México, Coyoacán, México City, México

ABSTRACT

The rise of angiosperms is one of the major revolutions in Earth's biological history, yet many aspects of their diversification remain unresolved. Extant and fossil data are both critical to understand angiosperm macroevolution and intersect particularly in calibration of molecular dating analyses and in phylogenetic assessments of fossil taxa, but this integration remains often limited and both sources of data are typically under-utilised. Here, we present results emerging from two collaborative efforts to improve this integration, relying on new datasets built with the PROTEUS database as part of the general Paleo-eFLOWER initiative. First, we present a new molecular dating study of angiosperms as a whole, calibrated with the most comprehensive set of fossil age constraints to date (238 calibrations), and including 1209 species sampled from all currently recognised orders (64) and families (435). Each fossil calibration was entirely revised for absolute age and phylogenetic assignment, and all aspects were thoroughly documented and justified according to best practices. These analyses provide the first comprehensive set of comparable estimates for every angiosperm family, showing that most families diverged from their sister lineage (stem age) during the Cretaceous (66–145 Ma), whereas most intrafamilial diversification (crown age) started in the Cenozoic (2–66 Ma). Our second study aims at including 100 fossil flowers in angiosperm macroevolutionary analyses by recording their traits in our expanding eFLOWER dataset, offering the potential to conduct the first phylogenetic analyses of fossil flowers without a

priori assignment to an angiosperm subclade. Here, we present the results from a pilot study based on molecular backbone analyses of 10 fossil flower taxa from the Cretaceous. While we find support for previous assignment hypotheses, our results also highlight alternative relationships for some of the fossils. Together, these two studies demonstrate the importance of macroevolutionary research firmly grounded on morphological trait and fossil integration.

BIO

Hervé Sauquet is an evolutionary biologist and systematic botanist with a broad interest in flowering plant macroevolution. A key focus of his research is to unravel and better understand large-scale patterns in the evolution of flowers, combining molecular phylogenies, the fossil record, and databases of plant morphology. After a PhD in Paris and postdocs in Stockholm, Sydney, and Kew, he worked as an Associate Professor at Université Paris-Sud from 2009 to 2017. He is now a Research Scientist at the Royal Botanic Gardens and Domains Trust in Sydney.

Session 11: Thursday 1:45 – 2:00

***Palissya*: Absolutely incomprehensible or surprisingly interpretable: A new morphological model and phylogenetic insights**

Andrew Rozefelds – acfrozefelds@live.com.au – ASBS member

Gary Pattemore[1], Andrew Rozefelds[2]

[1] Department of Natural Resources, Mines and Energy, Charleville, Queensland, Australia.

[2] Queensland Museum, Hendra, Queensland, Australia.

ABSTRACT

The genus *Palissya* occurs in Australia and New Zealand, and the Northern Hemisphere, and is recorded from Triassic through to Early Cretaceous sediments. It has been variously interpreted as an ovulate or staminate cone, or sporophyll, that is either a compound or single structure. The adaxial surface of the lateral appendages has rows of 'cup-like' structures that have been variously interpreted as arils, epimatia, seeds, winged seeds, cup-like collars or processes. Because of the difficulties in interpreting these structures on the cone scales, some researchers have concluded that the cones were absolutely incomprehensible. The discovery of permineralised, three-dimensionally preserved cones of *Palissya* in early Cretaceous sediments in Queensland provides an unparalleled opportunity to resolve the morphology of these cones. The cones are interpreted as ovulate, and the lateral appendages as a bract/scale complex as seen in some pinopsids. The adaxial surface of each lateral appendage has two rows of erect, orthotropous seeds on either side of the midline of the bract/scale complex. The seeds are subtended by a pair of unequally sized, discrete scales that form the 'cup-like' structure alluded to by earlier researchers. The scales and seeds form a highly synorganised structure and a model for this structure is proposed. *Palissya* shows morphological similarities with taxa in the Pinopsida, including (1) the compound structure of the bract/scale complex, (2) ovule/scale units on the adaxial surface of the complex, and (3) orthotropous ovules having a non-lignified micropyle, seeds are not winged and are subtended by a pair of scales. Similar organographic relationships in the ovule/scale complex are seen in the highly reduced cones in the Taxales, some Podocarpaceae and Ephedrales and the cones of *Palissya* may represent an appropriate organographic model for a precursor to one of these extant groups, or may represent an extinct lineage that shares generalised features with a number of taxa within this class.

BIO

Andrew Rozefelds is interested in the evolution and history of the modern Australian flora and the focus of his research is on Cenozoic and Mesozoic floras of northern Australia which remain little studied. He is based at the Queensland Museum and is currently working on projects that will help document some of these poorly known floras.

Session 11: Thursday 2:00 – 2:15

Fossil flowers from the Foulden and Hindon Konservat-Lagerstätte deposits: Insights into Miocene biodiversity, ecology and pollination in Zealandia

Daphne Lee – daphne.lee@otago.ac.nz

Daphne Lee[1], Jennifer Bannister[1], Uwe Kaulfuss[1], John Conran[2], Elizabeth Kennedy[3], Dallas Mildenhall[3]
[1] Department of Geology, University of Otago, Dunedin, New Zealand
[2] School of Biological Sciences, The University of Adelaide, Australia
[3] GNS Science, Lower Hutt, New Zealand

ABSTRACT

Flowers are rare as fossils and flowers containing in situ pollen are exceptionally rare. The 70 or so flowers/inflorescences we have now collected from the 23 m.y. old Foulden Maar diatomite and the 15 m.y. old carbonaceous mudstones of the Hindon Maar Complex preserve a wide range of morphological features including petals and stamens containing anthers with in situ pollen. The flowers range in size from 2–20 mm and vary in shape from generalist dish-bowl, to tubular or bell-shaped and the association of these flowers with previously described dispersed pollen provides crucial new data on source plants. The range of taxa represented by flowers includes Alstromeriaceae (*Luzuriaga*), a palm (Arecaceae), Akaniaceae (*Akania*), Alseuosmiaceae (*Alseuosmia*), Araliaceae (*Pseudopanax*), Cunoniaceae, Elaeocarpaceae (several genera), Euphorbiaceae (several genera), Lauraceae (*Litsea*), Loranthaceae (several genera), Meliaceae (*Dysoxylum*), Monimiaceae (*Hedycarya*), Onagraceae, Rutaceae (several spp.) and other as yet unidentified taxa. Some, such as *Fuchsia* and *Hedycarya*, represent the only definite fossil flowers for their respective families. Although all these fossil species are extinct, almost half the families still have living relatives in New Zealand, while relatives of other locally extinct taxa now occur in eastern Australia and New Caledonia. Some genera also provide links to South America (e.g. *Fuchsia*). Consistent with evidence from leaves and pollen, the flowers indicate a mesothermal rainforest flora occupying the fertile basaltic soils surrounding the small maar lakes. Overall the flowers are remarkably similar to their modern-day relatives suggesting that floral size, structure and pollination syndromes have changed little since the Miocene.

BIO

Daphne Lee and members of her research group have been studying aspects of the flora and fauna of many Oligocene and Miocene terrestrial deposits of southern Zealandia for almost two decades. In particular, we have been carrying out research on Foulden and Hindon maars, two Konservat-Lagerstätte deposits in Otago that are continuing to yield plant and animal fossils of major international geological and paleontological significance.

Session 11: Thursday 2:15 – 2:30

***'Zealandia fructus'*: Angiosperm diaspores in the New Zealand fossil record and their implications for paleoecology**

John Conran – john.conran@adelaide.edu.au – ASBS and NZPCN member

John Conran[1], Daphne Lee[2], Jennifer Bannister[2], Ewan Fordyce[2], Ian Geary[2], Uwe Kaulfuss[2], Elizabeth Kennedy[3], Dallas Mildenhall[3]
1 School of Biological Sciences, The University of Adelaide, Adelaide, Australia
2 Department of Geology, University of Otago, Dunedin, New Zealand
3 GNS Science, Lower Hutt, New Zealand

ABSTRACT

The evolution of the modern New Zealand flora has been influenced by long-term floristic filtering by late Neogene and Quaternary cooling, the emergence of new habitats and the presence of a limited diversity of vertebrates. However, there is good evidence from the very diverse macrofossil diaspore record that past angiosperm floras displayed a wide range of possible fruit or seed dispersal strategies. Fossil fruits and seeds are known from many Late Cretaceous through to Pleistocene sites across New Zealand and include taxa of

Araliaceae, Arecaceae (including coconuts), Atherospermataceae, Bignoniaceae, Casuarinaceae, Combretaceae, Cunoniaceae, Cymodoceaceae, Cyperaceae, Elaeocarpaceae, Fabaceae, Euphorbiaceae, Lauraceae, Meliaceae, Menispermaceae, Monimiaceae, Myrtaceae, Nothofagaceae, Passifloraceae, Pittosporaceae, Proteaceae, Rutaceae, Typhaceae and numerous others, including a range of as yet unidentified taxa. In particular, the Miocene South Island fossil floras at Foulden Maar, the Hindon Maar complex and Landslip Hill are diaspore-rich, as are those of the Miocene and overlying Pliocene Beachlands deposits near Auckland. Many of these now-extinct fossil species are still in the process of being described formally. The fossilised angiosperm diaspores known from New Zealand and their putative affinities suggest that the dispersal strategies that they apparently represent are indicative of three processes: i) long term co-evolution, ii) niche conservatism, and iii) reduced diversity of many mesothermal taxa with late Cenozoic cooling.

BIO

John Conran completed his PhD in 1985 at the University of Queensland and since 1990 has been teaching botany at The University of Adelaide. His research into the evolution and systematics of plants in the Australia/New Zealand region spans >35 years and covers diverse groups, including the petaloid monocots (lily-like plants), conifers and the carnivorous plants, amongst others. This research involves taxonomy, morphology, anatomy, palaeontology, cytology and co-evolution, as well as phylogenetic systematics using molecular methods.

Session 11: Thursday 2:30 – 2:45

Cenozoic fossil wood: New evidence for diversification and extinction of forest trees in the New Zealand region

*Matt Vanner – mrvanner@hotmail.co.nz – NZPCN member

Mathew Vanner[1], Matt Larcombe[2], John Conran[3], Daphne Lee[1]

[1] Department of Geology, University of Otago, Dunedin, New Zealand

[2] Department of Botany, University of Otago, Dunedin, New Zealand

[3] School of Biological Sciences, University of Adelaide, Australia

ABSTRACT

Since the time of Gondwana, forests have been a dominant biome type in New Zealand. The fossil record preserves a history of diversification and extinction of forest tree taxa as a result of climatic and environmental change. Palynomorphs, leaves and wood are widespread throughout New Zealand and represented in every major time period since the Jurassic. Fossilised wood is abundant in lignite, conglomerate, mudstone, limestone and volcanic tuff in a variety of preservation types including silicified, calcified or original organic material. Here we summarise new Cenozoic wood fossils (in situ tree stumps, branches and logs) from New Zealand to investigate diversification and extinction of major forest tree lineages. Cenozoic fossilised wood of both gymnosperms and angiosperms is abundant. Gymnosperms, which seem to preserve more readily in many environments, include Araucariaceae, Cupressaceae and Podocarpaceae, confirming that these three extant families have had a long history in New Zealand. Angiosperms include families with extant genera including Nothofagaceae, Elaeocarpaceae and Strasburgeriaceae, extant families with locally extinct genera including Myrtaceae and families which are no longer present here such as Casuarinaceae. Nothofagaceae and Casuarinaceae wood occurs in the Miocene in both North and South Islands. Strasburgeriaceae, which is now restricted to the North Island, was present much further south in the Eocene providing evidence for warmer climates in the past. Climatic cooling has resulted in the extinction of some forest tree taxa since the late Miocene or Pliocene.

BIO

I am a PhD student in the departments of Geology and Botany at the University of Otago. My main interest is in fossil wood – distribution, diversification and extinction of fossil wood species as well as change in paleoclimate and environment these ancient forests were growing in.

*Session 11: Thursday 2:45 – 3:00 **

Southeast Australian palaeofloras of the late Pleistocene, and their implications for glacial palaeoclimate reconstructions

*Kia Matley – kia.matley@unimelb.edu.au

Kia Matley[1], Kale Sniderman[2], Andrew Drinnan[1], Nicholas Porch[3], Quan Hua[4]

[1] School of BioSciences, The University of Melbourne, Melbourne, Australia

[2] School of Earth Sciences, The University of Melbourne, Melbourne, Australia

[3] School of Life and Environmental Sciences, Deakin University, Melbourne, Australia

[4] Centre for Accelerator Sciences, Australian Nuclear Science and Technology Organisation, Lucas Heights, Australia

ABSTRACT

The last glacial period (approximately 100,000 years ago to 12,000 years ago) and in particular the last glacial maximum (LGM, approximately 20,000 years ago) is thought to have exerted a significant influence over the current distribution of mesic forest taxa in southeast Australia. However, limited taxonomic resolution afforded by fossil pollen has meant that the nature of glacial biotic communities remains poorly understood. Pollen-based palaeoclimate reconstructions of Southeast Australia at the LGM have invoked a mostly treeless, 'glacial steppe' environment characterised by cold, dry, windy conditions. In the Northern Hemisphere, the late-Pleistocene glacial cycles, occurring with roughly 100,000-year cyclicity, have corresponded with large-scale migrations of arboreal taxa to lower-latitude refugia. But in southeast Australia, contemporary patterns of species diversity and endemism suggest a different biogeographical history. Here, phylogeographic evidence suggests that forest taxa persisted widely, in multiple, disjunct, local refugia. Resolving this conflict is the focus of our study. Our study will provide precise new insights into the southeast Australian glacial climate and biotic communities based on species-level identifications of plant and insect mesofossils. Where recovered fossil remains correspond to extant species, bioclimatic niche modelling will be used to quantitatively reconstruct palaeoclimate. The results will contribute to a globally significant debate about the role of the Pleistocene glacial-interglacial cycles in the generation and maintenance of terrestrial biodiversity, and also to the increasingly urgent discussion of the degree of sensitivity of Australian plant taxa to a changing climate.

BIO

Kia Matley is a second-year PhD student at the University of Melbourne. Her research examines the potential of plant macrofossils as a proxy for palaeoclimate reconstruction. Kia completed a Postgraduate Diploma thesis in arid-zone palaeoecology in 2017, investigating fossil pollen recovered from speleothems. Kia also has experience with a range of applications of pollen analysis, including an industry-supported investigation of the pollen content of commercial honeys as a tool for determining their botanical and geographical origin. She also participates in the monitoring and forecasting of airborne pollen, which informs a daily alert service for hayfever and asthma sufferers.

1:30 – 3:00 pm – Session 12 – Chair; Juliet Wege; AV: Kelly Shepherd – **Rangimarie 1**

Session 12: Phylogenomics

Session 12: Thursday 1:30 – 1:45

The phylogeography of *Eucalyptus behriana* (Bull mallee): A story of many signals

*Patrick Fahey – psfahey@student.unimelb.edu.au – ASBS member

Patrick Fahey[1], Michael Bayly[1], Frank Udovicic[2], David Cantrill[2]

[1] School of Biosciences, Faculty of Science, The University of Melbourne, Melbourne, Australia

[2] National Herbarium of Victoria, Royal Botanical Gardens Victoria, Melbourne, Australia

ABSTRACT

I will be presenting the results of a phylogeographical study of *Eucalyptus behriana* (Bull Mallee, Broad-leaved box) using whole chloroplast genomes plus mitochondrial and nuclear markers. This species is a mallee with a

disjunct distribution in south-east Australia, occurring as small populations in regions of 300–600 mm of annual rainfall, several of which are hundreds of kilometres apart. There is no morphological differentiation between populations, suggesting events giving rise to the scattered populations were recent. Our study is the first on *E. behriana* using molecular data, as well as the first in *Eucalyptus* to include a mitochondrial DNA phylogeny

BIO

Patrick is a PhD candidate at the University of Melbourne undertaking an investigation of the phylogeography of mallee-box eucalypts in south-eastern Australia using chloroplast genomes, and mitochondrial and nuclear markers. He previously completed a Bachelor of Advanced Science (Honours) at the University of Queensland in 2017 and took up his current studentship in 2018.

Session 12: Thursday 1:45 – 2:00

Phylogenomic analysis of New Zealand polyploid *Azorella* (Apiaceae)

*Weixuan Ning – w.ning@massey.ac.nz – ASBS member

Weixuan Ning[1], Heidi Meudt[2], Antoine Nicolas[3], Gregory Plunkett[4], Jennifer Tate[1]

[1] School of Fundamental Sciences, Massey University, New Zealand

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[3] Manhattan College, Riverdale, NY, USA

[4] Cullman Program for Molecular Systematics, New York Botanical Garden, Bronx, NY, USA

ABSTRACT

All angiosperms have at least one whole genome duplication in their evolutionary history, and polyploidisation has played an important role in new habitat colonisation, species diversification and adaptation. To have a better understanding of the role of polyploidisation in plant evolutionary history, genera that have species with multiple ploidal levels offer a chance to explore 1) species' relationships and origins of higher ploidal levels; 2) species' divergence time and divergence rate; 3) post-polyploidisation, correlations (if any) between genome size variation and their geographical and/or habitat distribution; 4) correlations between polyploid migration pattern and selection forces; and 5) environmental factors that may assist polyploid species' adaptation. The subalpine plant genus *Azorella* (formerly *Schizeilema*, Apiaceae) is represented in New Zealand and Australia by 16 species, which may be 4x-, 6x- or 10x-ploids. Preliminary ITS (internal transcribed spacer, ribosomal DNA) and plastid trees offer low resolution of New Zealand *Azorella* species' relationships and suggest they originated from diploid *Azorella* species in Chile and Argentina. New phylogenomic data generated from genome skims (including whole chloroplast genomes and haplotype rDNA sequences) and the Angiosperm353 bait set will be presented to elucidate the origins of the polyploid species from New Zealand. Divergence time and divergence rates will be estimated from the low/single copy nuclear gene (LCNG) data. Phylogenetic data will ultimately be analysed along with genome size estimates (from flow cytometry and genome skims data), and publicly available environmental database layers on soil, climate, elevation, etc. to determine what selective forces among the environmental factors played an important role in the evolution of the higher polyploid species. We anticipate that the multiple ploidal levels of *Azorella* species will offer a chance to explore how polyploidy contributes to the evolutionary adaptation of species over the long term.

BIO

Weixuan Ning finished his MSc at Oulu University, Finland in 2018, and started his PhD at Massey University in NZ in 2018. He had internships at the Uppsala Evolutionary Biology Centre and Max Planck Institute for Plant Breeding Research to learn about plant population genetics and adaptation. Currently, he is working on polyploid species diversification in NZ. He is trying to find out if there can be a more efficient way for non-model species classification using advanced molecular tools, and what environmental factors may assist polyploid species adaptation by examining the correlations between species' genome size and natural habitat.

Session 12: Thursday 2:00 – 2:15

Investigating polyploidy in Malvaceae using target sequence capture

Todd McLay – todd.mclay@csiro.au – ASBS member

Todd McLay[1], Mike Bayly[2], Jennifer Tate[3], Sarah Mathews[1]

[1] Centre for Australian National Biodiversity Research, CSIRO, Canberra, Australia

[2] School of Biosciences, University of Melbourne, Melbourne, Australia

[3] School of Fundamental Sciences, Massey University, Palmerston North, New Zealand

ABSTRACT

Polyploidy has been a major driver of diversification and speciation throughout the angiosperms. Whole genome duplications have been important in the evolutionary history of the Malvaceae, and recent studies using genome and transcriptome sequence data indicate that lineages in the family have undergone at least five genome duplications. Multiple analyses using different datasets have identified a duplication event at the base of Malvaceae subfamily Malvoideae, which includes the tribes Hibisceae, Gossypiae, and Malveae, and more independent duplications within Hibisceae and Gossypiae. However, to date, the genomic sampling within Hibisceae has been restricted to only a few species, and within Malveae whole genome duplications have not been investigated broadly. We used a Malvaceae specific target-capture set that has baits for 689 supposedly low-copy genes to sequence predominantly Australian members of Malvoideae, focusing on Hibisceae and Malveae. Assembly of these genes indicated that more than 75% had paralogs, which required careful filtering to identify orthologs. Alignments of orthologs were used to reconstruct the phylogeny using both concatenation and coalescent methods. Plastid genes were obtained from off-target sequence reads to compare the nuclear phylogeny to a plastid phylogeny. Polyploidy events were then mapped onto the phylogeny using gene copy number information and scenario testing. Inferences of polyploidy were supported with genome sizes obtained using flow cytometry. These findings will contribute to the understanding of polyploidy in Malvoideae, as well as provide methods for dealing with paralogy in target-capture data.

BIO

Todd McLay is a New Zealander who has lived in Australia for the past seven years. He is interested in the application of high-throughput sequencing methods to understand the evolutionary history of the Australian and New Zealand flora and to guide conservation.

Session 12: Thursday 2:15 – 2:30

A broadly sampled phylogenomic dataset resolves major clades of Australian Gnaphalieae (Asteraceae)

Alexander N. Schmidt-Lebuhn – alexander.s-l@csiro.au – ASBS member

Alexander N. Schmidt-Lebuhn[1]

[1] CSIRO, Centre for Australian National Biodiversity Research, Canberra, Australia

ABSTRACT

The paper daisy or cudweed tribe Gnaphalieae accounts for half of the c. 1,000 species of native Australian Asteraceae. Its Australasian clade includes perennial herbs, shrubs, alpine cushion plants, and arid zone ephemerals. Despite having undergone significant taxonomic changes over the last c. thirty years, the circumscription of many genera remains in doubt, and numerous monotypic genera appear to be apomorphic segregates. The most comprehensively sampled published phylogeny showed low branch support and resolution. A new dataset from a combination of sequence capture and skimming of ribosomal and chloroplast data allow the inference of a well-supported backbone phylogeny and resolve major clades of Australian Gnaphalieae. Sampled broadly and aiming to sequence at least one species of each genus, it now provides a framework to guide more in-depth sampling in the future. Results suggest that the majority of Australian Gnaphalieae fall into two large clades: One includes numerous ephemerals of southwestern Western Australia and the arid zone, the other is predominantly perennial and most diverse in southeastern Australia. The monotypic genera *Parantennaria* and *Tietkensia* are strongly supported as being outside of the Australasian clade of Gnaphalieae.

BIO

CSIRO scientist at the Australian National Herbarium in Canberra, Australia. Research interests include plant systematics, phylogenetics, biogeography, and polyploidy, in particular in Asteraceae (daisy family). In addition to his work on Australian native biodiversity Alexander has used his taxonomic and phylogenetics expertise to provide identification tools for biosecurity and assist with biocontrol research.

Session 12: Thursday 2:30 – 2:45

Evolution of Australia's terrestrial orchid diversity in space and time: Phylogenomic insights from tribe Diurideae

Katharina Nargar – katharina.nargar@csiro.au – ASBS member

Katharina Nargar[1,2], Natascha Wagner[3], James Perkins[2,4], Lars Nauheimer[1], Stephen Bent[5], Mark A. Clements[6]

[1] Australian Tropical Herbarium, James Cook University, Cairns, Australia

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[4] Australian National University, Canberra, Australia

[5] Data61, CSIRO, Brisbane, Australia

[6] Centre for Australian National Biodiversity Research, Canberra, Australia

ABSTRACT

Australia harbours a rich and highly endemic orchid flora, with 90% of species occurring nowhere else, and many threatened species. The terrestrial tribe Diurideae is a characteristic element of the Australian orchid flora representing 60% of Australia's orchid diversity. The tribe encompasses over 900 terrestrial species in nine subtribes.

Here we present a phylogenomic study based on genome skimming data for 239 Diurideae representing all genera within the tribe, and 28 outgroup samples including all five orchid subfamilies. Phylogenetic analyses, molecular divergence dating, ancestral area and ancestral character analyses were carried out based on 63 plastid coding regions (41,700 bp alignment). Evolutionary patterns of plastid gene losses within tribe Diurideae were assessed based in a phylogenetic framework. Phylogenetic relationships among the nine subtribes of Diurideae were resolved with high support, with the exception of the placement of Rhizanthellinae due to severe losses of plastid genes in this subtribe. Infrageneric relationships within the subtribes were well resolved allowing for a re-evaluation of systematic concepts within Diurideae based on phylogenetic evidence. Divergence dating and ancestral area analysis provided advances in our understanding of the spatio-temporal evolution of the tribe, supporting an Australian origin of the Diurideae in the Eocene and subsequent and independent dispersals to other neighbouring regions in Australasia, Asia and the Pacific. The analysis of plastid gene presence revealed an unexpected high level of independent gene losses and truncations across the tribe, in particular of *ndh* genes, which were unevenly distributed among the nine Diurideae subtribes. These results point to repeated shifts in the nutritional modes from autotrophic to mixotrophic to fully mycoheterotrophic within Diurideae.

BIO

Katharina Nargar is a Research Scientist at the Australian Tropical Herbarium (ATH) and National Research Collections Australia (CSIRO). Katharina's research interests lie in understanding the diversification of species-rich plant groups in space and time, and the underlying factors that shaped today's diversity. In her research she uses genomic tools to reconstruct evolutionary relationships, historical biogeography and character evolution and to assess species delimitation and genomic diversity in threatened species. Since 2010 Katharina has led the Orchid Research Program at the ATH and since 2019 she has been Chair of the IUCN Orchid Molecular Identification Group. In 2017, Katharina was awarded the Women in Science Award 2017 (Digital National Facilities and Collections, CSIRO).

Session 12: Thursday 2:45 – 3:00

Chloroplast genome evolution in New Zealand mycoheterotrophic Orchidaceae

Richard Winkworth – r.c.winkworth@massey.ac.nz – NZPCN member

Richard Winkworth[1], Katherine Murray[1], Carlos Lehnebach[2], Jennifer Tate[1]

[1] School of Fundamental Sciences, Massey University, Palmerston North, New Zealand

[2] Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

ABSTRACT

The plastid genomes of non-photosynthetic, heterotrophic land plants are often reduced in both size and gene content. Although broad comparisons support a functionally driven, stepwise model of genome reduction we have few details about the sequence of genome reduction in most non-photosynthetic plant groups. As part of ongoing work to examine the genomic changes associated with transitions to a non-photosynthetic lifestyle we have assembled complete plastome sequences from two groups of orchids – the Diurideae and Goodyerinae – both of which contain non-photosynthetic, mycoheterotrophic New Zealand species. In this talk we discuss insights from comparisons of plastome sequences of two geographically distinct populations of *Corybas cryptanthus* Hatch with those of 11 other Diurideae, as well as comparisons of the *Danhatchia australis* Garay & Christenson plastome with those of seven other Goodyerinae. In particular, we focus on contrasting patterns of genome reduction in *C. cryptanthus* and *D. australis*, features of the *Corybas* plastome that may predispose this lineage to genome reduction, and intraspecific diversity within *C. cryptanthus*.

BIO

Richard received his PhD from Massey University in 2001 and has since worked in the United States, Brazil, and Fiji. He is currently a senior lecturer at Massey University. One aim of Richard's research reflects his interest in the origins, diversification and biogeography of southern hemisphere plant lineages and the floras they comprise. Another aim is documenting biodiversity using emerging DNA technologies. In particular, field deployable DNA assays for anywhere, anytime disease diagnosis and environmental monitoring.

3:00 – 3:45 pm – Afternoon tea – Icon

3:50 – 4:50 – Awards & Wrap up – Rangimarie 1 & 2

4:50 – 5:50 – Informal meeting regarding Australasian Virtual Herbarium – Chair: Darren Crayn – All invited – **Rangimarie 1 & 2**

6:30 – 7:45 pm – Public panel discussion: The politics of collecting: From Banks & Solander to today – Invited expert panel: Leon Perrie, Peter de Lange, Priscilla Wehi, Hēmi Whaanga, Tom Roa; Facilitator: Bronwyn Labrum – **Soundings Theatre** (ticket required)

Own arrangements for dinner

Delegates

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We all need to play our part in protecting our precious landscapes and waterways from pests and diseases. Go to thisisus.nz to find out how you can get involved. Ko Tātou This Is Us.

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