NEWSLETTER NUMBER 86

FEBRUARY 2019

BSO Meetings and Field Trips February 2019 - July 2019

Wednesday 13th February 2019, 5:20pm. Ring of Fire: Volcanoes and Plants around the Pacific. Speaker: Peter Johnson. Volcanoes: ancient to active, with or without fumes, steam, scoria, sparks, ash, lava … what places for plants to live! Over the years I have found myself scrambling, botanising, and photographing upon the slopes and sometimes summits of solidified or eroding magma mountains. Most of these have risen up from the 'ring of fire', and my retrospective journey will take us clockwise around the margin of the Pacific Plate. We shall start among gentians on the highest point of the Auckland Islands, rest briefly on the basalt hills of Dunedin, then head north for a dose of younger volcanic fields: Tongariro, Taupo, Tarawera, and Rangitoto. Then up through Pacific Islands (Samoan lava fields, *Metrosideros* mist forest, erupting Mt Yasur) towards Indonesian mountains (or Gunung) with names such as Agung, Abang, Kawa Ijen, Bromo, Merapi, and Sibayak … with plants ranging from rice to wild raspberries, *Dianella* to *Dodonaea*. In northern Japan we shall climb Mt Asahidako and Rishirifuju, see familiar genera such as *Rhododendron* and *Betula*, another gentian, and wildflowers you may have never heard of. Google Earth will take us to Kamchatka, Canada, and Guatemala; we have garden plants from all those places. Finally, to the dry Andes, to see red mistletoes upon columnar cacti, and to Volcan Llaima where the alpine herbs bloom blue and white, yellow and orange and red … an illustrated nursery catalogue to die for … except: take nothing but photographs!

Saturday 16th February Blackstone Hill Conservation Area 8.00 am This is a block of montane tussock grassland and shrubland rising to an elevation of 800 m accessed from Highway 85 between Wedderburn and Becks. The Blackstone Hills separate the Ida Valley from the Manuherikia Valley. They are relatively flat on top but are dissected by gullies that contain grey scrub vegetation. BSO has not visited the area before so it will be a useful exercise to make a species list for the area. Meet at the Botany carpark at 8.00 am. Contact David Lyttle on (03) 454 5470 or djl1yttle@gmail.com

Wednesday 13th March, 5.20 pm: The vision of a Pest-Free Peninsula. Speaker: Rod Morris and trustees of the Otago Peninsula Biodiversity Group (OPBG), a community led conservation initiative to control animal pests on Otago Peninsula to make the area a better place for people and native wildlife. They will talk about reclaiming the biodiversity values of the Otago Peninsula, and how OPBG are promoting and enhancing these values through predator control. Since 2011, the OPBG has removed 14,500 possums from Otago Peninsula and as a result several native bird species are increasing in abundance and spread, including korimako, tui and kereru. In addition to this, monitoring of forest remnants and reptile and invertebrate numbers is beginning to document other signs of recovery. This growing achievement is thanks to the concerted effort of an increasing number of volunteers - the backbone of this initiative - ably guided by staff, and assisted by funders and supporters.

The next five years will be crucial in eradicating possums. Already Government and local bodies are showing an interest in supporting the final drive for eradication, as part of the Predator Free NZ vision. We are already preparing for the return of native species such as falcon, morepork and kaka, as well as looking to the next animal pest or pests that need targeting. Peninsula residents are concerned about the presence of ship rats, mustelids, rabbits, hedgehogs and feral cats as the possum project gathers support and momentum! However as the talk demonstrates, this is not about killing possums, it's about re-claiming our natural biodiversity. So... prepare to meet a suite of 'new' neighbours heading our way...

...karearea has already arrived on the Peninsula, kaka is an accessional and itinerant visitor from Orokonui, and ruru is already across the harbour, is getting closer and already visits the town belt.

Saturday 16th March 9.00 am Botanical Field trip to the Otago Peninsula. We will start off at Smaills Beach where we will look at dune and coastal vegetation. We will then go to the top of the Karetai Track where there is an extensive area of *Veronica elliptica* shrubland and associated coastal plants including *Linum monogynum, Pimelea prostrata, Samolus repens* and *Epilobium komarovianum.* This is your chance to see some

spectacular coastal and clifftop scenery. Depending on the time available there is the potential to visit several other sites. We shall return to Centre Road where we will look at a newly intitiated conservation planting project on a piece of fenced bush on the property of Mr Donald Lyttle.

Following the field trip there will be a barbeque at 189 Centre Road to which all participants are invited. Meet at the Botany Department carpark at 9.00 am. If the weather is unsuitable we will hold the trip on Sunday 17th. Contact: David Lyttle (03) 454 5470. Email: djl1yttle@gmail.com

10th April 5:20pm. Willows for baskets. Speaker: Maia Mistral. Willows introduced to New Zealand can be subject to bad press. Often neglected in the debate are willow species that humans have depended upon for centuries for their high utility values. One such group of willows selected over time specifically for their flexibility and amenability to cultivation are referred to collectively as basket willows. For those interested in learning willow basket making or considering it as a vocation, a lack of access to suitable willow can be a major barrier to progress. In fact securing a reliable supply of raw material has been an ongoing concern even amongst professional willow basket makers who first began to work in New Zealand from the mid-19th century. This talk will use insights from the past to discuss the relative value of importation, wild harvesting and traditional coppice management of selected basket willow varieties as pathways for securing material supplies in the future.

27th April 9:00am. Livingstone Wetland Restoration Project, Taieri Mouth. This is a family run restoration project of a wetland and forest remnant. The project has been going a number of years now and has had quite a bit of success with reforestation, increased birdlife and pest eradication. Recently they hosted the bird watching society who assisted them greatly with a bird count and a list of birdlife in the wetland and native bush. Now the Greens have asked the BSO to help create a plant species list for the native bush. We will spend the day exploring the tracks around the bush and wetland to compile a species list. Meet at Botany Department carpark at 9am. Contact Gretchen Brownstein 021 065 8497 or brownsteing@landcareresearch.co.nz.

8th May 5:20pm. BSO Annual General Meeting and Photographic Competition. The photographic competition is a popular and eagerly anticipated event for anyone interested in botanical photography. Enter your best photos and learn what makes a good photograph and how to improve your photographic skills from our panel of expert judges. Your photographs may be chosen for the BSO Calendar so this is your opportunity to have one month of fame. Start organising your entries now and don't wait until the last minute.

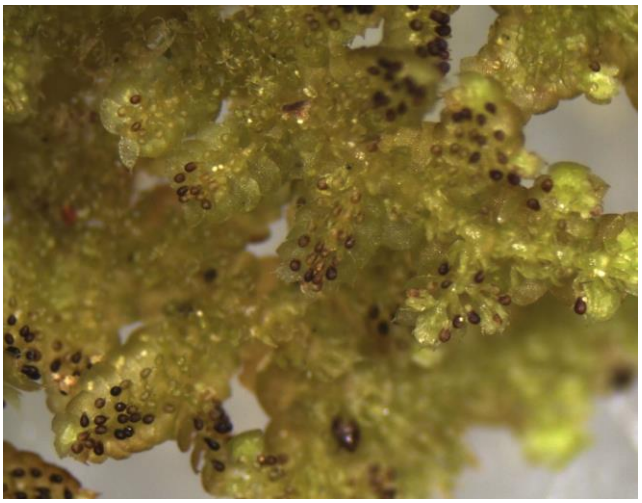
25th May 8:30am. Fungal Foray to Knights Bush, led by keen mycologist David Orlovich. This forest bordering the Clutha River at Tuapeka West has many different ecosytems to explore. Plantings of macrocarpa, pine, eucalyptus and Douglas fir grow on the edge of a diverse area of native forest. Inside the forest are stands of old kanuka, silver and mountain beech, ancient totara and matai on the shady slopes, with mixed podocarp/broad leafed forest on the river flat and a kowhai/korokia/divaricating shrub mix on the sunniest slopes. A list of known fungi from the area will be circulated and there will be a prize for the person who adds the most new species to the list! Meet at the Botany Dept car park at 8.30 am to carpool. 4WD to cross the access paddocks and footwear with good grip for the steep slopes recommended. Contact Allison Knight 027 4878265.

8th June 9:00am. Field trip to Okia Reserve, Otago Peninsula. Okia Reserve is a large coastal reserve on the Otago Peninsula that is jointly owned by the DCC and Yellow-eyed Penguin Trust. It comprises an old dune system that is rapidly changing from its dominant bracken cover to woody coastal species. The hollows between the dunes hold a variety of wetlands that include turf, bogs and ponds. The Otago Regional Council regards the dune hollow vegetation to be the best example in the Otago Coast Ecological Region. Along with the Pyramids - a significant geological feature, and Victory Beach - the longest beach on the Peninsula, there's plenty to keep us occupied. We'll do a walk that encompasses all these features. Meet at Botany Department carpark at 9am or the Okia Reserve carpark at the end of Dick Road at 9.30 am. Contact John Barkla 03 476 3686 or jbarkla@doc.govt.nz

12th June 5:20pm. Revegetation of Wangaloa Coal Mine Reserve. We are privileged to have Cathy Rufaut and Professor David Craw (winner of the 2018 Otago University Distinguished Research Medal) to talk to us about their ongoing geo-ecology project at the Wangaloa Coal Mine Reserve and how they have monitored re-vegetation on this challenging site.

10th July 5:20pm. A search for the co-evolutionary partner(s) of New Zealand's sequestrate fungi. Speaker: Dr Toni Atkinson. New Zealand has long been known as a "land of birds". The idea that the array of sequestrate fungi found here, many of which are colourful, may have arisen through coevolution with birds was first mooted in mycology around 20 years ago. It seemed a natural progression from the widely accepted hypothesis that New Zealand's diverse divaricating plants evolved due to selective pressure from the now extinct moa species. The suggestion appears to have been taken up by mycologists, and is becoming part of the story of science in this land. This year, an international team using high-throughput sequencing techniques to analyse the DNA in moa coprolites, revealed the first real evidence that moa may have eaten fungi.

But what happens if we take a fresh look at the whole question? Are moa the most likely coevolutionary partners of our sequestrate fungi, out of all the vertebrate and invertebrate inhabitants of prehistoric New Zealand? In this recently humanised but greatly altered land, it is challenging to hold in mind the relationships that might have played out over evolutionary time. What might we have missed?



Lepidolaena taylorii *(Photo: John Steel)*

Meeting details: Talks are usually on Wednesday evening starting at 5.20 pm with drinks and nibbles (gold coin donation), unless otherwise advertised. Venue is the Zoology Benham Building, 346 Great King Street, behind the Zoology car park by the old Captain Cook Hotel. Please use the main entrance of the Benham Building to enter and go to the Benham Seminar Room, Room 215, located on the second floor. Please be prompt as we have to hold the door open. Items of botanical interest for our buy, sell and share table are always appreciated. When enough people are feeling sociable we go to dinner afterwards: everyone is welcome to join in. The talks usually finish around 6.30 pm. Keen discussion might continue till 7 pm.

Field trip details: Field trips leave from Botany car park 464 Great King Street unless otherwise advertised. Meet there to car pool (10c/km/passenger to be paid to the driver, please). Please contact the trip leader before Friday for trips with special transport and by Wednesday for full weekend trips. A hand lens and field guides always add to the interest. It is the responsibility of each person to stay in contact with the group and to bring sufficient food, drink and outdoor gear to cope with changeable weather conditions. Bring appropriate personal medication, including anti-histamine for allergies. Note trip guidelines on the BSO web site: https://bso.org.nz/trip-guidelines

Contents

Cover: Cyanotype of Alectryon excelsus, *overlaid with text from* Paradise Lost. *Artwork by Lyn Taylor.*

Chair's Notes

Gretchen Brownstein

Hello! Hope 2019 has started well for everyone. I'm writing this in December, so I still have hope that the weather clears up and I can get out for a couple trips in the mountains.

This year is the 250th anniversary of the Endeavour voyage and Solander's visit to New Zealand. There will be a number of events throughout the year to mark the occasion, including a special exhibition by New Zealand artists, including local artist Lynn Taylor. Lynn has been experimenting with paper flower cut from the outline of one of the original specimens collected by Solander. We are lucky enough to have one Lynn's recent pieces as the cover art for this issue.

The committee has put together a great and diverse programme of talks and trips this year, from a grand exploration of the Pacific flora with Peter Johnson to highlighting the very small: fungi with Toni Atkinson and David Orlovich. A bit of a theme around local restoration projects (the Otago Peninsula and Taieri Mouth) has also emerged. So there is something for everyone and I am looking forward to seeing you at the events.

Also, remember that the BSO photo competition is coming up. Entries are due end of April, so get snapping! As Allison's winning shot last year showed (see page six), the judges reward unique pieces that make us think.

As always, if you have ideas for projects, trips or talks please get in touch.

Happy Botanising!

Secretary's Notes

Allison Knight

The end of the year is nigh as I write this and by the time you read it another year's programme of interesting trips and talks will be under way. 2019 is the 250th anniversary of the Swedish botanist Daniel Solander's visit to New Zealand on the *Endeavour*. In 2018 the Swedish Ambassador, Pär Ahlberger, made a special trip to Dunedin to encourage us to celebrate this significant event in any way possible, and he has written an article for our newsletter. In November we hope to have a Swedish scientist come to talk. Paintings, photos or related articles for the newsletter would all be greatly appreciated.

There was only one entry for the 2018 Audrey Eagle Botanical Drawing Competition and it was of such a high standard that we offered the artist a chance to have it auctioned at our October meeting. Bidding was vigorous and entertaining, so perhaps next year we will have an art display and auction rather than a competition.

One of the more unusual pieces of correspondence was a request from a visiting botanist to see *Luzuriaga parviflora* in the flesh. Ever helpful, two of our members have it growing in their gardens.

Peter Johnson provided a most useful reply to our request for urban lichen items for the Urban Lichen book. He sent a paper documenting distribution and species of lichens in Dunedin city in 1996. The air has become much cleaner since then, with less sulphur dioxide, but more nitrogen; a comparison with present lichen species could be interesting. We would still appreciate good quality photos of urban lichens, especially from those of you who live outside Dunedin. Email allison.knight.nz@gmail.com.

Treasurer's Notes

Mary Anne Miller

2018 was the final year BSO awarded Peter Bannister Student Field Grants. The awards were initiated by Jennifer Bannister, in memory of Professor Peter Bannister, Department of Botany, University of Otago from 1979 to 2005. Since 2014, these awards have assisted twelve post-graduate students from four departments at Otago University - Botany, Geography, Geology and Marine Science. A total of $10,930 was given out to projects as diverse as: comparative genomics of sequestrate fungi and their agaricoid relatives; the phytogeography of *Celmisia* in New Zealand; Miocene-Pleistocene fossil fruits and wood of the northern North Island; and assessing the trophic status of shallow, tidal lagoon estuaries. It was a pleasure to be involved

with these grants and our thanks go to Jennifer for her generosity, and to the other selection panel members, Bill Lee and David Orlovich, for their time and expertise.

The 2018 Baylis Lecture was a huge success, and a good revenue event. Calendar sales alone that evening brought in $390. When I wrote this report we had four unsold 2019 calendars, so if you'd like one email me - if there are any left in February they will be at a reduced price.

We finished last year in a good financial position. Our everyday working account had the most end-of-year funds for some time and the Audrey Eagle Fund is well set for the publishing projects we have underway.

It's that time of year when memberships are due for renewal. If you've not already done so, but wish to ensure knowledge of upcoming talks, field excursions and general happenings in the local botanical sphere, fill in the form at the back of this newsletter or go to our website and download a 2019 membership form. Email me if you wish to check on your membership status at maryanne.miller53@gmail.com

Editor's Notes

Lydia Turley

We have yet another great newsletter to start your botanical year on a high. As Gretchen and Alli have mentioned, this is the 250th anniversary of Solander's visit to New Zealand and we are celebrating with a Solander themed newsletter. Local artist Lynn Taylor has made a stunning cyanotype print for our cover (isn't it gorgeous?) and written an article on the process she used. The Swedish ambassador has sent us a well-researched article on Solander; do check it out.

As always, we have a variety of other interesting articles, reports and tid-bits; you'll have to keep reading to find it all! Many thanks to everyone who contributed to this newsletter and feel free to keep sending in any botanical musings or creative works for future articles.

If you haven't already, remember to bookmark our new website www.bso.org.nz and like us on Facebook. Any comments or suggestions, please let me know.

Suggestions and material for the newsletter are always welcome from our members. If you are keen to submit stories, drawings, reviews, opinions, articles, photos or letters – or anything else you think might be of botanical interest to our diverse range of members, don't hesitate to get in touch. Send your feedback, comments or contributions to lydiamturley@gmail.com. Copy for the next newsletter is due on 13th May 2019. Earlier submissions are most welcome.

New Members

A warm welcome is extended to Tony Green, Laura van Galen and Zoe Lunniss. To our existing members, thank you for your continuing support.

Thank you very much to Bill Nagle and Alf Webb for their generous donations.

Alli's winning picture: Unnatural selection? (Allison Knight)

Editor's guidelines: Try to aim for a 0.5–1 page of 14 pt. Times for news, trip/meeting reports and book reviews and 1–5 pages, including illustrations, for other articles. Electronic submission by email to lydiamturley@gmail.com is preferred. Send photos as separate files and remember to include photo captions and credits.

Disclaimer: The views published in this newsletter reflect the views of the individual authors and are not necessarily the views of the Botanical Society of Otago.

Enter the Competition and support the Calendar
Entries Due May 1st 2019

Categories are:

1. **Plant Portrait**
2. **Plants in the Landscape**
3. **Plants and people**

It's easier than ever - no prints required.

To enter just email up to 5 digital photos as JPEG files between 2 – 8 MB to BrownsteinG@landcareresearch.co.nz along with the electronic entry form. Label each image with the category number followed by a caption and email in batches of no more than 16 MB per batch. Entrants must be current members of the Botanical Society of Otago. Entry and membership forms will be posted on the BSO website: https://bso.org.nz/photo-competition

There will be a prize of $50 for the winner of each category. Entries will be judged on technical and artistic merit by a panel of three judges. A separate prize of $50 may be awarded for members' choice on the night. Photos will be displayed and winners will be announced at the meeting on 8th May. Only photos of native plants (with or without people and landscapes) will be considered for the calendar and pictures in landscape orientation are more suitable for this.

Correspondence and News

John Child Bryophyte and Lichen Workshops

Allison Knight

2018 Report

Enthusiasm was running so high at the 2018 John Child Bryophyte and Lichen Workshop, based at Pureora Forest Camp, that some late applicants had to be turned away. These informal 4-day workshops occur annually and are open to anyone keen to learn more about mosses, liverworts, hornworts and/or lichens. Participants range from beginners wanting to increase their understanding through to experts happy to share their knowledge. Four representatives of the local iwi stayed for the whole workshop. Their indigenous outlook added a whole new perspective and I was fascinated to learn about early uses of lichens. They in turn became so fascinated about having a whole new miniature world revealed on their doorstep that they went away keen to share everything they had discovered.

2019 Announcement

The workshops usually alternate between North and South Island and this year it is our turn to organise one. We are pleased to announce that the 2019 John Child Bryophyte and Lichen Workshop will be based at Camp Taringatura, from Thursday 21 November to Tuesday 26 November. The camp sits beside the Taringatura Reserve, situated between Dipton and Winton. Nearby are all sorts of rare and interesting remnants of the original wetlands, tussock grasslands, shrublands and forests that once covered the Southland plains, most of them carefully preserved by QEII Covenants or DOC Reserves.

More information and registration forms will come out later in the year. Register early so that you don't miss out! Students, bear in mind that there is a Tom Moss Award for the best student speaker or research paper whose project relates to some aspect of bryophytes or lichens. It might be worth including them in your project!

2019 Applications Open for Auckland Botanical Society Lucy Cranwell Student Grant for Botanical Research

Allison Knight

The grant of $2,500 is to assist a student studying for a degree in New Zealand whose thesis project deals with some aspect of New Zealand's flora and vegetation. Priority will be given to projects relevant to the northern half of the North Island.

The application forms are available on the ABS website under resources (https://sites.google.com/site/aucklandbotanicalsociety/Resources/lucy-cranwell-fund?authuser=0).

Please note the closing date for applications is Friday, 15 February 2019 by 5 pm. Please feel free to contact Stephanie Angove-Emery, ABS Secretary, if you have any questions or concerns.

Obituary: Emeritus Professor Peter Holland

Mary Anne Miller

It is with much sadness that we record the passing of Peter Holland on 15 January this year. Peter was much admired for his contributions to the historical and botanical geography of southern New Zealand through his role as Professor of Geography at University of Otago. He was encouraging and helpful if you had work that overlapped with his fields of expertise, and more especially if you were starting out in your studies. I was never a student of Peter's, but in 1987 walked into the Geography Department where he was Head of Department and asked for a job. He obliged and I had a great start to a university career working part-time as a technician. He took an interest in all aspects of my progress, even when I made the move to full-time employment in the Botany Department.

One aspect that stood out about Peter was his understanding of struggles and setbacks. I once came across him pacing the lab, practicing a lecture he was to give later that day. He wanted to ensure that the

students would fully understand what was important for them to grasp.

In latter years we'd meet at the Hocken Library as both had projects that involved investigating pioneer farmers' diaries. He was able to steer me in the right direction as he'd spent many hours there on his projects. One of these was the reaction of these farmers to their new environment when New Zealand was first settled by Europeans - see Meeting and Trip Reports.

Obituary: Rodney John Lewington 1935 – 2018

Allison Knight

Anyone lucky enough to have been on a Wellington Botanical Society summer camp or trip, a John Child Bryophyte (and Lichen) Workshop or, more recently, a guided tour of Otari-Wilton Native Botanic Garden is likely to have extended their knowledge of New Zealand's native plants and to have very positive memories of Rodney Lewington.

A member of the Wellington botanical community since 1961, Rodney made a point of welcoming newcomers and imparting his enthusiasm for, and understanding of, our native flora, with many memorable hints on identification. Who could forget "scaly *Cyathea* and hairy Dick" when struggling to distinguish between different genera of tree fern! Rodney would cheerfully help with the identification of anything from the tallest tree to the smallest bryophyte. He was instrumental in updating Gill Rapson's Beginners Guide to Mosses, Liverworts, Hornworts and Mosses and expanding the content by adding Lichens.

Over the last 57 years, Rodney must have passed on his enthusiasm for New Zealand's native plants to many hundreds, if not thousands of people. An outstanding contribution, and he will be greatly missed. Our condolences to his family, and especially to his companion botanist and supportive wife Darea.

Articles

Paradise Lost - Daniel Solander's legacy

His Excellency Ambassador Pär Ahlberger, of Sweden

The Swedish naturalist Daniel Solander was one of the foremost botanists on board the *Endeavour* during its voyage in 1768 - 1771. He represents the first encounter between the Nordic Region and the Pacific Region based on botany, linguistics, culture and astronomy. The Polynesian scholar Tupaia and Solander formed an important bond during the *Endeavour* voyage. It was the first exchange between the Swedish culture and the Polynesian, Māori and Aboriginal cultures. It is a partly forgotten story which needs to be told again.

The Simpling Macaroni, 13 July 1772 / M. Darly Mitchell Library, State Library of New South Wales / PXA 1353. Macaroni, a satirical etching portraying Daniel Solander, holding a plant specimen with flowers and root in his right hand, and a curved knife (lettered Savigny) in his left.

Daniel Solander was born in 1733, in a town only 100 km from the Arctic Circle. He was described as short and stout. His eyes were small, his face jovial with a fair complexion. He was a careless dresser and liked bright waistcoats. He was a person well liked, combining humility, charm, absent-mindedness and

social skills. He studied medicine and natural history in Uppsala as the favourite student of Carl Linnaeus, the founder of modern systematic biology. In 1760, at the invitation of British naturalists, Solander travelled to London to give instructions in the Linnean methods. He never returned to Sweden, much to the disappointment of Linnaeus.

In 1763 Solander was appointed assistant keeper at the British Museum. He formed a strong friendship with Joseph Banks and joined the scientific staff on the *Endeavour* expedition. This deciding moment was later described by Banks in a letter to a friend in Sweden.

Of this (the *Endeavour* voyage) *I promptly informed Doctor Solander, who received the news with much pleasure and immediately promised to provide me with complete information on all aspects of natural history which could probably be met with during such an extensive and unprecedented voyage. But some days afterwards, when we were together at Lady Monson's table and spoke about the unique opportunities I should get, Solander got remarkably fired, sprang up a short time later from his chair and asked with intent eyes: Would you like to have a travelling companion? I replied: Such a person as you would be of infinite advantage and pleasure to me! If so, he said, I want to go with you, and from that moment everything was settled and decided.*

During the voyage, Solander and Banks collected around 17,000 plant specimens. The specimens from Australia included around 900 species and in New Zealand 349 species. Solander was the author of the first individual floras of Australia and New Zealand. These were major but unpublished botanical works. His pioneering descriptions have been described as scientifically comprehensible, yet elegant and poetic. He also recorded important ethno-botanical information, including many Māori names. The Polynesian navigator and interpreter, Tupaia played a crucial role in this.

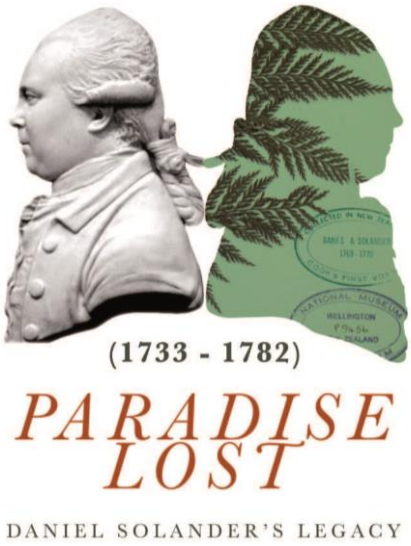
In a letter to Sweden, Banks later described the intensive work on board the *Endeavour*.

During this voyage, which lasted three years, I can say of him (Solander) *that he combined an incomparable diligence and an acumen that left nothing unsettled, with an unbelievable equanimity. During all that time we did not once have any altercation which for a moment became heated...We had a reasonably good supply of books with us for Indian natural history and seldom was a gale so strong that it interrupted our usual time of study, which lasted from approximately 8 o'clock in the morning until 2 o'clock in the afternoon, and from 4 or 5 o'clock, when the smell of cooking had vanished, we sat together until it got dark at a big table in the cabin with our draughtsman directly opposite us and showed him the manner in which the drawing should be done and also hastily made descriptions of all the natural history subjects while they were still fresh.*

Banksia solandri, *Stirling Range Banksia. The species name commemorates Daniel Solander. It was first gathered in 1829 in the Stirling Range WA by William Baxter. (The Banksia Book, AS George, p 80)*

Solander and Banks used large quantities of John Milton's epic poem Paradise Lost to press the specimens during the voyage.

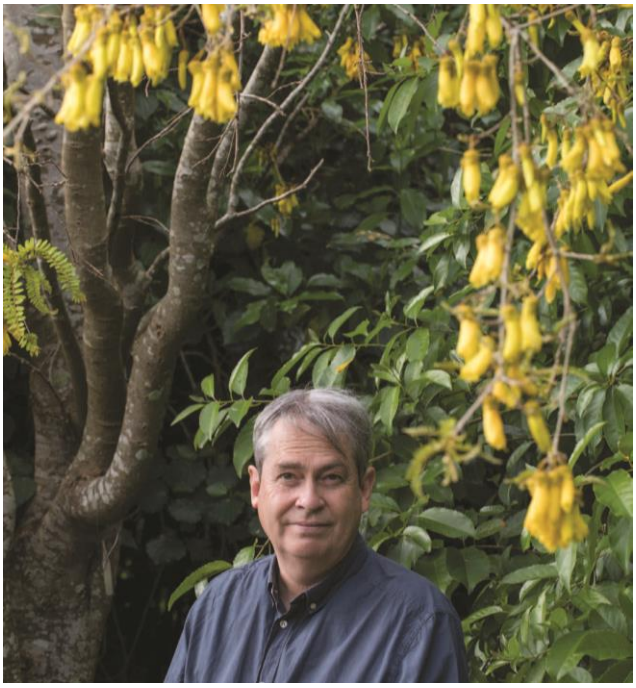
After returning to London, Solander resumed his post at the British Museum. He continued to work with Banks and they made several smaller expeditions, among them to the Isle of Wight, Scotland and Iceland. The plan was to document the botanical results of the *Endeavour* expedition. However, Solander passed away following a stroke in 1782, which left Banks devastated. In 1784 he wrote to a friend in Sweden: *The botanical work, with which I am now occupied, is drawing near to an end. Solander's name will appear on the title page beside mine, since everything was written through our combined labour. While he was alive, hardly a single sentence was written while we were not together.* This was not to happen.



The Embassy of Sweden and the Solander Gallery in Wellington, NZ, have launched a unique art collaboration: Paradise Lost - Daniel Solander's Legacy. Ten artists have been invited to respond creatively to the legacy of Daniel Solander, with works including painting, watercolours, limited edition prints, artist books and three-dimensional objects. The research by Dr Edward Duyker has been important in this project. I would like to recommend his book: *Nature's Argonaut: Daniel Solander 1733-1782*.

The artists involved in the project are Sharnae Beardsley from Christchurch, Dagmar Dyck from Auckland, Tabatha Forbes from New Plymouth, John McClean from New Plymouth, Alexis Neal from Auckland, Jo Ogier from Christchurch, Jenna Packer from Dunedin, John Pusateri from Auckland, Lynn Taylor from Dunedin and Michel Tuffery from Wellington. The exhibition will be officially opened at the Solander Gallery in Wellington in February 2019 and will tour New Zealand until mid-2020.

Reproduced from Fronds 90, December 2018, with permission from Pär Ahlberger, the Swedish Ambassador and the Friends of the Australian National Botanic Gardens, Canberra.

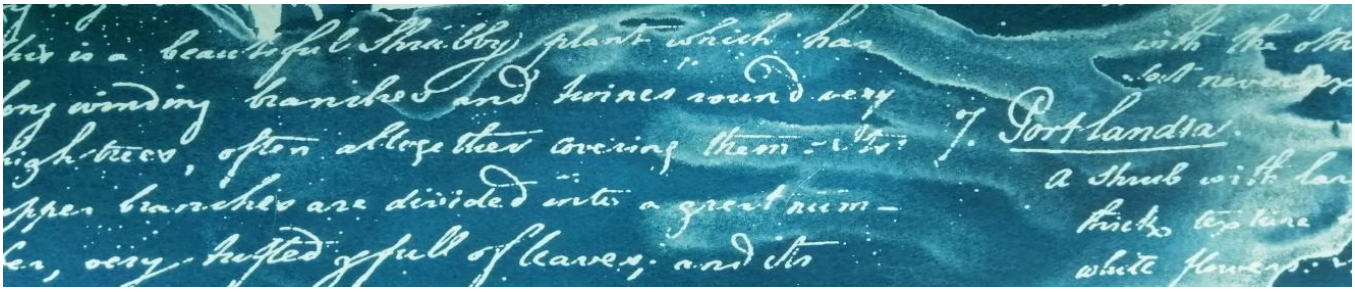


Swedish Ambassador Pär Ahlberger, in the Auckland Botanic Gardens under a Sophora microphylla*, coined by Joseph Banks and Daniel Solander. The common name of this tree is Kowhai, family Fabaceae, native to New Zealand and widely regarded as the NZ national flower.*

Drawing plants with light: cyanotype

Lynn Taylor

The cyanotype process for making prints was invented by Sir John Herschel in 1842 and came from his discovery of the light sensitivity of iron salts. It produces a deep indigo image, which can be printed onto many surfaces. Cyanotype is mixed from chemistry; a combination of iron, potassium and other elements are coated onto the paper, dried in the dark, exposed to sunlight and then washed to remove the unexposed chemistry. The magical appearance of the image after exposure and washing is one of the charms of this process.



This image is a pattern created from a cyanotype of Pittosporum umbellatum *in the Dunedin Botanic Garden.*

I'm one of a group of artists making art works relating to Daniel Solander for an exhibition, *Paradise Lost*, which opens in February at Solander Gallery in Wellington. While walking the Solander Trail in the Dunedin Botanic Gardens when Sweden's ambassador to New Zealand Pär Ahlberger visited, I was invited to create an image for the Botanical Society of Otago Newsletter. I chose to make cyanotypes for this as a direct way of responding to nature and because the process offers up fluid and new ways of seeing things. It created an opportunity for me to draw with light in a way that informs my printmaking.

Alectryon excelsus *being exposed to light (Photo: Lynn Taylor)*

I precoated paper with cyanotype chemicals and headed up to the Solander Trail with them in a black bag. Leaves and floor litter were collected and then placed on the paper and sandwiched between board and glass. Once all clamped up the unit is tilted towards the sun and exposed for about 15 minutes. Here, *Alectryon excelsus* (titoki) is being exposed and later was overlaid with text from Milton's book *Paradise Lost*. Paper was in short supply on the *Endeavor* journey and pages from a copy of *Paradise Lost* were used in the drying and pressing of plant specimens.

What has been lovely about this activity are the moments when the years between then and now melted away. When I hesitated before tasting native spinach, I wondered how those onboard the *Endeavor* felt, trying new and often distasteful foods. (No worries, indeed, like spinach!) When I sat under the dappled light of the titoki, breathing in quiet beauty I imagined being a botanical explorer. When I reproduced Solander's writing (above) in cyanotype, it looked so fluid, as if written on water, as it was.

Thanks to Dr Janice Lord for sharing the Botany Department's copy of Solander's descriptions of plants (transcribed from slips written on the Endeavour during the first voyage 1768–1771) and to Kate Caldwell (Dunedin Botanic Gardens) for her guidance and permission to utilize the plants in the Solander Trail.

Check out the *Paradise Lost* exhibition on line @ https://solandergallery.co.nz/

Spiders as bioindicators of vegetation complexity in urban environments.

James Crofts-Bennett

While plant-insect interactions are widely appreciated, the relationship between spiders and plants may not be as readily recognised. From a purely zoological frame of mind, it might be hard to draw links between a plant and what were, until recently, thought to be obligate carnivores (Nyffeler, et al., 2016). However, for more than 2000 years Chinese farmers recognised the importance of

spiders in relation to crops and even went as far as recognising some degree of correlation between structural complexity and spider abundance (Halaj, et al., 2000). Surveying and observation of spider populations has suggested that the structural complexity that plants offer is one of the strongest correlative forces behind the amazing abundance and diversity of spiders (Greenstone, 1984; Halaj, et al., 2000; Lövei, et al., 2018).

Urban environments do not offer the environmental heterogeneity that forests and woodlands, or even rural areas offer (Lövei, et al., 2018; Tews, et al., 2004). Derived from this, Lövei, et al. (2018) suggested that the current extent of urban "green spaces" is not large enough to provide the necessary microclimate for moisture sensitive invertebrates. Urban environments also add other environmental stresses such as pollution and invasive predatory animals, particularly rats (Feng & Himsworth, 2014). One type of urban green space is offered by the green roof concept. The William James building roof top is an example of a green roof; though somewhat limited in actual green space, it offers an isolated space of vegetation in an urban environment. Constructed during the later part of 2009 and surveyed for invertebrates in 2010, this green roof offers a brief glimpse of insight into what spider communities looked like on a recently erected building roof top. Despite the roof top being vegetated at this point the invertebrate population was limited with mostly flying insects of the orders Diptera and Hymenoptera being present alongside a considerable population of small invertebrates such as Springtails and mites. The spider population consisted of a mere eight individuals, all being members of the species *Cryptachaea blattea*.

During 2018, I resurveyed the rooftop under the supervision of Janice Lord and with the assistance of John Steel. When originally planted, the vegetation was segregated into blocks of abiotic and biotically pollinated plants. These blocks were re-established and had quadrats placed at the centre of each plot. Vegetation was identified and contrasted against the original planting to look for shifts in vegetation structure. Vegetation was then characterised into cover types and roughly estimated for percentage total cover in each quadrat. Following this, pitfall traps were placed in pairs in each quadrat in order to capture invertebrates for survey. Pitfall trapping continued over the late autumn and duration of winter.

Vegetation surveys confirmed a shift towards a grass dominated environment, with over 85% of the roof cover type being recorded as grass. Woody shrubs have greatly diminished from the south side of the roof where shade from sunlight is higher than on the north side. The south side of the roof also has the highest percentage of open ground cover type. Pitfall trapping managed to bring in 4,715 individual invertebrates, over three times the number observed in 2010 (1,376 invertebrates). The number of orders present increased by four, with gastropods, millipedes, thrips and field crickets being recorded. While no wasps were recorded in the 2018 survey (three species of wasp were recorded in 2010) the ant, *Monomorium antarcticum*, was recorded. A wider range of moths have colonised the roof top with Erebidae and Psychidae larvae being a common sight during the autumn collection. Ink tunnel traps and a chew card were implemented to record mammal activity, baited with peanut butter. Both methods failed to indicate any presence of mammals on the roof top, although the ink tunnel traps did manage to offer some interesting finds. A black back gull (*Larus dominicanus*) was caught pilfering the bait during one routine check and after several days of being set, the peanut butter was found swarming with *M. antarcticum* with numbers greater than fifty counted on a single set bait. With regards to spiders observed, 98 individual spiders were caught over the duration of pitfall trapping. The vast majority (97) of these spiders were *C. blattea* with one individual *Dolomedes minor* also turning up. Note that the seasonal time of capture for 2010 was during the summer. It is estimated that large portions of spider populations are lost during the winter time due to bird predation (Gunnarsson, 1983). While it is hard to compare the results of Gunnarsson (1983) to a more urban environment, even a more conservative estimation of spider population growth based on his works would suggest a population growth over fifty times that originally observed.

Different spider species have different population growth potentials with regards to what type of vegetation structure is available, as spiders can alter local structural complexity through web formation

(Vollrath & Selden, 2007). This would imply that vegetation complexity may have more control over abundance than diversity in spiders. By this logic, as vegetation changes over time spider populations may change in abundance but diversity may remain static. If vegetation type changes it may result in a different species becoming dominant depending on spider adaptability to different forms of structural complexity (Duffey, 1962). The presence and dominance of *C. blattea* may come from the overall dominance of grass on the roof top. *C. blattea* is noted as a generalist predator that favours grassy meadow lands (Sirvid, 2009). In terms of factors contributing to *C. blattea* distribution on the roof top, the two primary prey types (Collembola and Diptera, as found in *C. blattea* webs) failed to show a strong relationship with the distribution of the spider. The individual plant cover types failed to exhibit a relationship with the distribution of *C. blattea* by themselves, but when combined into one group a weak but statistically significant relationship was established.

Part of the reason for this cover effect could be explained by the overall dominance of grass on the roof top; there were no quadrats that had less than 50% overall grass cover and the majority had more than 80%. It would be difficult to account for the effects of grass cover when there are too few examples of non-grass cover to contrast against.

Looking at Shochat, et al. (2004) in contrast to the survey findings, there is an apparent reversal of the urban spider syndrome. This is manifest in high abundance but low diversity, the opposite predicted for an urban environment. However, regarding Lövei, et al. (2018), the low diversity could be a by-product of the high level of disturbance urban environments undergo. This could be characterised by the way the roof changed in the short period of time it was surveyed during 2018. Over the period of half a year, a new tool shed was installed on the roof top that displaced large amounts of soil from the north-eastern corner to the north-western corner of the roof. This also had a cascade effect with plants displaced and relocated to various points on the roof top. Having said that, the roof top has certainly expanded and diversified from a plant population perspective. While some plants have been lost from the overall population a wide range of new colonisers have turned up, dominating the unplanted border and taking select open spaces between the original plant occupants. In turn, invertebrate populations have exploded with greater abundance and diversity. Of the moth species that have established on the roof top, *Nyctemera annulata* was notable due to a specific dietary preference for plants of the tribe Senecioinae (Singh & Mabbett, 1976). Senecioinae representatives were not originally planted on the roof top and have invaded the green roof from an outside source. The source of a lot of the new invertebrates is a point of contention. While moths, flies and beetles could feasibly reach the roof top by flight, millipedes, slugs and wingless thrips could not. There are a multitude of potential vectors; hitchhiking (phoresis) comes to mind. This would not be exclusively through birds and flying insects but would also include human visitors, particularly those bringing building materials to the roof top during construction operations. Mites, like spiders, are capable of aerial dispersal (Hoy, 1982) and it would, perhaps, be more concerning to not see the addition of another species to the roof top fauna.

Ultimately, the addition of flora to the roof top, regardless of the actual species, has created a hospitable environment for invertebrate populations to establish. Further wilding of the roof top has really allowed the invertebrate population to evolve, with greater species diversity and even dietary specialists colonising the vegetation. The spider population will need future surveying to further extrapolate the impact of vegetation complexity on spider diversity. However, the current level of structural complexity present has had a large positive impact on the total spider abundance.

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Variants within *Astelia*.

Dylan Norfield

Through my eyes as a horticulturalist I have been observing the *Astelia* species throughout areas of the South Island, noticing some differences within groups and observing the different species. I have found this fascinating and have been meaning to write something in detail on it for the last 5 years but have realised that if I do not write something now I will leave it another 5 years.

My interest started with *Astelia fragrans* and the variability throughout the South Island but most noticeably in the North West Nelson area. Around Dunedin we have what I think of as typical large strap shaped plants with leaves that are green top and bottom up to 2 metres. Leaves can be lapse in habit but still a great architectural plant for bush areas. Plants that I have observed along the lower west coast are similar in habit and structure to local ones.

Then one day on a walk up into Kahurangi National park, more specifically Mount Arthur, the *Astelias* observed were significantly different. Around the car park at 912 metres again what I presume is *Astelia fragrans* can be found, noticeably stiffer but also the underneath of the leaves is distinctly covered in rusty coloured scales. At this height the plants are very robust and again leaves can reach 2+ metres in length. This form seems to be dominant, with other species or forms not appearing until higher altitude is reached.

The walk up to Mount Arthur hut I believe is one of the most magical in New Zealand, still impressing me after many trips up to the summit. Each time I observe the *Astelia* and each time notice differences in their structure and form. The *Astelias* with the rusty scales underneath continue almost up to Mount Arthur hut at 1308 metres but change in size and form which would be expected with altitude. Other storey plants are *Lophozonia menziesii* and *Fuscospora cliffortioides*, interspersed with *Olearia lacunosa*, and one of the best stands of *Dracophyllum traversii* I know in the country.

Amongst the *Astelia* with the rusty scales is a similarly sized *Astelia* but with good silver scales on the underneath of the leaf and a broader laminar.

This form has intrigued me for some time as I first found it about five years ago on the Lewis Pass near the summit of the road and have subsequently seen it in the Dunn Mountains behind Nelson. This is a particularly attractive plant due to its sturdiness and would make a great garden subject. Unfortunately I have never seen them in flower or fruit, but have seen spent fruiting spikes. I have considered the fact that it may be a hybrid of *A. fragrans* and *A. nervosa* as the latter is found near the plants on Mount Arthur and on Lewis Pass but not near the plants found in the Dunn Mountains (It is found near the summit). Could it just be a forest form of *Astelia nervosa*?

Once you get past Mount Arthur Hut there is a tremendous silver form of *Astelia* possibly just a variant of *Astelia nervosa* (presumably what was previously named *Astelia cockaynei*) but it continues up into Horseshoe Basin and Gordons Pyramid. It must be one of the most aesthetic *Astelias,* beating *Astelia chathamica* for colour and form. This silver *Astelia* can also be found in the forest margins meaning that it is a stable form not just colour induced by increased light levels. There is also a more typical form of *Astelia nervosa* in the forest margins similar to what we would find around Dunedin with the silver scales and often red mid-rib.

These variations can be extreme and may just be local variants and forms but it is very hard for a horticulturalist not to say that they need to be studied in more depth. It may involve DNA sequencing to get a definitive answer, but I enjoy tangible differences that you can see. These are all just my observations and I have had no confirmation on names but will continue to admire them. As a horticulturalist I am always fascinated by variants and hybrids within species and would love to see more of them available to keen gardeners.

Evotourism as a New Zealand opportunity.

John Grehan

Zealandia has received quite a lot of popular press in recent times, with its focus on New Zealand and surrounding regions as a continental fragment that broke away from the rest of Gondwana in the Cretaceous. As this continental fragment was pushed eastwards by the newly formed Tasman Sea, much of the original land area subsided and was submerged. This history has led to the question as to what extent the original plant and animal communities were also separated and survived through to the present day. Many studies have accepted that a wide range of groups were indeed separated. Recent Miocene fossil discoveries have also highlighted the presence of a diverse endemic New Zealand fauna and flora that survived the major Oligocene sea transgressions. These discoveries have lent support to the pioneering works of Robin Craw and Michael Heads in the 1970's and 80's that first drew detailed attention to the matching patterns of geology and biogeography in New Zealand. These constituted evidence that New Zealand's modern biota is mostly made up of Gondwanan relicts.

Craw and Heads argued that the extensive parallels between the distributions of organisms and the underlying geological structures indicated that New Zealand's biota is not just an assemblage of miscellaneous Gondwanan organisms, but comprises actual biogeographic fragments of the former supercontinent. With a 90 + million year history of repeated subsidence, uplift, and displacement it might hardly seem credible to accept any distributional stability at all. But incredible or not, detailed biogeographic analyses provide evidence of at least a partial geographic imprint of the Gondwana landscape in the distributions of modern biota. It is this 'incredible' result that lends itself to an as yet unexploited potential – what I would call evotourism.

Evotourism is a way of exploring the evolution of landscapes as if they were in the past rather than the present. Instead of focusing on plants and animals in their present day landscape, as in ecotourism, evotourism can use biogeography to look at plants and animals as fragments of their ancestral landscape – a landscape that has Cretaceous roots preceding the formation of Zealandia. An example of this opportunity is the distribution of related organisms in New Zealand and the subantartic islands. Many plant and animal groups in these two areas do not show a pattern of individual distributional relationships radiating out from the main islands to the subantarctic islands, as might be expected if the latter were the result of waifs and strays dispersing across the ocean. Instead there are patterns of allopatry that

are consistent with a history of widespread ancestors that were already present in these regions at the time of Gondwana breakup.

Fig. 1a Pleurophyllum speciosum. *Pleurophyllum CC BY-SA 2.0, https://commons.wikimedia.org/w/index.php?curid =13070621*

Fig. 1b Olearia chathamica
https://www.inaturalist.org/photos/17435567

An example of this allopatry is the plant group *Pleurophyllum* and its macrocephalous *Olearia* sistergroup (Fig. 1). The two groups fall into two distinct geographic sets that are not divided between mainland and island and yet are almost entirely allopatric (see Heads 2018, *Biogeography and Evolution in New Zealand*, for details). The macrocephalous *Olearia* group ranges over most of mainland New Zealand, Stewart Island, and the Chathams, but in the subantarctics it is only present in the Snares and Auckland Islands. In an almost a reverse mirror image, the *Pleurophyllum* group is found only on the subantarctic islands of Macquarie, Antipodes, Campbell, and Auckland Islands. The two phylogenetic sister groups are entirely separate geographically other than on the north-eastern Auckland islands. Appealing to chance dispersal for such a precise distributional separation (one that is also present in other taxa) creates more paradoxes than it solves, and in any case it is unnecessary.

A vicariance model predicts this kind of geographic displacement of sister taxa through the local differentiation of a widespread ancestor, first into the ancestors of the macrocephalous *Olearia* and of the *Pleurophyllum* lineages, and subsequently by local differentiation within the ranges of each group. The only indication of subsequent dispersal is the minor overlap of the two groups in the Auckland Islands. As to the origin of the allopatry, there is a correlated geological separation matching the biogeographic separation. This geological formation is the Great South Basin (GSB). This is a huge tectonic rift off the coast of Otago that is now largely filled with sediments. The GSB is an intracontinental rift between the South Island and the main Campbell Plateau, with a mainland outlier preserved at the Cretaceous Titri fault near Dunedin (Fig. 2). The GSB opened up in the early Cretaceous about 120-110 million years ago and lies at the western end of the Bounty trough, another large, intracontinental rift. The whole structure is comparable to the East African Rift.

Formation of the GSB in the early Cretaceous provides a vicariance mechanism explaining the divergence of *Pleurophyllum* and macrocephalous *Olearia*. The original allopatry is largely sustained into the present, despite widespread subsidence and submergence drastically reducing the distribution of *Pleurophyllum*.

This history offers the evotourist a way to be drawn from the ecological and geographic landscape of the present to the Mesozoic landscape of the past. This is the essence of evotourism – a visit to the past through the present – and where better to make this time travel than in New Zealand, with its biological and geological complexity? For the visitor, New Zealand's collection of sometimes strange and startling animals and plants becomes a pathway into evolution, where it is possible to literally stand at the site of evolutionary events that occurred millions of years ago. The dinosaurs (of the classic kind), crocodiles, snakes, terrestrial mammals, eucalypts and other assorted Gondwanan organisms may have

gone forever, but there is plenty left. And many retain the geographic trace of their Gondwanan past.

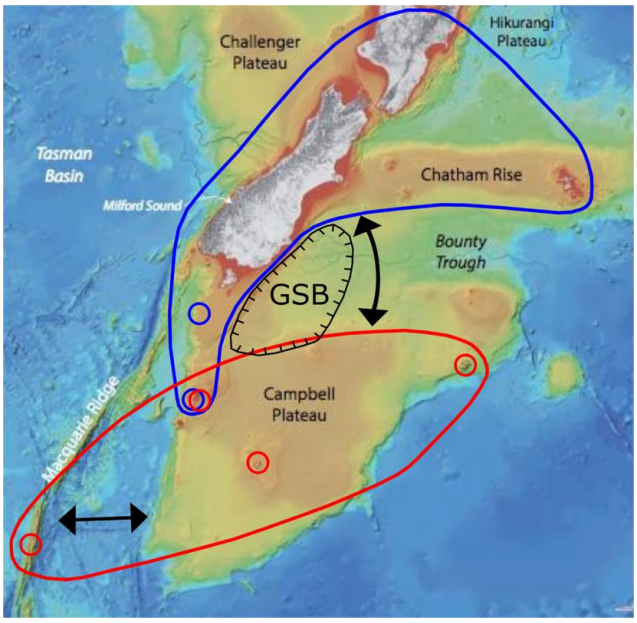


Fig. 2. Biogeography of Pleurophyllum *(red outline) and its macrocephalous* Olearia *sister group (blue outline). Note the predominant allopatry between the two groups and the potential role of the Great South Basin (GSB). The opening of the basin by intracontinental rifting explains the differentiation of the two groups from a formally widespread ancestor in the Cretaceous. Note also the spreading of the Emerald Basin (lower left) further fragmenting the ancestral range of* Pleurophyllum. *Most of the Gondwana landscape of* Pleurophyllum *has submerged, leaving its surviving representatives on several islands. Modified from* Biogeography and Evolution in New Zealand.

Acknowledgement: My thanks to Michael Heads for improvements to the draft ms.

Book Review: The moss genus *Fissidens* in New Zealand

John Steel

Beever, J.E.; Malcolm, N.G.; Malcolm, W.M. (2018) *The moss genus* Fissidens *in New Zealand.* 130 pp. Micro-Optics Press, Nelson.

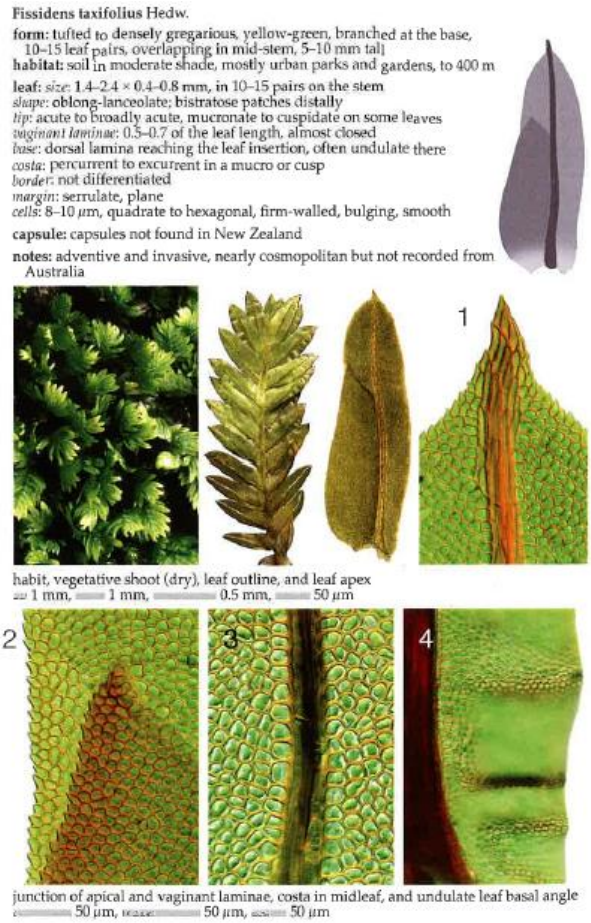
At 130 pages, this is not so much a revision, but rather an updated and much extended version of their 2002 treatment of the distinctive moss genus, *Fissidens*, which, with 34 taxa, is a significant component of the New Zealand bryoflora. Jessica has been the go-to authority for this genus for many years and coupled with Bill and Nancy have produced this excellent addition to the bryophyte library. If you haven't obtained a copy by now then this is the perfect opportunity to justify yourself a belated Christmas treat – you will not be disappointed.

Bryophytes are generally green and rather small which, sadly for many field trippers, puts them straight into the too-hard basket. However, *Fissidens* is so widespread, morphologically distinct and commonly found in such a broad range of habitats that, with this treatment, it is well worth making the effort to try to identify them. The shoots are feather-like with the leaves in one plane and often overlapping. They can be very small with some species being less than one centimetre tall, but with others up to five. The give-away is the leaf, each of which has a fold or slot on its upper edge into which the lower edge of the next leaf fits. Spot that and you have *Fissidens*!

The book begins by defining this feature, clearly and with detailed descriptions accompanied by the relevant microphotographs and diagrams. A key to the genus follows and, having disdain for the use of subjective adverbial and adjectival descriptors, I was surprised to find "strongly undulate" in the first lead of the first couplet. I turned immediately to the species description and there it was – the perfect photograph shewing the feature perfectly to justify its description! This highlights an excellent feature of the authors' writing by never taking the reader's knowledge for granted and being able to do so without appearing condescending. I have tried the key a couple of times and it works just fine. Then there follows outlines of a leaf from every species and variety before dealing with each taxon individually in two to four pages of detailed photographs of all its requisite characters.

The first page is divided into three. The top third of the page consists of the character descriptions, separately and individually rather than in a large block and so much easier (for me at least) to follow, and lastly the leaf outline. The next comprises four or five, numbered pictures of more general features such as habit, leaf, shape, capsule, cells *etc*. The remaining third consists of three higher

magnification photographs of the leaf characters. All this in one A5 page and not a hint of clutter!



The following page is a gem! A large, full-length picture of one or more of the major plant features is accompanied by a distribution map and below that a leaf outline cleverly delineating where the numbered pictures from the previous page fit on the leaf. For many of the species there follow a couple more pages with higher magnification pictures of the significant features.

A hundred pages later, there follows an expanded glossary with many of the terms from the text often accompanied by a photograph to highlight their meaning.

My first impulse is to end saying this book is just crammed full of necessary information, but crammed, to me, implies that there isn't any space left. On the contrary, with their book the authors have managed to include all that information in an open and completely uncluttered format, a lesson worth noting by any budding author of similar genres. What with Jessica's *Flora of New Zealand* treatment and now this, there cannot now be any excuse for not attempting this fascinating group of mosses.

Price NZ$36 (includes GST and shipping inside New Zealand). Order from Bill by e-mail at nancym@micro-opticspress.com or by post at P.O. Box 320, Nelson 7040, or by phone at 03-545-1660. Payment options PayPal or direct credit.

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Meeting and Trip Reports

Swampy Spur Wetland via Burns and Rustler Ridge Tracks, 15th September 2018

Robyn Bridges

As it turned out, a number of areas on the north western flanks of Swampy were looked at on this field trip. However, the main focus was a wetland near the intersection of the Burns and Rustler's Ridge Tracks to look not only at the botany but also to establish if this particular wetland is a bog or a mire.

To start with, we followed the Pipeline Track which follows the original city water pipeline from Swampy to Dunedin. Though some of this pipeline has been replaced by metal piping, there is still a large section made up of the original large salt glazed pipes which were made by McSkimming at their brickworks at Benhar in Otago at the turn of the last century.

For most of the track the vegetation was largely regrowth; a mixture of broadleaf, wineberrry and *Coprosmas*. Of note was a magnificent specimen of Hall's totara, *Podocarpus laetus*, a remnant of the original mixed podocarp forest that once clothed these slopes. There were a few small rimu but they were very sparse. Further up Rustlers were fine specimens of *Libocedrus bidwillii*, the New Zealand cedar, pahautea or kaikawaka.

David Lyttle noted that broadleaf (*Griselinia littoralis*) and *Coprosma rigida* were common around the dryer margins, with manuka (*Leptospermum scoparium)* and *Dracophyllum longifolium* in the wetter parts. Scattered shrubs of *Coprosma elatirioides, Veronica odora* and *Olearia bullata* were present as well. Harakeke (*Phormium tenax*) was found in the wet areas rather than *Phormium cookianum*, which was otherwise common along the tracksides and ridges. A variety of large herbaceous plants including *Carex secta, Chionochloa rubra* subsp *cuprea, Chionochloa conspicua, Poa cita* and *Aciphylla scott-thomsonii* were present. Small herbaceous plants recorded were *Oxalis magellanica, Lobelia angulata, Nertera depressa, Anaphalioides bellidioides* and *Ranunculus foliosus*. The fern *Blechnum montanum* was everywhere abundant.

As it turned out, this wetland is neither a bog nor a mire. It is a fen as it has water flowing in from above and flowing out via a largish creek at the bottom.

Thanks to John Steel for kindly providing a recent species list and ensuring it was updated.

Participants: Paul Rubina, Allison Knight, Marcia Dale, John Steel, David Lyttle, Duncan Nicol, Judy Russell, Penelope Gillete, John Barkla, Marilyn Barkla, Paul Smale and Robyn Bridges.

Field trip to Swampy Spur Wetland, 15th September 2018

Duncan Nicol

A start to a trip like many others; converging on the track-start to catch up and welcome newcomers. Our crew for the day had many familiar faces, along with two Paul's. One, a Christchurchian who had driven down just for the trip and to meet the Dunedin members. The other, a local Dunedinite looking to enjoy the day out. With the sun already beaming down, we headed up to the pipeline track where we left Penelope and Allison, who spent the morning lichen-ising. *Coprosma* flowers were already well into the season and it was difficult enough to focus in on them with your eyes let alone the camera. *Fuchsia excorticata* were out in flower with blue stigmas and yellow pollen, a hypnotising combo. Just a few stumbles along the pipe-line track we came across a *Cyathea smithii* with a number of epiphytic floras that had hitched a ride including *Griselinia littoralis, Microsorum pustulatum, Austroblechnum sp.*, and a *Pseudopanax colensoi*. There was a strip full of *Ranunculus spp*. alongside the track gutter which provided a good example for distinguishing between the deeply lobed *R. acris* and *R. repens*.

As we started ascending up from the pipe-line track, John Steel and I were side-tracked by lichens, liverworts, *Libocedrus bidwilli, Tmesipteris elongata*, and *Hymenophyllums* and other ferns.

Cranfillia fluviatilis individuals were unravelling their fronds and their spherical assembly on the forest floor made it far easier to distinguish them from *Pellaea rotundifolia* than when they are climbing up the side of the bank together. One of the liverworts had a clear display of their gemmae cups all over its thallus. Gemmae are haploid cell-tissue contained in these cups, which get tossed about with rain drops and grow into new gametophytes. This is a form of asexual reproduction for some liverworts.

(Photo: Duncan Nicol)

We were joined by the Paul at this point and were well behind the front of the pack (including the other Paul, Robyn and co.), who had split off and were making their way to the swamp. Similarly, Penelope had made a run for it once she and Allison had stopped lichenising and, just as Paul and I would later, headed for the Swampy Peak wetland instead of the trip's aim of a closer swamp nearer the road.

Once we were out of the forest it was all pretty distinctively scrubby with *Phormium*, *Ulex europaeus*, *Ozothamnus leptophyllus*, *Veronica odora*, *Dracophyllum longifolium*, *Kunzea robusta*, and *Olearia arborescens* among other successionary vegetation. In and amongst this was *Lycopodium volubile*, the twining wolf foot, in full-strobilus. Instead of turning off to meet the others at the fork after having lost John on the hill, Paul and I kept trotting up towards the summit. I was thinking this a wee bit too long for a botany trip and was right. However, after hearing from the others once we got back, we may have made the longer trip but it came with a better pay-off as the swampy summit bog was more interesting than the other one the trip was intended for, apparently. There were mat lichens which looked like a mathematicians hypnotising trap for the unwary; the structure resembling a rotated, transformed matrix. So after trampling through *Dracophyllum* and *Aciphylla* bush Paul and I made the long way down Leith Saddle trail to meet the others at the carpark as they were leaving. Although it wasn't the most cohesive trip we've had, it seemed like a success nonetheless.

(Photo: Duncan Nicol)

Reweaving species: The role of interactions in ecological restoration. Geoff Baylis Lecture by Dr Janice Lord, 26th September 2018

David Lyttle

In response to public concerns about climate change and environmental degradation, the present New Zealand government has proposed a programme to plant 1 billion trees. It is claimed that this programme will offer a wide range of benefits to landowners, communities, catchments, regions and New Zealand including; helping to improve land productivity, tackling environmental issues like erosion, reducing the effects of climate change by absorbing $C0_2$, improving water quality, enhancing natural landscapes, and providing additional sources of income from timber, honey and carbon credits.

Besides these benefits, it is also claimed the programme will provide habitats for a range of native species, as there is an assumption that there will be a commitment to large scale reforestation with native trees. It is proposed that one quarter (250 million) of

the billion trees will be native. Janice suggested in her lecture this is an ad hoc goal and is unrealistic because of a basic lack of ecological understanding.

The concept of re-wilding has become a growing trend overseas. "Rewilding" focuses on restoring natural interactions between species and allowing ecological processes to determine outcomes. In the process, biodiversity will be restored along with the vital services that ecosystems provide, such as pollination and water purification. Management means putting back what has been lost. In the case of Yellowstone National Park in the USA this means reintroducing wolves, the idea being that by reintroducing apex predators the ecosystem will be forced back to an earlier state.

In New Zealand, the original native vegetation has been highly modified by human activity. Following the arrival of Polynesian settlers, large tracts of forest in the eastern South Island were burnt and replaced by grassland. Europeans felled most of the remaining lowland forest and converted much of the country into farms, replacing the indigenous vegetation with exotic grassland. Areas unsuitable for pastoral farming were planted in exotic conifers for production forestry. A raft of alien plant and animal species were introduced, many of which had, and continue to have, profound negative effects on indigenous biodiversity. It is fair to say that both Maori and Europeans have done as much environmental damage as the technology available to them at the time allowed. Rewilding in the New Zealand context does not just mean restoring something which has been lost but rather removing pests and weeds that should not be there.

Recent years have seen increasing community interest in native replanting projects, typically using container grown native species that are easy to propagate. However, establishment can be patchy and maintenance becomes an issue.

In her Geoff Baylis presentation Janice asked the question; "How can we put ecosystems back together? Could "re-wilding" or other process based approaches work in New Zealand?" Her talk went on to explore concepts and approaches to restoration, drawing on experience with the QEII National Trust Mahu Whenua covenants, Otago Lakes District, and other innovative restoration projects, against the background of the government's 1 billion trees proposal.

The Mahu Whenua covenants cover 53,000ha of contiguous landscape over most of Motatapu, Mount Soho, Glencoe, and Coronet Peak Stations. The stations cover a large part of the country between Lake Wanaka and Arrowtown and are bordered by the Shotover River and the Cardrona Valley. The covenants have been destocked and control programmes for the control of goats and rabbits initiated, together with a planting programme to restore native species. In 2015, the University of Otago became involved in the project.

Cushionfields dominate the harshest sites in the alpine zones. Snowbank plant communities occur where snow lies for extended periods. Slim snow tussock (*Chionochloa macra*) is found above 1400–1500m. Narrow-leaved snow tussock (*Chionochloa rigida*) dominates below 1500m. Short tussocklands dominated by hard tussock (*Festuca novae-zelandiae*) are found between 900–1000m. Wetlands form as bogs in the alpine zone, as seepages in tussocklands, and as ephemeral tarns in the montane zone and along river and stream edges. Grey shrublands are dominated by tree daisies (*Olearia* species) and mingimingi (*Coprosma propinqua*). Mountain ribbonwood (*Hoheria lyallii*) is largely confined to gullies below 1000m. Mountain beech (*Fuscospora cliffortioides*) forest remnants are common in the Motatapu Valley. In the past, beech species would have dominated the country below treeline but as a result of fire and pastoralism this type of forest vegetation is now much reduced in area.

As the result of pastoral farming, much of the original indigenous vegetation at lower elevations has been highly modified and replaced by exotic grasses and woody weed species. Destocking resulted in the increase in manuka/kanuka shrubland. It has been proposed that beech can colonise manuka/kanuka woodland by taking advantage of the existing ectomyorrhiza. This does not appear to be occurring on the Mahu Whenua covenants. Ecosystems do not return to their original state once grazing pressure has been removed.

Janice talked about the importance of the interactions between soil biota and plants in restoration planting.

Mycorrhizal interactions are seen as key factors for the restoration of indigenous species but are also important for the invasive spread of conifers. Manuka and kanuka have the capacity to form associations with both endo- (AM) and ecto- (EM) mycorrhiza. Beech is totally dependent on ectomycorrhiza, without which it cannot establish or grow. Other woody species such as *Coprosma robusta* grow poorly when the AM mycorrhiza they depend on are not present. Matagouri (*Discaria toumatou*) and tutu (*Coriaria* sp) need *Frankia*, an actinomycete, to fix nitrogen. Kowhai (*Sophora* sp) are dependent on native mesorhizobium for this function.

Mast flowering when conditions are favourable is a feature of the New Zealand flora; it drives the breeding of other animals. There is an increase in the number of native bees and hoverflies in masting seasons. Examples of plants that mast flower include, *Aciphylla sp*, *Chionochloa sp*, and, perhaps most importantly, the beech species and podocarps. Beech masting has profound consequences for native bird populations. The availability of beech seed causes rodent populations to explode, which in turn increases the number of predators, in particular stoats. At the end of the cycle when rodent populations are falling, stoats turn their attention to birds. All native bird species are at threat from predation, particularly females, eggs and the young in nests. In many places local populations have been completely wiped out.

Janice went on to consider the pollination biology of NZ seed plants; 71% are cross-pollinated and 87% are self-incompatible. Fragmentation of forests results in more self-pollination, which reduces the viability of seedlings. This results in a loss of diversity and fewer host plants to support other biota. For example, flower feeders need other plants for their life cycle. Successful pollination is dependent on multiple interactions within functionally diverse ecosystems.

The seed of many native species are dispersed over long distances by birds or in some cases by wind. However, long distance dispersal does not occur in beech and seedlings colonise only the zone in the immediate vicinity of the parent plant. Because of this, and the lack of compatible mycorrhizal fungi, regeneration of beech forest occurs very slowly.

Janice was critical of restoration projects that depend on a limited suite of species. While a number of widely used species such as *Pittosporum*, *Coprosm*a, *Hebe*, *Phormium*, and *Cordyline* are cheap and easy to cultivate, the mycorrhizal and other biotic interactions in these depauperate plantings is insufficient to support a self–sustaining plant community. Planting a limited suite of species can stall the restoration process and limit the ecological processes required to restore the full biodiversity necessary for the functioning and future growth of the system; *Pittosporum* does not promote diversity.

Having illustrated the complexities inherent in a natural ecosystem and the importance of AM and EM mycorrhiza, Janice suggested a number of measures to facilitate the natural processes of revegetation. For large scale restoration projects, developing suitable mycorrhizal inoculation techniques would be essential. Revegetation would be done by direct drilling of seeds coated with mycorrhizal inoculum.

She challenged the BSO to prepare a restoration guide for local planting in Otago. Overall, Janice raised many important points that need to be considered when undertaking restoration planting using native trees. The process is not simple and to achieve successful outcomes the complex interactions occurring within native plant communities must be taken into account when undertaking major projects.

Field trip to Dogwood, Kuri Bush, 6th October 2018.

John Steel

Dogwood comprises a narrow, five hectare gully; a remnant of regenerating coastal forest surrounded by grazed pasture. Janice Lord is negotiating its protection under a QEII covenant and invited the Botanical Society along to check it out and help with the compilation of a species list and nine of us made the trip. As usual, the group split into hares and tortoises with the former soon disappearing into the

bush while the slower group of us were soon engrossed in a rocky outcrop with a generous cover of *Lepidolaena taylorii* and other assorted micro gems.

Bemisia flocculosa *on leaves of* Melicytus.

Meanwhile Alf had spotted *Melicytus alpinus* – or was it *Melicytus angustifolia*? – or something else? – flowering profusely nearby. This was to be, for me at least, the find of the day. As I tried to come to terms with it, I spotted beautiful scale insects on the undersides of the leaves. Dr. Julia Bohorquez, currently in the Department of Botany, had already stirred my interest in these rather overlooked creatures so I collected a couple for her. After much effort on Julia's part she found them to be *Bemisia flocculosa* and not previously recorded from the South Island. No sooner had their presence been noted on NatureWatchNZ than Julia had a request for a sample to be sent to Australia to a researcher there who was excited to have a specimen.

Our progress was slow with new finds popping up all the time. Small seedlings of *Pittosporum crassifolium* had us stumped for a time and a couple of mats of *Corybas trilobus* in full flower had us grovelling among the litter to expose their flowers. A small patch of *Tetragonia implexicoma* in the shade of the dry forest seemed a bit out of place in the otherwise bare ground. As we approached the top of the gully, Alf found the tiny lichen *Calopadia subcoerulescens*, with its distinctive, tiny, shell-shaped fruiting bodies on the undersides of leaves of *Fuchsia excorticata*.

Korthalsella lindsayi *(Photo: Paul Smale)*

About then we were summoned to the lunch spot where the others had ensconced themselves to admire Janice's pride and enjoy, two specimens of *Tupeia antarctica* so far evading the predation of the possums which Janice hopes she now has under control. Helen further added to the day's interest by finding a plentiful supply of *Korthalsella lindsayi* growing on *Coprosma crassifolia* bushes. From there the group made its way back to the house and a drink before dispersal – although I did manage to find myself diverted by a large sheet of *Vaucheria* covering a muddy flat along the stream bed.

With our latest additions the number of plant species stands at about 200 with much more work to be done on the lower plants and well worth another visit. Anyone wanting a copy of the species list should contact Janice.

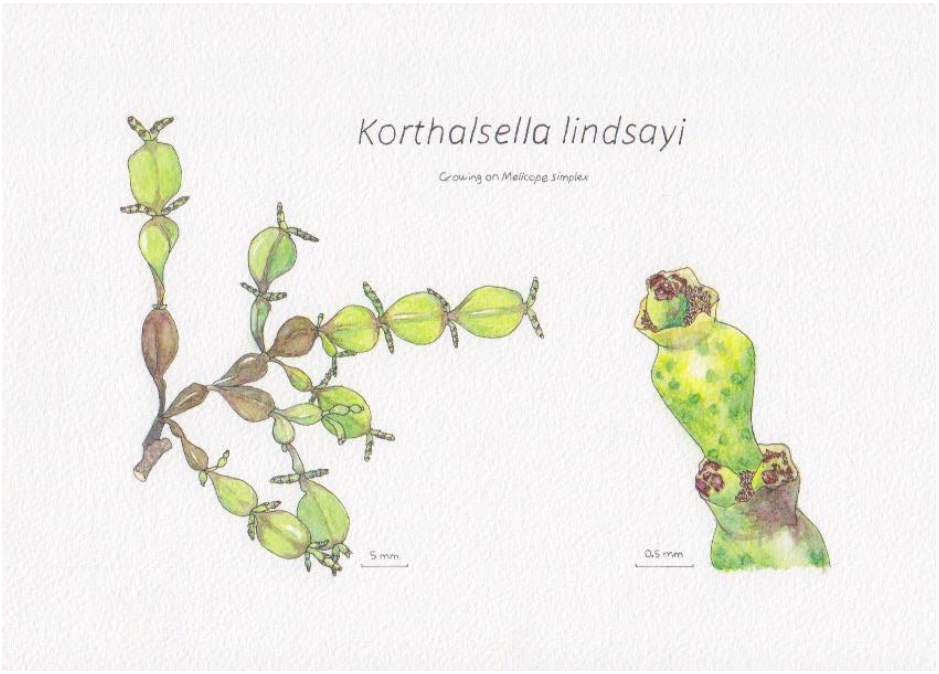
Participants: Alf Webb, Dan Small, Helen Jones-Rippey, Janice Lord, Jeanne Hutchison, John Steel, Laura van Galen, Mike Small, Melanie Vermeulen, Paul Smale.

BSO Audrey Eagle Botanical Drawing competition, 10th October 2018

Allison Knight

This year there was but one entry; a superb drawing of the dwarf mistletoe, Korthalsella lindsayi, by Helen Jones-Rippey, accompanied by excellent notes. That let the judges off the hook so we decided to try something different and have a botanical art auction instead. John Knight, with his good loud voice, was press ganged into being auctioneer. Bidding was spirited and the hammer went down at $120. Possibly next year we'll run an art sale and auction, and if there is more than one entry we could have a Members' Choice prize as well! So keep up the painting and drawing. The only condition will be that you are a current member of BSO.

Helen with her painting. (Photo: Anthony Green, the winning bidder)



Scan of Helen's Korthalsella *painting.*

Kothalsella lindsayi **- Growing on** ***Melicope simplex***

Left: Habit illustration. Right: Terete shoot in fruit.

Specimen Notes

Both specimens were collected from the Lovelock Ave. Bush in Dunedin. The specimen on the left was collected in September 2018, and the specimen on the right was collected in February 2018.

Both were drawn from fresh samples, although the colours for the specimen on the right were based on a photograph I took using the microscope mounted with a camera at the University of Otago Botany Department.

Botanical Notes

K. lindsayi have leaves that are reduced to scales, their main stems are flattened and leaflike, and they also have small, terete stems at the nodes of the main stems. Minute flowers occur at the tip of the internodes of both flat and terete stems from October to March, and the fruit form from October to June.

K. lindsayi is found in the lower North Island and the eastern and lower South Island, in habitats ranging from costal to subalpine, although most commonly in lowland and costal settings.

There are three species of *Kothalsella* (pygmy mistletoes) endemic to New Zealand. *K. salicornioides* is found parasitizing *Leptospermum* and *Kunzea* while *K. clavata* and *K. lindsayi* are more generalists and parasitize many of New Zealand's small leaved shrubs. *K. lindsayi's* preferred hosts are *Melicope simplex* followed by *Coprosma crassifolia, Lophomyrtus obcordata, Myrsine australis* and *M. divaricata. K. lindsayi* and *K. clavata* only share two hosts, *C. rigida* and *C. virescens*, both of which are rarely parasitized. It is also interesting to note that all three New Zealand *Korthalsella* parasitize themselves as well.

Material Notes

Outline done with a 0.05 Staedtler pigment liner pen.
Watercolours -AS Spectrum Red
-AS Spectrum Yellow
-AS Lemon Yellow
-Maimeri Cobalt Blue
-Maimeri Prussian Blue

Reference List

Amir Sultan, Jennifer A. Tate, Peter J. de Lange, David Glenny, Jenny J. Ladley, Peter Heenan & Alastair W. Robertson (2018) Host range, host specificity, regional host preferences and genetic variability of *Korthalsella* Tiegh. (Viscaceae) mistletoes in New Zealand, *New Zealand Journal of Botany*, 56:2, 127-162,
DOI: 10.1080/0028825X.2018.1464476

Nzpcn.org.nz (2015) *Korthalsella lindsayi*, available at http://www.nzpcn.org.nz/flora_details.aspx?ID=884, accessed on 29 September 2018

Were native plants on settler's farms in southern New Zealand used or abused? A talk by Peter Holland, 10th October 2018

Mary Anne Miller

This question was posed by Peter Holland, Emeritus Professor, Department of Geography, University of Otago, in an engaging history of early European interactions with the vegetation encountered when they first settled in New Zealand. Peter's research is focussed on the eastern areas of Canterbury, Otago and Southland as he had an early interest in these regions.

As John Hale, the Otago Daily Times Wordways columnist, recently wrote "Diaries may be undertaken when a new experience begins. Or the exact opposite, as records of long routine."[1] Peter has utilised diaries of early farmers, official reports and newspaper articles to analyse their experiences in this new environment and how this played out over time. At first the native vegetation was challenging; and although it provided some essential materials it didn't supply everything necessary for setting up farms from scratch. For example, kauri (*Agathis australis*) was brought in from northern localities and those who required quick homes and could afford it, as my farming ancestor did, used ready-made imported Baltic Pine (*Picea abies*) doors, windows, floor boards and ceilings in early cottages[2].

However, local plants were widely utilised: rata (*Metrosideros umbellata*) made great fence posts; broadleaf (*Griselinia littoralis*) was also used for posts and house piles; totara (*Podocarpus totara*) was good for buildings as it didn't rot; beech trees (*Fuscospora sp.*) were also used in construction; kowhai (*Sophora microphylla*), was valued for strength and non-decaying features so was preferred for gate-posts; matagouri (*Discaria toumatou*) was used for harrowing; reeds (*Apodasmia similis*) for thatch, and protecting hay stacks in adverse weather; kanuka (*Kunzea robusta*) for binding roof stays; and firewood of various kinds was in high demand for cooking, and heating homes.

Post-meeting discussions with David Lyttle, who also has ancestral connections in Otago, confirmed that some early houses were constructed from tree fern (*Dicksonia squarrosa*) trunks, a spectacular Dunedin example being "Ferntree Lodge" in Wakari, which dates from 1849. David also highlighted that fences in those days were post and rail, so used more timber than modern ones - see the view of early farms close to Dunedin, looking south down George St from near present-day Gladstone Rd in about 1861[3]. Also, David's grandfather twisted green flax (*Phormium tenax*) leaves to make a strong rope - good enough to lead horses.

Unlike their counterparts in the UK or USA, early New Zealand farmers were under economic pressure to have the land productive as soon as possible. They did, however, appreciate that native vegetation had a role to play in preserving the environment so some made efforts to conserve it. Many farms had native bush near the farmhouse and sheds, and areas that could not be made productive were often left as found. As an example, my ancestor who in 1855 began farming outside Milton, left *Phormium tenax* growing on the banks of his section bordering the Tokomairiro River, as it mitigated flood damage and provided shelter for stock[2].

Those who farmed in tussock country were very aware of its benefits in sheltering grasses more suitable for cattle and sheep. Another reason early landowners could see the benefits of keeping some native vegetation was that it also provided human food - wood pigeons from the bush and eels from streams which had native vegetation along their banks. As those of us who research pioneer New Zealand through early photographs know, native ferns, clematis and flax leaves were widely used to decorate halls and shows.

Thoughts for conservation were put forward as early as 1878 to encourage not only preserving remaining native vegetation but to actually plant natives. This, however, mainly took place in suburban localities up to the 1920s.

An unusual and refreshing aspect of Peter's talk was that there were no illustrations, no overheads or Powerpoint presentations, just his captivating observations in which we could imagine all he has discovered and which encouraged audience participation.

1. Otago Daily Times, 11 October 2018, p.12.

2. *Meeting Different Winds: A History of the Miller Family of Milton and Mandeville, New Zealand*. M A Miller, Pukeko Press, 2016.

3. Hocken Collections - Uare Taoka o Hākena, University of Otago.

S18-582a "View of Dun Edin, Otago, New Zealand. Bought there 1865", from Allan Houston, "The Gold fields of Otago, A.H.'s Jottings 1865 with Lithographic Illustrations. Memoranda of Otago Gold diggings and of Gold Diggers, from personal inspection and reliable information written in March 1865", Misc-MS-1413-1-2 Hocken Collections - Uare Taoka o Hākena, University of Otago.

Native Plants are vital to Nationhood, not just 'Nice to Have, Optional Extras'. A talk by Colin Meurk, Manaaki Whenua- Landcare Research, 14th November 2018

Serra Kilduff

New Zealand is a biodiversity hotspot, but continues to lose unique habitats rapidly to the march of intensifying agriculture and urbanisation. In particular, lowland habitats and the dryland ecosystems of the East Coast of the South Island are disappearing. With this has come the increased urbanisation of the New Zealand population and a growing disconnect between New Zealanders and nature.

Colin Meurk presented his talk to a gathering of members of the Otago Botanical Society, suggesting that with extinction of our unique endemic habitats comes an 'extinction of experience', and putting forward some ideas as to how developing 'recombinant' ecosystems and ecosystem services may not only improve the prospects of many native species, but increase their 'value' in the eyes of urban populations while contributing to the wellbeing of people and fostering connections to nature.

With the loss of habitat comes a loss of national identity, of connection to the weird and wonderful species which live nowhere else. For many people living in cities, Nature is something to visit, rather to live within or alongside. Colin illustrated the all too common perception that persists in NZ, that natives are 'dull and boring', and showed that the reality is very different! His examples of urban gardens incorporating the textures, colours and forms of New Zealand native plant species were inspirational.

While making the point that traditional offsetting of the loss of habitat may often be token, with little understanding of the local landscape, Colin put forward some ideas using opportunities afforded by urban landscapes which can be seen as analogous to natural landscapes; rooftop gardens as predator- free dryland environments, rubble as riverbed, buildings as cliffs.

Reconciliation Ecology acknowledges that it is not possible to restore the landscape to what it was, that pragmatically we are part of the landscape now. The goal is to maximise the diversity of indigenous species within the modified landscape by incorporating them into spaces. Incorporating native plant species into functional systems provides habitat while having 'value' in urban settings; ecosystem services such as stormwater filtration using wetland habitats, riparian plantings for erosion control and amenity plantings as shelter and roadside noise buffers also provide corridors of habitat.

Colin set out graphics showing the surprisingly small areas which can provide significant patches- the microhabitats of gutters, walls and other edges can be used. The biggest hurdle is the public's perception of what a city should look like.

Colin has been involved in developing the Christchurch 360 trail- a pathway which circles the entire city, from the Eastern beaches, the beautiful eastern wetlands, the source of the Avon, the Port Hills and the Heathcote River. Additionally, the Ti Kouka pathway is being developed- retracing the trail followed by pre-European Maori from the Port Hills to the mountains, following the *Cordyline* trail markers which still persist in a few places throughout the city. Citizen science is fostering connection to the land through apps such as iNaturalist, which allows anyone to document, identify and monitor the natural world around them.

From a personal point of view, Colin's talk felt very pertinent to the work I do with the Parks Department of the City Council. Finding ways to incorporate native habitats into Dunedin City is a great goal. Changing the culture of an expectation of tidiness (bowling-green grass verges and gutters clear of weeds) will be a challenge in Dunedin! However, Colin shows that it is happening in Christchurch. I look forward to possibly implementing a few ideas here, and hope one day for falcons controlling rock pigeon numbers around the Octagon, and alpine and coastal gardens on the roof of the library.

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Please submit copy for next newsletter to Lydia Turley by 13th May 2019

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Buttons for botanical pundits – still available at BSO meetings

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Right: Corokia cotoneaster *branch (Artist: Sharon Jones)*

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