



BOTANICAL SOCIETY

OF OTAGO

NEWSLETTER NUMBER 87

JUNE 2019



On a wet forest floor: *Nertera depressa* nestles in a tangle of bryophytes near Supper Cove.

Photographer: Alyth Grant

BSO Meetings and Field Trips June 2019 - October 2019

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) 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 revegetation on this challenging site.

6th July 9.00am Bryophyte trip to Pipeline Track. Led by John Steel. A chance to check out some of the smaller denizens of our local bush and learn the differences between mosses, liverworts and hornworts. Leave from the Department of Botany car park at 9.00 a.m. Contact John Steel john.steel@otago.ac.nz.

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?

7th August 5:20pm. The importance of ectomycorrhizal fungi for beech forest regeneration: what we can learn to help forest restoration. Speaker: Laura Van Galen. The symbiotic relationship that exists between beech trees and ectomycorrhizal fungi has important implications for beech forest regeneration and the stability of forest boundaries. I am doing a PhD to investigate this relationship and provide practical information to assist forest restoration projects. I am conducting a large-scale survey of ectomycorrhizal fungi in beech forests across the South Island of New Zealand, to better understand the influence of host species, soil properties, patch size and condition, and other environmental factors on ectomycorrhizal diversity and community assembly. I am also establishing a plot experiment in ex-pasture where beech seeds will be sown under varying conditions, to determine the relative importance of fungi compared to other factors (such as soil nutrient levels, grass competition, the availability of shelter and herbivory) for restoration project success.

31st August, 9:00am. Chrystalls beach. We will go and see what we can find. Contact Sarah Kilduff (Sarah.Kilduff@dcc.govt.nz)

18th September, 6:00pm. Geoff Baylis lecture: Geological constraints on the age and antiquity of land in New Caledonia and the Chatham Islands. Speaker: Hamish Campbell (Emeritus Scientist, GNS Science). Location: Castle 1, University of Otago (drinks and nibbles starting from 5:15 in the concourse).

This is an illustrated talk exploring the geological evidence for the emergence of land and onset of terrestrial conditions in New Caledonia (northern Zealandia) in the Oligocene, and in the Chatham Islands (eastern Zealandia) in the Pliocene. These age interpretations have significant implications for our understanding of the antiquity and biodiversity of the floras of both New Caledonia and the Chatham Islands.

21st September, time t.b.a. Field trip to Akatore. Akatore is a remnant of diverse coastal shrubland at the mouth of Akatore Creek, 45 minutes south of Dunedin. Some special features of this site include the diversity of shrub species and threatened species such as *Coprosma obconica*, *Olearia fragrantissima*, *Melicytus flexuosus* and *Carex littorosa* with the possibility of our discovering other threatened species. We may also visit the adjacent coast where the threatened cress *Lepidium tenuicaule* is present as well as *Myosotis pygmaea*. The timing of this trip is dependent on the tides, so please check our website nearer to the time. Contact Robyn Bridges (robyn.j.bridges@gmail.com) (03) 472 7330.

9th October, 5:20pm. Botanical art. The Botanical Art and Illustration Courses at Olveston began in January 2017. An Advanced Botanical Art and Illustration Course was later held beginning June 2018 and out of that course came the first Botanical Art and Illustration Exhibition at Olveston, which was held in December 2018. The classes have been hugely popular. The exhibition of original botanical artwork was of very high quality and created great public interest.

The courses are taught by Wayne Everson, who is an award winning teacher and practising artist. He holds a Master of Fine Art degree from RMIT University, Melbourne, and has taught art at tertiary level for many years in New Zealand and overseas. Wayne Everson will give the talk, which will centre on the success of the classes at Olveston and their botanical focus.

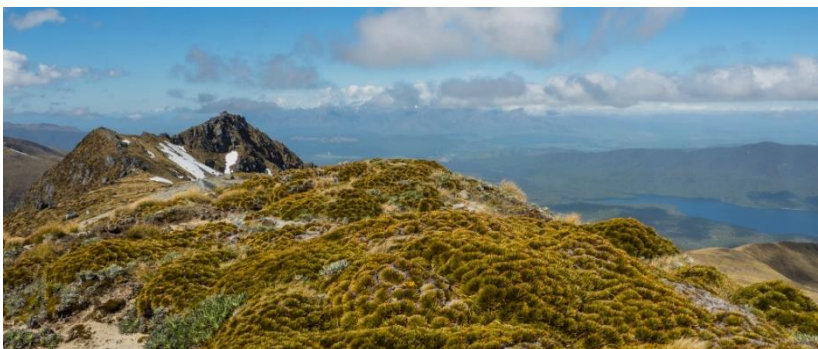
19th – 20th October 2019. Weekend trip to the Catlins. This is a placeholder with more details to come in the next newsletter and on the website. We plan to visit a range of botanically-inspiring coastal sites where there is always the chance of encountering interesting critters as well. Leader: John Barkla (jbarkla@doc.govt.nz)

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/>

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Aciphylla ridge: *Aciphylla cushion* dominating the top of the southern scarp of the Green Lake landslide. (Photo: Cara-Lisa Schloots)

Chair's Notes

Gretchen Brownstein

Trips and talks – We held ten trips and ten talks last year, spanning a wide array of botanical subjects. Talks ranged from genetics to textiles, and from palaeobotany to restoration. The trips were just as diverse, exploring many interesting bits of Otago and Southland from the coast to the mountains. The committee spends a fair amount of time working to develop a programme that we think will interest the membership. These events are about getting together to learn and share, so the more people who participate the better the event. As always, if you have a suggestion for a trip or talk, please let us know.

Membership – Our membership is holding steady at 98 members. 67 have paid dues for 2019, which is great to see and a vast improvement on last year. As always, we would love to see this number grow, so bring your friends and colleagues along to the events and show them just how wonderful botanical life is!

Website / Facebook – This year saw a major change to our website. We now have our own domain name (www.bso.org.nz) and the Diary database system is running again. Thank you to Lydia Turley, David Orlovich, Hadley O'Sullivan, and Daniel Pritchard for making that happen! Both the website and Facebook are still the go-to places for any BSO information.

Newsletter – We produced three volumes of the newsletter this past year. These had a total of 92 pages, including 12 original articles contributed by our members along with numerous reports on the trips and talks held during the year. Sharon Jones provided the lovely cover art and we were able to produce a full colour print version due to a donation from Bill Malcolm.

Committee – I would like to acknowledge the stellar job everyone on the committee does! It takes a fair effort to keep the society running smoothly. Thanks to Allison Knight for her work as secretary and for being the connection between us and the other botanical societies. Mary Anne Miller does a wonderful job keeping count of the accounts and making sure all the paperwork is up to scratch. A big thanks to Robyn Bridges for looking after the membership and room

bookings. Thanks to Lydia Turley for doing a great job editing the newsletter, and keeping our website and Facebook page up to date. Sarah Kilduff kindly stepped up this year to help out with drinks and nibbles; and she also provides a great connection with the DCC. Many, many thanks for all the hard work the rest of the committee puts in (Tina Summerfield, Esther Dale, Ian Geary, David Orlovich, and Sharon Jones). Lastly, a special thanks to David Lyttle and John Barkla for chairing meetings when I was on fieldwork and for freely sharing all their knowledge. I reckon between them they must have half a century of BotSoc committee knowledge which we couldn't do without!

To wrap up, I would like to echo what David wrote last year in his annual chair's report; just how important your active membership is. Through members' participation on trips and in talks we all have a chance to share and learn botanical knowledge, and by engaging with the community through our society we can promote botanical science and raise environmental issues. So, a big thanks to you, our members!

Secretary's Final Notes

Allison Knight

These are my last notes as secretary. The hundreds of unidentified lichen photos posted on iNaturalist for Christchurch's entry in the global City Nature Challenge brought home the need for a better guide to lichens. I'm standing down so I can devote more time to this.

Looking back with nostalgia at some of the highlights.....

When BotSoc was re-instated in 1999, Bastow Wilson was chairman and the committee consisted of Barbara Anderson and me. Meetings and field trips were at random times, as was the newsletter, which was a slim photocopied affair – though there were 9 issues in 2000 to keep the enthusiasm going! After Barbara left in 2000, I took over editing the newsletter. Drawings and photos were literally cut out and pasted in and the photocopier ran hot as we churned out hundreds of pages then folded and stapled them and wrote the addresses by hand. Now the newsletter is prepared

electronically and runs to over 30 wonderful pages. It is printed professionally and looks great online. The addition of printed labels and colour makes the printed copies look even more professional.

The biggest controversy arose when David Orlovich was chairman. There were several extended committee meetings as we agonized over whether or not to publish Michael Heads' paper describing the controversial new genus *Hebejeebie*. We published and were damned! David also oversaw the inaugural Geoff Baylis Lecture, to honour our then patron, Professor Geoff Baylis, who had been Head of the Botany Department for over 30 years. It was a splendid occasion, held in the museum, and Geoff's legacy lives on in the annual Geoff Baylis Lecture, held in conjunction with the Botany Department.

John Barkla's offer to publish the Supplement to Audrey Eagle's magnificently illustrated *Complete Trees and Shrubs* led to a generous donation from Audrey and, as the sales came in, to the establishment of the Audrey Eagle Botanical Publishing Fund. This in turn led to the publication of an introductory illustrated guide to lichens and sales of this have been ploughed back into the fund. Now there are a series of guides to plants of Dunedin, and more comprehensive guides to lichens of New Zealand in the pipeline.

With Audrey as patron and judge we established the biennial Audrey Eagle Botanical Drawing Competition, which led to some talented botanical art to display and to publish. Last year the competition took the form of an enthusiastically interactive auction, and it would be great if it could be broadened into an annual art display, sale and/or auction. The establishment of an annual photographic competition has led to some great evening meetings, thanks to the combined experience of our judges. The excellent photos led in turn to the annual production of a wonderful calendar, thanks again to John Barkla.

Bill and Diana Wilson's institution of dinners out after meetings was a brilliant social addition and it would be great if someone out there is keen to continue this highlight. Let Gretchen or anyone on the committee know!

Jennifer Bannister's generous donation in honour of her husband and our second patron, Professor Peter Bannister, enabled us to oversee the Peter Bannister

Student Field Grant. Over several years this supported a significant number of post-graduate students in their field work.

Trips to look at the botany of Southland with the expert guidance of Brian Rance and Jesse Bythell have become a highlight in recent years. The last trip was based at Taringatura, near Dipton. This in turn has led to the annual John Child Bryophyte and Lichen Workshop being held there this November. The Botanical Society is offering two grants of \$100 to help two keen people attend.

So one thing has often led to another good thing, and my stepping down has led to the election of Angela Brandt as secretary. I'm sure she will do an excellent job. In the 20 years I've been involved with the committee our society has gone from strength to strength. Long may you all continue to enjoy and contribute to BSO.

Editor's Notes

Lydia Turley

It's another busy newsletter! Thanks to everyone who has written pieces. John Steel has been busy reviewing books; check out his reviews if you're looking for your next botanical book. We've got lovely pictures from the photo competition decorating the pages, and the overall winning photograph providing a lovely green cover!

Suggestions and material for the newsletter are always welcome. 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 (poetry is very welcome) to lydiamturley@gmail.com. Copy for the next newsletter is due on 12th September 2019. Earlier submissions are most welcome.

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 is preferred by email to lydiamturley@gmail.com. Send photos as separate files and remember to include photo captions and credits.

**Statement of Receipts and Payments
Botanical Society of Otago, P O Box
6214, Dunedin North 9059
CC24010**

For the year ended 31 March 2019

Operating receipts

Subscriptions	\$	
Donations		2,975
Calendar sales		1,100
Badge sales		1,687
Lichen Guide sales		618
Moss Guide sales		384
Interest		1,515
TOTAL		3
		8,282

Operating payments

Calendar printing	\$	
Newsletter printing		1,477
Speaker gifts		509
Baylis Lecture catering		490
Meeting expenses		444
Photo & Art competition prizes		334
Administration		421
TOTAL		273
		3,948

Operating surplus

4,334

Capital receipts

Interest	\$	
From Everyday account		244
TOTAL		12
		256

Capital payments

Peter Bannister Student Grants	\$	
		3,510

Cash in hand

\$ 15

Increase in Bank Accounts and Cash

\$ 489

Treasurer's Notes

Mary Anne Miller

The reports presented here are BSO's 2019 submission to the Charities Commission. As you will note, we are in a healthy position going into the next financial year. Besides these summaries we also had to complete an Entity Information form in which we explained our mission, objectives, structure and methods of fundraising.

**Statement of Financial Position
Botanical Society of Otago, P O Box
6214, Dunedin North 9059
CC24010**

For the year ended 31 March 2019

CAPITAL

Current Assets	2019	2018
Everyday Account	\$ 6,451	3,651
Audrey Eagle Publishing Account	\$ 11,641	11,182
Business Online Saver Account	\$ 5,699	8,077
Accounts receivable	\$ 75	531
Inventory – publications	\$ 72	60
Petty Cash	\$ 15	13
Current Liabilities		
Sundry payables	\$ 0	-49
Working Capital	\$ 23,953	23,464

Membership

General	57	26
Students	7	1
Total paying members	64	27
Life members	2	2
Complementary newsletters - libraries & allied societies	25	24
Newsletters distributed including electronic versions	91	53

New Members

A warm welcome is extended to Darea Sherratt, Nina Batucan, Zola Yun and Jessica Paull. To our existing members, thank you for your continuing support.

Thank you very much to Tess and Tony Molteno, Ann Wylie, Tony Aldridge, Audrey Eagle, Rebecca Brown-Thompson and Graeme Jane for their generous donations.

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.

Correspondence and News

37th annual John Child Bryophyte and Lichen Workshop, Camp Taringatura, Southland: 14 - 19 November 2019

Allison Knight

Please note that the dates for this have been brought forward to 14-19 Nov to avoid clashing with the NZPCN Conference in Wellington the following week. Here's the latest update from Angela:

Thank you to those who have already expressed interest in attending the 2019 John Child Bryophyte and Lichen Workshop! In this circular we have provided more details about the workshop and request you confirm your place at the workshop with a deposit to help us cover the expenses we need to pay up front. There are certainly still spaces available and we look forward to seeing more of you there! Please note that if we don't hear from you (even just to say you "may or may not" be coming this year), we won't send you future circulars for this year's event.

Where: Camp Taringatura, Southland

When: Evening of Thursday, 14 November, to morning of Tuesday, 19 November

Accommodation: Accommodation is available on site at Camp Taringatura (\$25/night for a bunk in one of 5 cabins and \$15/night for a campsite) -- and in nearby Winton (15 km south of the camp). Winton has a large

supermarket and we can recommend motels there (e.g. Paramount Motels).

Getting there: Camp Taringatura is <1 hr drive from the Invercargill airport, a 1.75 hr drive from the Queenstown airport, and a 2.5 hr drive from the Dunedin airport. We can help facilitate carpools from various locations to the camp. Members from the organising committee will also have some space available for carpools from Dunedin and Christchurch.

Meals: Evening meals (Thursday - Monday) will be cooked by caterers at the camp for all who wish to eat with the group. Breakfast and lunch supplies will be provided to all attendees Friday morning through Tuesday morning.

Costs: We anticipate total cost for the workshop to be around \$350, which includes \$20-30 per dinner, \$5-15 per breakfast/lunch, accommodation at the camp, and the booking fee for use of the camp. We request a deposit of \$150 to be paid by 14 October to confirm your place at the workshop; the deposit can be waived for overseas attendees so please get in touch. If you have to cancel your registration for any reason, please do so before 31 October so we can guarantee at least a partial refund of your deposit.

Transport costs: Most of the field trip sites are close to Camp Taringatura -- a mileage charge (10c/km) will apply to passengers and drivers will receive a refund for providing transport on field trips during the workshop. Those carpooling to/from the workshop will be responsible for making their own arrangements to reimburse drivers.

How to register: Please email Angela (angela.j.brandt@gmail.com) with the following information:

- If you will attend the full workshop, or which dates you will attend
- If you would like to reserve a bunk or campsite at Camp Taringatura
- If you will join in group meals, and which meals (breakfast/lunch/dinner on which days)

If you are vegetarian, vegan, gluten free, or dairy free; we will try to accommodate special dietary requirements wherever possible but will need to discuss options well in advance with the caterers.

Tom Moss Award: This award is open to any student studying any aspect of Australasian bryophytes and/or lichens. See the Wellington Botanical Society page for details (www.wellingtonbotsoc.org.nz/awards/moss.html).

Botanical Society of Otago Grants: This year the Botanical Society of Otago is offering two grants of \$100 each to assist two people who might otherwise not be able to attend the workshop. If you would like to apply for one of these grants, please email bsoc@otago.ac.nz by September 1 with a paragraph summary, including:

- 1) Your background and why you would benefit from the grant
- 2) What you can do to benefit the Workshop (e.g., give a talk, help set up a display table)

Thank you and we look forward to seeing you in Southland this November!

Organisers: Angela Brandt, Allison Knight, Maia Mistral, John Steel, David Glenny, Kelly Frogley, and Penelope Gillette

NZPCN and ASBS Conference

Heidi Meudt and Rewi Elliot

24–28 November 2019, Wellington, New Zealand. The Australasian Systematic Botany Society and the New Zealand Plant Conservation Network are proud to announce our joint conference *Taxonomy for Plant Conservation – Ruia mai i Rangiaotea* in November 2019. Attending this conference is a must do for anyone who is passionate about science and conservation of native plants in New Zealand and Australia. Early bird registration and abstract submission closes on 23 August.

This conference will be held at Wellington's premier venue, the Museum of New Zealand Te Papa Tongarewa.

- Get up to date with our stimulating and comprehensive range of presentations
- Explore Wellington's forests and rugged coastlines on our field trips
- Network with people involved in a wide variety of plant conservation work

- Discuss and learn about a range of issues at our workshops
- There will be opportunities to tour the Te Papa herbarium and Otari Native Botanic Gardens

The conference comprises three days of talks, one day of workshops (seven to choose from), one day of field trips (five options), a conference dinner, and a welcome reception. We have three exciting keynote speakers, a jam-packed programme with up to 75 talks by attendees and a poster session and even a silent auction. We particularly encourage students to register to the conference, submit an abstract, and attend. There are student prizes and student support available.

For updates, follow us on our Facebook page [ASBS NZPCN Wellington 2019](https://www.facebook.com/ASBSNZPCNWellington2019) and conference website https://systematics.ourplants.org/asbs_2019/.

Key conference organisers: Rewi Elliot (NZPCN) and Heidi Meudt (ASBS). To contact the conference organisers email: plants2019nz@gmail.com

iNaturalist City Nature Challenge: Final Results for Christchurch!

Allison Knight

Christchurch was the only city in Australasia that took part in this global challenge, which was run over 8 days at the end of April. Colin Meurk persuaded me to come up to help add lichens to the tally and David Lyttle came with me to help with the botany. The brief was to spend 4 days photographing as many things living naturally in the Christchurch area as possible. David racked up an impressive number of observations and identifications and I was excited that Melissa Huchison and Marley Ford found and photographed a lichen I'd never seen before, *Parmotrema reparatum*. I got to photograph another rather rare species, *Dufourea incavata*, and was pleased to capture some interesting invertebrate-lichen interactions, all grist for the expanded lichen guides.

Here are the awesome results of the Challenge from the Christchurch organisers:

“The amazing final tallies for Christchurch in this City Nature Challenge were: 17549 observations, 2377

species, 312 participants! A short while ago we received a spreadsheet from the central organisers summarising the results. We'll dig into these in more detail as soon as we can (there are so many different ways to look at the data!), but in the meantime, here are some highlights:

Overall, out of 159 cities that participated worldwide, Christchurch was:

- 16th for number of observations
- 13th for number of species
- 40th for number of participants

By population: For cities between with populations between 250,000 and 500,000, we came in 2nd place for numbers of observations, species and participants, after Mazatlan, Mexico.

Area: For cities with an area between 1000 and 2500km², we came in:

- 2nd for observations (after Quito, Peru)
- 1st for species
- 5th for participants

Region: In the East Asia/Pacific region, we came in 3rd for all categories after Hong Kong and Klang Valley (Kuala Lumpur).



Microscopic native snail Phenacharopa pseudanguicula, a browser on Leptogium cyanescens. (Photo: Allison Knight)

The global totals were an astonishing 963,773 observations of 31,000+ species, from 35,126 people. Over 7500 people helped make identifications as well. Among the participants, our project was boosted by local user Jon Sullivan, who came in 2nd worldwide for number of observations! We also had at least three kiwis ID'ing species for our local project that made the global top 100 for number of identifications: Lloyd

Esler, Mark Tutty and Mark Smale, each of whom contributed to more than 1800 identifications! Congratulations, everyone! An awesome result for an awesome effort!"

My question is: Would our Botanical Society like to help Dunedin give it a go sometime? You could start by taking note of all the different species of wild plants you see growing round Dunedin so that you can photograph as many as possible as quickly as possible when the challenge comes!

Invitation to A Garden of Earthly Delights, 11 May – 11 August 2019

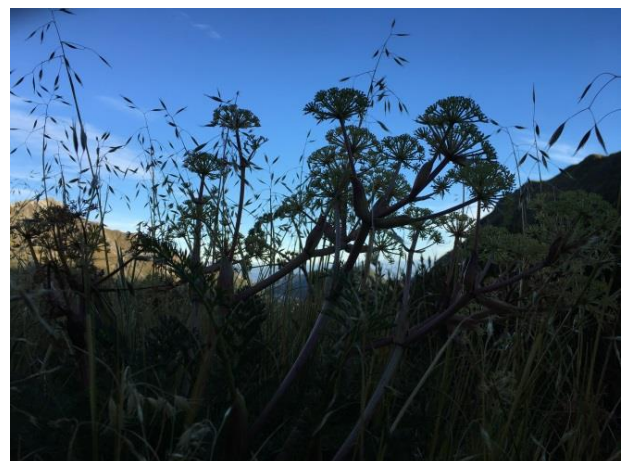
Allison Knight

Sharon Jones and I went to the opening of this exhibition at the Hocken Library. It has a strong botanical theme and is full of treasures from the Botany Department dating right back to the late 1800's, as well as a cornucopia of other fascinating and curious objects. Thoroughly recommended.

Health and Safety

Lydia Turley

We don't want anyone getting hurt or lost on our field trips, so we have put together a hazard register which covers most of the risks that may be encountered on our trips. It is on the website (www.bso.org.nz/trip-guidelines), please read it and review the trip guidelines. Most importantly, please use your common sense, stay with the group, and let the trip leader know if you're going off on your own.



Silhouettes (Photo: Gretchen Brownstein)

Articles

Peter Bannister Student Field Grants

Mary Anne Miller

It is our pleasure to present one of the last two Peter Bannister Field Grant reports, in which you'll appreciate Duncan Nicol's efforts to clarify the geographical distribution of *Celmisia* through his fieldwork and herbarium visits. We wish Duncan all the best for the remainder of his Masters programme.

Phytogeography of the genus *Celmisia* (Asteraceae: Astereae)

Duncan Nicol

The Otago Botanic Society awarded the Peter Bannister Field Grant to research leading to a better understanding of the phytogeography of *Celmisia*. In particular, a subset of *Celmisia* was chosen as the study group – the subgenus *Lignosae*, along with the two smaller subgenera *Glandulosae* (1 spp.) and *Caespitosae* (2 spp.); a subset endemic to New Zealand mainly in the South Island. This grant contributed to two aspects of research. The first was for the researchers to become familiar with the plasticity of the taxa in different ecological situations across their distribution. The other was to verify the identification and location of herbarium collections of *Lignosae*.



Celmisia traversii and *C. allanii* (Photo: Duncan Nicol)

The field work was planned for the alpine areas around Mt. Stevens, Mt. Peel, and Mt. Arthur, all within Kahurangi National Park, Tasman district. Mt.

Stevens was chosen in reference to a vague locality on a herbarium record labelled "Collingwood". It is also the most northern alpine locality in the South Island and the northern distributional limit for some *Celmisia* species (confirmed in the field). We found six *Celmisia* species here. Mt. Peel, however, was the most diverse with 16 *Celmisia* species. There was also great morphological variation of some difficult taxa such as *C. discolor* and *C. durietzii*, species which are notoriously difficult to discriminate. It was beneficial to observe the variation in habitat tendencies for all these species. For example, *C. bellidioides* tended to be found in the high alpine rock crevices along ridges, whereas *C. dallii* tended to be found amongst the meadows extending out from the treeline. *C. rupestris* tended to be found on south-facing rocky outcrops, whereas *C. discolor* could be found nearly everywhere from just above the treeline to the high alpine ridges. Some of the interesting findings in phytogeography (and biogeography in general) are the absences of taxa in areas where they are expected to be present. In this case, it was interesting to note that *C. glandulosa*, which occurs all the way from Fiordland and Central Otago to Tongariro and Taranaki, was absent around these mountains in Kahurangi National Park.



Celmisia discolor (Photo: Duncan Nicol)

The herbarium work was based at the Auckland War Memorial Museum (AK), the Te Papa Museum (WELT), and the Otago University Botany Department (OTA) herbaria. The process involved gathering the herbarium specimens of *Celmisia* subgen. *Lignosae*, verifying the identification or updating it according to a concurrent revision, and finally choosing a location on satellite imagery based on the locality label. Because some of these 'localities' were very vague (e.g. 'Forbes Mountains')

or 'Cobb Valley'), the chosen lat-lon coordinates on the satellite imagery were up to the researcher's discretion. Therefore, it was essential to have done the field work beforehand in order to choose suitable locations according to each species ecology. With just these three herbaria, 2600 herbarium records have already been processed. Once the herbarium records within Lincoln University (CHR) have been processed, too, it is expected that this study will have 4000 records to work with in order to gain a closer understanding of the phylogeography of *Celmisia*.

Mountains and glaciers: biogeography in Westland Tai Poutini National Park

John Grehan

In the mid to late 1980's I had the great fortune and pleasure to spend four summers working as a Park Interpreter (landscapes) at the Westland Tai Poutini National Park (Fig. 1). At that time I was starting to learn about the science of biogeography, and how the evolution, distributions and biology of organisms are intimately tied to the history of the regional geology. I had previously been taught that biology and geology are largely unrelated worlds (at that time evolution courses were about animals, plants and natural selection). My university courses only served to further emphasize this separation by attributing the evolution of distributions to the vagaries of chance dispersal. But I was also confronted with evidence presented by Leon Croizat in support of the view that animal and plant dispersal is connected, not with chance, but with Earth's geological and tectonic history. This awareness was instigated by the research of Robin Craw and Michael Heads, who were actively publishing evidence demonstrating that Croizat's approach was scientifically credible for New Zealand and the world in general.

Westland Tai Poutini National Park forms a strip along the western side of the Southern Alps that narrows down to just 10 km between the coast and the alpine divide. Here the divide has an average altitude of about 3,000 m. Combined with the immense topographic panorama are spectacular examples of erosion (Fig. 2) and more rain than anyone would like to see in a lifetime. I was afforded an exceptional opportunity to consider the emerging biogeographic evidence that conflicted with traditional theory. One

long established thesis held that virtually all life along central Westland was exterminated by Piedmont glaciation during the last ice ages. According to this theory, the present biota was made up of waifs and strays that had drifted back onto a lifeless postglacial landscape. The absence of many organisms was explained as a result of their lacking sufficient dispersal ability to return. The lack of southern beeches (*Nothofagus* [Nothofagaceae]) in Westland was a prominent example, and the absence was often referred to as the 'beech gap' (see Fig. 8).



Fig. 1. Franz Josef village (left), next to the Callery River that flows from the Franz Josef Glacier Valley.



Fig. 2. Erosion at Franz Josef Glacier. The thickness of the central fallen block is about 4-5 m.

In the 1980s the beech gap theory was beginning to unravel, as Robin and Mike were finding many plant and animal groups with distributions inconsistent with this evolutionary model. Organisms were present that one would not expect (so-called poor dispersers). Others were strangely absent even if they were 'good dispersers'. There were also species that occurred only in the 'gap', and these sometimes replaced close relatives that were absent there. In addition, many

organisms have distributional 'gaps' far wider than the area supposedly wiped clean by glaciers. Finally, there are also marine and alpine species involved, and it is unlikely that the alpiners were eliminated by glaciers (Heads 1990, 2017, Heads & Craw 2004). Robin and Mike suggested that the various distributional gaps were consistent with the influence of tectonic processes, and that many organisms on the West Coast had survived there throughout the Pleistocene in small, local pockets or 'refugia'.

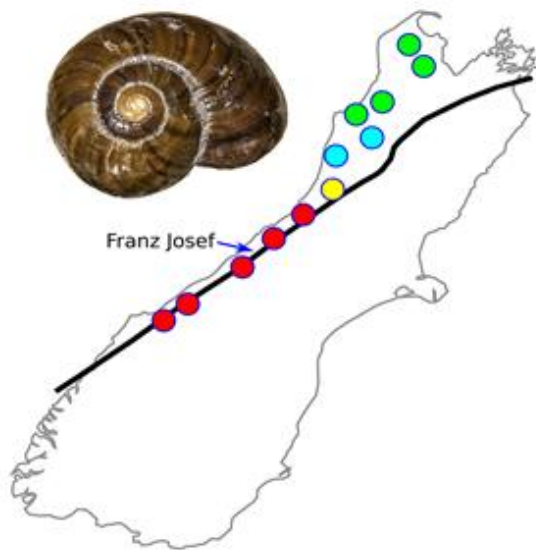


Fig. 3. Allopatriic distribution of *Powelliphanta rossiana* group. Red circles – *P. rossiana rossiana*; yellow circle – *P. rossiana fletcheri*; blue circles – *P. rossiana gagei*; green circles – *P. rossiana patrickensis*. Modified from Meads et al. 1984. Image from Danilo Hegg, iNaturalist.org

At the Park I used my spare time to examine, collect, and identify various invertebrates, particularly moths. One intriguing find in the subalpine vegetation was the giant land snail *Powelliphanta rossiana rossiana*. Upon finding this snail along an alpine ridge, I recall looking down the deep, adjacent glacial valleys and reflecting on how a snail like this could traverse glaciers and raging rivers to reach central Westland, while beech trees apparently could not. When I mentioned this find to conchologist Frank Climo, he noted that the Westland distribution was indeed biogeographically significant. This snail has a distribution extending from Haast to Hokitika (Fig. 3), and further north the subspecies is replaced by other, allopatriic, subspecies (Meads et al. 1984, Walker 2003). This allopatriy is consistent with each subspecies being locally derived from a widespread ancestor along the western part of the South Island.

This means that *P. rossiana rossiana* not only survived the West Coast Pleistocene glaciations in situ, but did not lose its original allopatriy with its relatives.

Fig. 4a

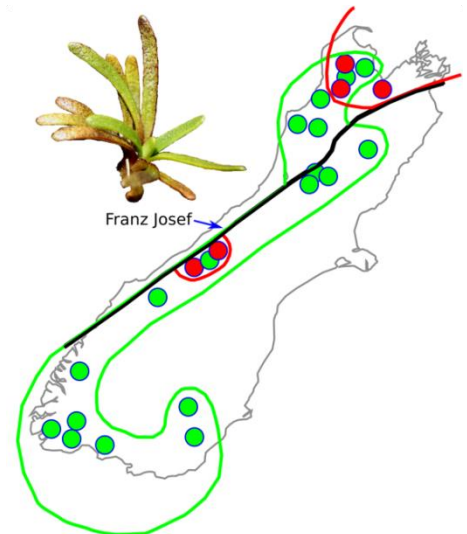


Fig. 4b

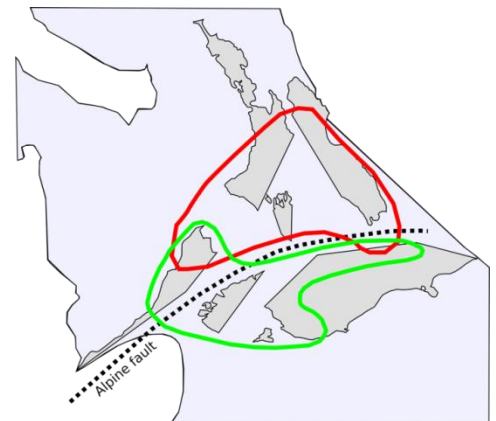


Fig. 4. Distribution of *Abrontanella fertilis* (red circles) and sister species *A. linearis* (green circles): (a) present day showing relationship to the Alpine Fault, (b) pre-fault-movement Cenozoic landscape with hypothesized ancestral range about 27 Ma, suggesting largely allopatriic ranges with a more northern *A. fertilis* and southern *A. linearis*. The extent of the northern and southern range of each species may have been greater than shown here. Modified from Heads 2017, figs 10.12a, 10.14). Photo from Chris Ecroyd, iNaturalist.org.

The main tectonic feature in New Zealand is the Alpine fault. This marks the boundary between the Australian and Pacific plates, and runs parallel with, and a few kilometres west of, the main divide of the Southern Alps. The cushion plant *Abrontanella fertilis* occupies a small area of the Southern Alps just east of the Alpine Fault near Mt Cook, further north in North West Nelson to the west of the fault, and also across much of the North Island (Fig. 4a). Its sister species, *A. linearis*, is also widely distributed, but only in the

South Island (and Stewart Island) east of the fault, until it 'skips' over to west of the fault in Northwest Nelson (Fig. 4a). Although there is some geographic overlap between the two species (evidence of local dispersal), the distributions are mostly allopatric. That they both obliquely 'cross' the fault is consistent with a geographic dislocation. This can be explained by strike-slip (horizontal) movement on the Alpine fault, which began about 27 million years ago. At this time, *A. fertilis* would have ranged to the north and *A. linearis* to the south (Fig. 4b) on the pre-fault-movement Cenozoic landscape. As the Alpine fault moved, it stretched out the distribution of *A. linearis*, while a fragment of the *A. fertilis* ancestral distribution was broken away and has remained localized since that time. The West Coast 'gap' for *A. fertilis* is consistent with separation by fault movement (Heads 2017).

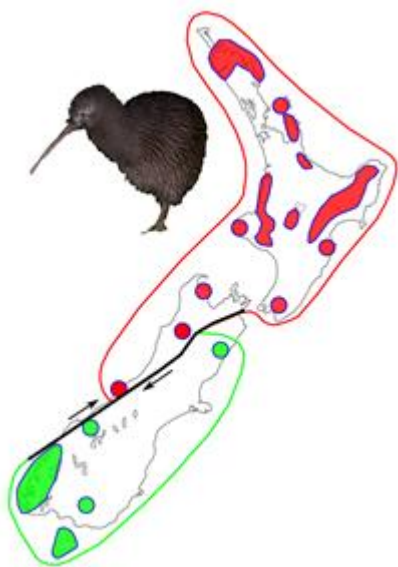


Fig. 5. Biogeographic map of the two brown kiwi clades: green – *Apteryx australis* group, red – *A. mantelli* group. Modified from Heads (2017, fig. 9.16).

To my surprise, I learned that there were no kiwis in the forests surrounding Franz Josef Glacier, but that they were present a few kilometers north in the forests of Okarito. These populations make up a locally endemic species, *Apteryx rowi*, which occupies the southern range limit of the *Apteryx mantelli* species group, confined to the west of the Alpine Fault (Fig. 5). This kiwi group is most closely related to the *A. australis* kiwi complex found east of the Alpine Fault from Arawata Valley and Haast Range, south to Fiordland and Stewart Island. Again, this boundary at

the fault (not at the main divide) suggests that the distributional and phylogenetic break between the two species groups, between the Arawata and Okarito, is explained by the major tectonic dislocation in the same area (Heads 2017). The kiwi at Okarito is endemic there.

Another bird that caught my attention was the kotuku or white heron, *Egretta alba*. In New Zealand, this well-known bird has its only nesting site in the Park, within Okarito Forest (Fig. 6). Naturally the kotuku was a major tourist attraction, but otherwise it was treated simply as a curiosity. It seemed that no one thought to ask: why Okarito? This is a pertinent question for evolution, given that the bird ranges widely in Australia. Many other wide ranging bird species have very limited and precise nesting areas (penguins and albatrosses, for example). So while the foraging range of a bird may not show a narrow geological correlation, the nesting site may. For example, some birds that feed in coastal or marine areas have nesting sites in inland or even montane locations; the nesting sites have been progressively lifted up into higher elevations through tectonic movements. Over time the birds keep returning to a nesting site that is ever higher in elevation (Heads 2017). The general significance of uplift affecting the distribution of plants was recognized by early New Zealand botanists such as Thomas Kirk and Leonard Cockayne (Heads 2017).



Fig. 6. Kotuku waiting for leftovers. Okarito.

It is quite possible that there were other kotuku nesting sites in New Zealand in the past that are now extirpated. But either way, the fact that the Okarito nesting site is located at a biogeographic centre of local endemism (cf. *Apteryx rowi*) raises the question of whether the endemism is older than the Pleistocene.

This possibility is suggested by the presence of a late Cretaceous fault that extends out to sea from Jackson's Head, curves inland by Okarito/Abut Head, then out to sea again before connecting with Cape Foulwind and Heaphy bluff to the north. With the opening of the Tasman basin, most of the land west of New Zealand has been lost to sea, but near Okarito a slice of that Cretaceous landscape became embedded within the South Island fragment and continued to support localized endemics, including nesting preferences of the kotuku. The remnant geology is consistent with Okarito as a biogeographic centre and the occurrence of local Westland records such as *Hebe canterburiensis* at Omoeroa (5 km SW of Franz Josef) (Fig. 7) that is widely disjunct from its other populations further north and south (Heads 1990 571; Bayly and Kellow, 2006)

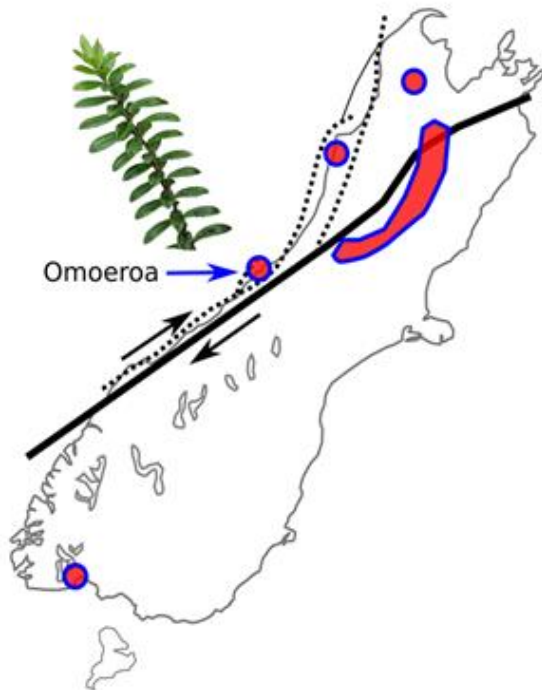


Fig. 7. Mesozoic faults (dotted lines) and distribution of *Hebe (Veronica) canterburiensis* with central Westland record at Omoeroa coinciding with landward position of fault line. Modified from Heads (1990, figs 33c, 27).

These examples illustrate the role of tectonic processes in the region, particularly in generating the Alpine Fault disjunction, which is now documented in over 225 plant and animal clades. While the 'beech gap' seems a useful term for the gap as a general pattern, Heads (2017) pointed out that it is confusing, since southern beech may be considered rare rather than totally absent from the region. *Nothofagus (Lophozonia) menziesii* is present in central Westland

at Karangarua River, and there are early records of *N. (Fuscospora) fusca* and *N. (Fuscospora) solandri* at Okarito, as well as records of Late Pleistocene fossil *Nothofagus* pollen from Westland. The *Nothofagus* species with a true disjunction is *N. truncata*. The northern populations in Nelson and the North Island are separated by 230 km from a southern population at the Jackson River, right on the Alpine fault (Fig. 8). This is consistent with the idea that the disjunction resulted from displacement by fault movement (Heads 1990, 2017).

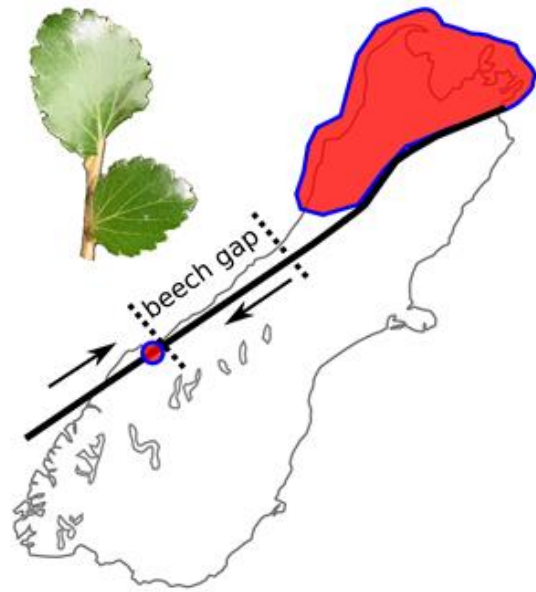


Fig. 8. Alpine fault correlation of *Nothofagus (Fuscospora) truncata* disjunction. South Island range shown only. Modified from Heads (1990, fig. 17b).

At Franz Josef I was immersed within a biogeographic landscape brought into sharp topographic relief, and surrounded by evidence of evolutionary continuity from Mesozoic time. I was also fortunate that the Chief Ranger, Murray Ready, was not at all perturbed by my lack of evolutionary orthodoxy. Indeed, he facilitated a meeting with the Rt. Hon. Helen Clark, Minister of Conservation, during her visit to the region. I presented many examples of alignment between Earth and life, and showed how this information enhanced conservation values for the region and New Zealand in general. She readily appreciated the evidence and was receptive to its potential for conservation. Unfortunately the government's science directorate was not so receptive. I was disappointed at the time, but I am now more aware of the difficulties in advocating new ideas against a century of established consensus.

Regardless of what one thinks about New Zealand's evolutionary history, the biological and tectonic correlations in New Zealand discovered by Robin Craw, Michael Heads and other researchers, are real and have empirical existence – they may be ignored, but they will not go away. They remain to be explored, both in Westland Tai Poutini National Park and elsewhere. By tramping across these landscapes around Franz Josef I was able to fully appreciate the geographic records of life and their relationship with geology in a way that no other experience has since matched.

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A New Years trip to the Chatham Islands

Esther Dale

Lloyd Esler organised a trip to Chatham Island (Rekohu/Wharekuri) from the Dec 28th 2018-3rd Jan 2019 with people interested in the natural history, including several BotSoc members. Our flight over with Air Chathams was in a Convair 580. We started the trip with a visit to Owenga where there is a memorial statue of Tommy Solomon, considered to be the last full-blooded Moriori. The next morning we visited the basalt columns on the way to Waitangi West. In the paddocks between the road and the shore,

we spotted *Gentianella chathamica*, *Drosera binata* and *Microtis* orchids. The shore plants included *Apium prostratum* subsp. *denticulatum* (Chatham Island celery), *Rumex neglectus* (shore dock), *Calystegia soldanella* (shore bindweed), and *Disphyma papillatum* (Chatham Island iceplant).



Gentianella chathamica (Photo: Esther Dale)

We headed to Waitangi West, where the dune and shore plants of note were *Embergeria grandifolia* (Chatham Island sowthistle), a monotypic genus and megaherb, and *Atriplex billardieii*. We visited the stone cottage nearby built by Moravian missionaries in the 1860s. Its current inhabitant, Helen, showed us around and filled us in on the local history.



Embergeria grandifolia (Photo: Esther Dale)

Next up was the Nikau Conservation Area, which was our first look at Chatham Island forest. Forest species included *Myrsine chathamica* (Chatham Island matipo), *Hebe barkeri* (Chatham Islands koromiko), *Pseudopanax chathamicus* (hoho), *Corynocarpus laevigatus* (kopi), *Plagianthus regius* subsp. *chathamicus* (Chatham Island ribbonwood), *Coprosma chathamica*, *Melicytus chathamicus* (Chatham Island mahoe), *Rhopalostylis sapida* (nikau), *Ripogonum scandens* (supplejack), *Muehlenbeckia australis*, *Dicksonia squarrosa*, *Cyathea smithii*, *Cyathea cunninghamii*, *Calystegia tuguriorum*, and *Piper excelsum* (kawakawa). We also saw *Brachyglottis huntii* (rautini) with stunning yellow flowers in more open parts of the reserve. Buff weka were common in the reserve and many other parts of the island.



Myrsine chathamica (Photo: Esther Dale)

The next day we spent in the north east of the island. On the way, we saw a considerable number of naturalised *Ugni molinae* (Chilean guava), in some places forming a dense scrub. At Ocean Mail Scenic Reserve we started with the Wetland Walk, where we observed many flax (*Phormium tenax*) with intensely red flowers, *Dracophyllum scoparium*, and *Aciphylla traversii* (Chatham Island speargrass). The Aster Walk showcased *Olearia semidentata* (Chatham aster). We also observed *Leptecophylla robusta*, *Gentianella chathamica* and a variety of orchids.

Point Munning has a NZ fur seal colony and this, in combination with the seabirds that occur there (we saw black backed gulls, Chatham Island shags and Pitt Island shags), results in a nutrient-rich highly

disturbed environment and associated seabird-associated plants. Interesting plants we saw here included *Lepidium oligodontum*, *Disphyma papillatum*, *Apium prostratum* subsp. *denticulatum*, *Carex trifida* (mutton bird sedge), *Leptinella potentillina*, and *Senecio radiolatus* subsp. *radiolatus* (Chatham Island groundsel).



An Esther with an aster (*Olearia semidentata*)



Lepidium oligodontum (Photo: Esther Dale)

The Admirals Garden was our next stop, it's a garden designed to attract butterflies. The garden is divided into different "rooms" and includes sculptures. The avenue of *Pseudopanax chathamicus* lined with *Astelia chathamica* was particularly striking. We walked around the wetland nearby and saw more flowering *Brachyglottis huntii*. Our next stop was the petroglyphs at Nunuku's Cave, featuring figures of seals and birds carved into limestone by Moriori.



Brachyglottis huntii (Photo: Esther Dale)



Geranium traversii (Photo: Esther Dale)



Petroglyphs. (Photo: Esther Dale)

I got up for sunrise on January the 1st, an opportunity to see the first sun in the world of 2019. Sadly it was overcast and there wasn't much to see! We visited the local museum. Of particular interest was the display on the Chatham Island robin, which included a taxidermy bird, Old Blue's last nest, and various gear from that conservation project. We visited Henga Scenic Reserve next, with one section of the loop track going along the back of the sand dunes. This dune vegetation included *Myosotidium hortensia* (Chatham Island forget-me-not) and *Geranium traversii*.



Corokia macrocarpa (Photo: Esther Dale)

The next morning we walked the Awatotara Bush Coastal Walking Track, which is a loop track that goes down to the sea on one side of the stream, and back along the other. It includes sections of forest, scrub and coastal herbfield. Plants of interest along the way included *Pterostylis* and *Corybas* orchids, *Corokia macrocarpa*, *Aciphylla dieffenbachii* (coxella), *Hebe chathamica* (Chatham Islands koromiko), *Austroderia turbaria* (Chatham Island toetoe), *Urtica australis*, *Myrsine chathamica*, and *Pseudopanax chathamicus*. We also spotted a Chatham Island pigeon from the roadside just before getting back in the van.

We had a wonderful time botanising, birdwatching, and exploring Chatham Island. Big thanks to Lloyd Esler for organising a great trip!



The full group.

New Books: Reviews

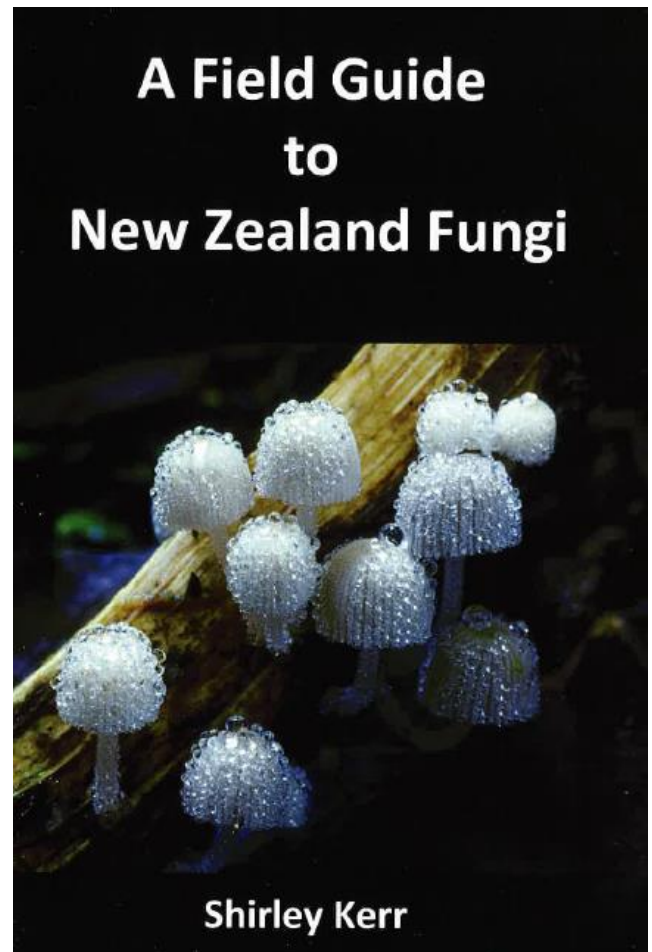
John Steel

A Field Guide to New Zealand Fungi

Shirley is well known for her natural history web-site, *Exploring the Kaimai Bush with Shirley Kerr* www.kaimaibush.co.nz, and her generous contributions to *iNaturalist NZ* so her new book is a welcome addition to the fascinating field of New Zealand fungi. Many examples of her photographic skills highlight the diverse mycoflora that surrounds us – but, could open up a Pandora's Box when trying to find a photograph to match a teasing specimen found on a weekend walk! This, however, is just a beginning: before you know it, you will be drawn further and further into this magical world as you begin to delve into the intricacies of identification and try to put names into the myriad specimens – over 600 of which are portrayed in this fine collection of Shirley's beautiful photographs.

Shirley Kerr (2019) *A field guide to the New Zealand fungi*. The author, Rotorua. ISBN 978-0-473-47551-2

Available from the author, Shirley Kerr shirley@kaimaibush.co.nz. To pay, please deposit \$65 (\$69 for rural delivery addresses) into the account: SD Kerr 06-0299-0019776-04 with your name in the details. Please also send your postal address for delivery.



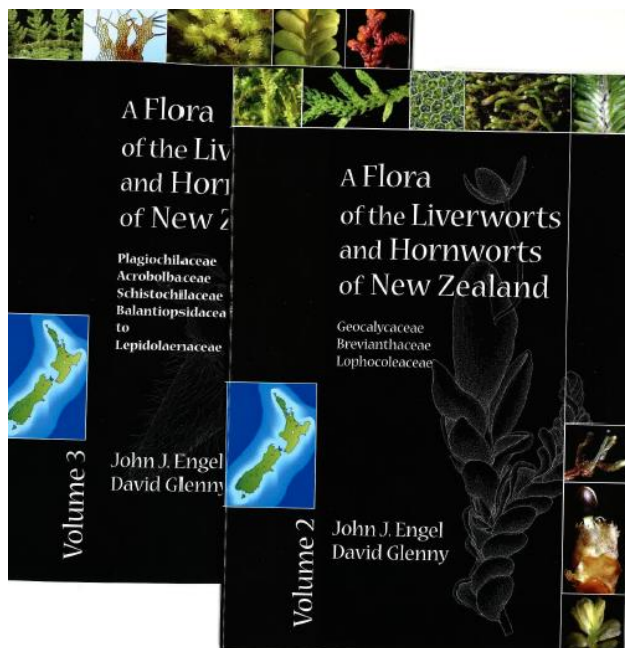
Book cover.

A Flora of the Liverworts and Hornworts of New Zealand

I have just received copies of these newest additions to our bryoflora literature – and what magnificent volumes they are! Photographs are all very well, but it is line drawings by Zorica Dabich and John Engel that are really essential for identification and it is the line drawings in these volumes that bring the plants to life: I can't wait for the final volume to bring this fine work to completion.

Engel, J.J.; Glenny, D. (2019) A Flora of the Liverworts and Hornworts of New Zealand, volume 2. *Monographs in Systematic Botany from the Missouri Botanical Garden*, 134: 1-739. ISBN 978-1-935641-16-2

Engel, J.J.; Glenny, D. (2019) A Flora of the Liverworts and Hornworts of New Zealand, volume 3. *Monographs in Systematic Botany from the Missouri Botanical Garden*, 135: 1-636. ISBN 978-1-935641-17-9



Book covers.

This is an illustrated guide to an important part of New Zealand's green plant flora. The liverworts and hornworts, together with the mosses, make up the bryophytes. Liverworts are morphologically a more diverse group than the mosses in that they have both leafy and thallose forms, the leafy forms often being mistaken for mosses. In New Zealand forests, they make up about half of the ground layer vegetation, but are also abundant as tree epiphytes. Currently 653 species of liverworts and hornworts are known from New Zealand.

Volume 1 of this flora was published in 2008. The authors have since then been working to prepare volumes 2 and 3, which are now published. A final volume remains to be written. When completed, this will be the first flora for these two groups of plants since Joseph Hooker's 1864–1867 *Handbook of the New Zealand flora*.

Volume 2 covers a single large family of leafy liverworts: the *Lophocoleaceae*, one of New Zealand's most important families and a conspicuous element of the terrestrial bryophyte vegetation. The family includes two large and confusing genera, *Chiloscyphus* and *Heteroscyphus*, which until now have been very difficult to identify because of a scattered and incomplete literature. 221 full pages of line drawings and 63 colour photographs comprehensively illustrate the species and will help considerably with identification of species in this family. Volume 2 also provides an update to the

Bibliography published in volume 1, with all new publications since 2008 that are relevant to New Zealand liverworts and hornworts. 739 pages.

Volume 3 covers three large families: *Plagiochilaceae*, *Schistochilaceae* and *Acrobolbaceae*. *Plagiochila* (28 species) and *Schistochila* (13 species) are an important element of the forest bryophyte vegetation. In addition, there are a number of small families, including one endemic family, *Herzogianthaceae*, and the Gondwanic family, *Lepidolaenaceae*, which has its strongest representation in New Zealand. The volume has 636 pages.

167 full pages of line drawings and 120 colour photographs illustrate the species.

Volumes 2 and 3 can be bought directly from the publisher, Missouri Botanical Garden Press:

Volume 2: <http://www.mbgpress.org/product-p/9781935641162.htm>

Volume 3: <http://www.mbgpress.org/product-p/9781935641179.htm>

The price per volume is \$US95 (currently \$NZ140) and shipping is about \$NZ72, so the pair costs about \$NZ350. Shipping time is about 1 week. There is no tax to pay in New Zealand. David Glenny has bought copies at a lower, author's rate and is selling them at \$NZ272 per pair (email: glennyd@landcareresearch.co.nz).

Volume 1 is still available from Missouri Botanical Garden Press: <https://www.mbgpress.org/product-p/msb-110.htm>, also at \$US95.

The Mosses of New Zealand

Beever, J.; Allison, K.W.; Child, A. (1992) *The Mosses of New Zealand* (2nd edition). University of Otago Press, Dunedin.

Jessica Beever's 1992 revision of Allison and Child's 1971¹, *The Mosses of New Zealand*, was an immediate hit with beginner-bryologists and has remained so ever since. Sadly, this invaluable work has long been out of print and second-hand copies difficult and expensive to come by, making it tricky for anyone

starting off in what can be a daunting subject. Her line drawings were superb and a great step forward from the previous edition and in a different league from Sainsbury's² great work.

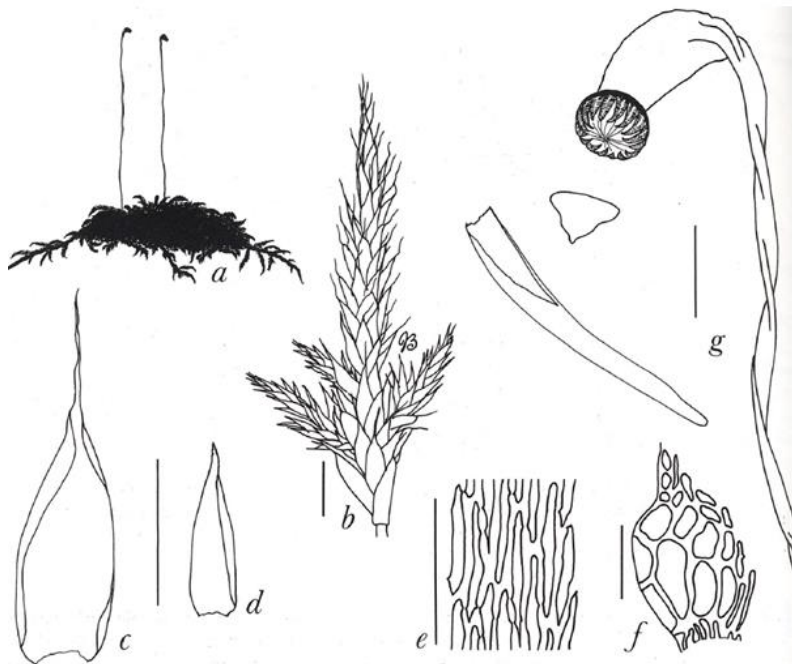


Figure 80: *Wijkia extenuata*: a. habit, life-size (dry); b. portion of shoot (dry); c. leaf from main stem; d. leaf from branch; e. mid-leaf cells of branch leaf; f. alar cells of branch leaf; g. capsule, operculum and calyptra (dry). Scale bars: b, c, d, g. 1 mm; e, f. 50 μ m

Moss illustrations. (The Mosses of New Zealand, 2nd edition)

A letter to the Otago University Press, enquiring for the reprinting of the book *The Mosses of New Zealand, Second Edition* revised by Jessica Beever (1992) was co-signed by over 30 bryologists and sent to the editor in mid-February. This letter was very well received and the editor promptly replied on the following day. The Otago University Press decided to produce an e-pdf of the book and Jessica happily agreed. The e-book will be a straight reprint of the second edition without any updates, but will have a new preface, an *errata* (not too many!), a list of “Mosses recorded in New Zealand since the 1992 Edition” (quite a lot!), plus links to other sources of information, namely the Manaaki Whenua Checklist of Mosses³ (published annually), the Manaaki Whenua eFlora series⁴, Bill and Nancy Malcolm’s superbly illustrated Glossary⁵, and Larry Jensen’s website⁶ of fantastic photos of New Zealand mosses. Another added advantage is that the new version will be SEARCHABLE and DOWNLOADABLE.

The production of the e-book is currently under way and will be on sale sometime in mid-May through

their United States distributor by means of a BUY NOW button from the Otago University Press website, university-press@otago.ac.nz, and for about \$US9.99. The e-book will also show up in searches on Amazon and other online retailers.

Special thanks go to Dr. Pascale Michel PhD (Otago of course) for her efforts to have this invaluable work available again and to Jessica for allowing it to be reprinted.

References:

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Marsippospermum gracile: Elegant alpine rush decorating a wetland edge. (Photo: Cara-Lisa Schloots)

Meeting and Trip Reports

Field trip to Taringatura, Southland, 9th-11th November 2018

John Barkla

The Dunedin contingent travelled on Friday afternoon/evening to Camp Taringatura, our weekend base near Dipton. We were warmly welcomed by caretaker Jenny, who gave us a tour of the camp before leaving us to it. Some elected to camp while others opted for the rustic but comfortable cabins. The Camp is a botanical treasure in its own right, adjoining lowland alluvial forest with a suite of interesting trees and shrubs including *Olearia hectorii*, *Melicytus flexuosus*, *Coprosma obconica* and fierce lancewood. A tree of weeping mapou next to the ablutions block was host to abundant dwarf mistletoe (*Korthalsella lindsayi*).

Our Invercargill-based hosts Brian and Chris Rance arrived soon after breakfast next morning and outlined the plans for the day. First up was a trip to the property of Graeme and Heather Milligan about 5km east of Dipton. We drove to the start of Cayfords Track, and followed this up into the silver beech forest, complete with some large examples of the hemiparasitic mistletoe *Peraxilla colensoi*. The track then led us into the podocarp-dominated QEII covenant that teemed with large emergent matai and kahikatea and, to a lesser extent, totara and rimu.

We emerged back into farmland and made our way across the other side of the valley to an open hilltop of red tussockland dotted with matagouri and other shrubs. A large rock stack demanded our scrutiny and we were rewarded with many otherwise uncommon plants such as *Scleranthus brockiei*, *Raoulia glabra*, *Muehlenbeckia axillaris* and *Senecio quadridentatus*. Then it was back to the cars and lunch, passing an impressive colony of the speargrass *Aciphylla glaucescens*.

Our next stop was at Peter and Kim McDonalds's farm in the Caroline Valley. Peter met us at their home and gave us some history about the property and their farming history. For the sake of the environment they rather courageously decided some time ago to stop

farming cattle. Peter then led our convoy of vehicles along farm tracks to a high point alongside one of his QEII forest covenants. Again he generously spent time with us as we wandered the farmland and admired its numerous podocarp and lowland ribbonwood-dominated remnants. Some of the trees were particularly large and probably ancient – a huge fierce lancewood was a case in point. The margins and understorey of the forest patches had great diversity, including several nationally 'threatened' and 'at risk' species such as fragrant tree daisy (*Olearia fragrantissima*), *Melicytus flexuosus*, *Coprosma virescens* and *Tupeia antarctica* (white mistletoe). Lianes were abundant and we admired mass flowering of two pleasantly scented examples - our native jasmine (*Parsonia heterophylla*) and *Clematis foetida*.

Back at Camp Taringatura the evening's entertainment was provided by Chris and Brian Rance who gave us a great presentation on their recent trip to Lord Howe Island.

On Sunday morning we walked a couple of hundred metres up the road to the Taringatura Scenic Reserve. The grassy valley floor had a shrubby margin that included some very large specimens of original *Melicytus flexuosus* as well as trees of *Olearia hectorii* that Brian had planted many years earlier. We struggled our way through the swampy toeslope before heading up the hillslope forest with its large kahikatea and abundant rohutu (*Lophomyrtus obcordata*) understorey. After traversing the boundary fenceline for a time we then headed back down slope, striking a patch of silver beech near the bottom.

We returned to the Camp for lunch and a pack up before heading away. One group added a further botanical site to their homeward journey, dropping in to Dunsdale Scenic Reserve near Hedgehope. This popular camping site has an excellent circuit walking track through alluvial forest. Orchids were common along the track margins but a highlight was finding several large trees of the threatened *Coprosma wallii*, some of which were host to the uncommon dwarf mistletoe *Korthalsella clavata*.

A big thanks is extended to the Milligan and McDonald families for kindly allowing us to visit their properties and to our Southland members Jesse

Bythell and Chris & Brian Rance. Jesse, the local QEII representative, did much of the background preparation but was unable to come on the trip. Brian and Chris Rance ably led us to the various sites and provided excellent plant lists and maps. Other participants included Sinead Spedding, Bradley Curnow, Mike Small and son, Phillip Dunn, Tony Aldridge, Robyn Bridges, David Lyttle, Lucy Parsons, and John & Marilyn Barkla.

Ring of Fire, a talk by Peter Johnson, 13th February 2019

Lydia Turley

Peter Johnson's February talk took us on a botanical and geological journey around the Pacific ring of fire.

The Solander Islands lie in the Foveaux straight. Here, Peter and his companions lived for several weeks among fur seals, taking on their smell to the point that other people didn't want to be near them on the boat ride back. One night, they pitched their tent in an area where seabirds burrow. When they packed the tent up the next morning, they counted several burrow holes underneath where the tent had been, where birds hadn't been able to leave or enter their nests. Peter got up early one morning and thought he could see a cruise ship passing in the distance. This was illustrated with a lovely sketch of him watching the cruise ship pass by, and a companion sketch of the Endeavour passing near the Solander islands.

Stewart Island isn't usually thought of as volcanic, but Peter informed us that pumice does wash ashore. He found the native spinach *Tetragonia tetragonoides* washed ashore on a beach. This disperses by floating on sea and washing ashore. It's also found in Australia and the Pacific and is not common so far south but has been recorded on Stewart Island before.

Taupo was one of the largest volcanic eruptions in recent times. On the Chatham Islands, the soil contains layers of ash from the Taupo eruption. The eruption burned and buried nearby forest and burnt logs have been found in the Pureora buried forest and identified as Rimu and Tanekaha, a snapshot into the botany of the area prior to the eruption.

Rangitoto consists of rubble a'a lava. Here you can find the stunning *Hymenophyllum nephrophyllum* (kidney fern) and the pygmy tree orchid *Bulbophyllum pygmaeum*. The vegetation on Rangitoto is mostly pohutukawa forest. Peter estimated that 13 million seeds were produced by one side of a pohutukawa tree growing down here. Robyn wanted to know if he'd counted them all (that would've been quite a feat), so he had to explain that he'd only counted 1/16 of the seeds in one capsule and multiplied up. Although pohutukawa seeds are tiny, if one lodges in a crevasse and puts down a good root, it has a good chance of surviving to the next year.

Leaving New Zealand, Peter then brought us to Lord Howe. On one of the islands, Peter only recognised one species, a *Carpobrotus*.

Norfolk Island is noteworthy because of *Araucaria heterophylla*. When passing through, Cook thought these trees would be good for masts because they grow straight and tall, but the wood isn't very solid. *Lagunaria patersonia* grows bent over in the wind and salt spray, a visual contrast to the straight *Araucaria*.

The Kermadec and Tonga trenches are noteworthy for obsidian sea mounts and black smokers. Peter explained the secret of his photographs of black smokers; he'd poured dye into a tube sitting in a glass of water, photographed it as the dye mixed with the water, and turned the photograph upside down. Very clever!

On Rarotonga we find more *Metrosideros*, *Cordyline terminalis*, *Phajis amboinensis* and an orchid in *Taeniophyllum* with reduced leaves and photosynthetic roots.

At some point, Peter had decided to climb a summit for each letter of the alphabet. When he reached 'Y', there was Mt Yasur in Vanuatu. Mt Zion ('Z') is in Dunedin. Mt Yasur has volcanic rock containing glass needles known as Peles hair and is home to *Pandanus*.

In Indonesia, Peter visited Kawah Ijen. He left before dawn to reach the summit in time for lunch beside a lake with a pH of 0.13. Locals go up the volcano to harvest sulfur, and one person Peter talked to was carrying 72kg – hard work!

Mt Rishiri in Japan has its own native edelweiss, and speakers which blast out the edelweiss song each day.

Pine seedlings were found growing in batches. There is a native bird which collects seeds and caches them away, like a squirrel, presumably the cause of this unusual distribution.

In Guatemala, Vulcan de Agua is the type locality for *Weldenia candida*, which Peter has growing in his garden.

In Llaima, southern Chile, grows *Araucaria araucaria*, *Misodendrum*, and a big *Gunnera tinctoria*.

All this was illustrated with stunning photographs and illustrations. Peter included sketches of the scenery that he'd made and, wow, they were good.



Pacific plants and islands (Images: Peter Johnson)

Field trip to the Otago Peninsula, 16th March 2019

David Lyttle

We were fortunate to be given permission to visit a coastal QEII covenant on Maori Head by the owners, Tim Ritchie and Sherrill Passau. The covenanted area encompasses a strip above the coastal cliffs north from Smaills Beach to Karetai Road. As well as shrubby vegetation and tussock, there is an interesting coastal turf community where the headland receives the full force of the southerly wind and the accompanying salt spray.

Immediately above Smaills Beach there are several patches of *Muehlenbeckia axillaris* which, rather than growing as a prostrate creeping mat, forms dense mounds about 800 mm in height and several metres in diameter. The southern end of the Covenant above Smaills Beach is mainly rough pasture dominated by

exotic grass species. However the native tussock *Poa cita* is also relatively common here together with the specialised coastal *Poa*, *Poa astonii*. The latter is recognised by its low spreading growth habit and green, slightly glaucous foliage. Harakeke (*Phormium tenax*) is a prominent plant here and the original population has been supplemented by planting. *Veronica elliptica* shrubland dominates the rocky coastal cliffs. Taupata (*Coprosma repens*) occupies large areas of the dunes behind Smaills Beach and has spread to the cliff edges as well. Although this species is a New Zealand native it does not occur naturally in the South Island and has been spread extensively on the Otago Peninsula mainly by starlings feeding on the berries.

The coastal turf higher on the point is dominated by *Selliera radicans*, *Samolus repens* and *Leptinella dioica*. Other species present are *Salicornia quinqueflora*, *Disphyma australe*, *Apium prostratum*, and *Colobanthus muelleri*. Two species of native shore groundsel occur there; *Senecio carnosulus* with narrow leaves and flowers with conspicuous rays and a second species with broader leaves and discoid flowers. The purple-flowered groundsel *Senecio elegans*, a South African plant, and *Plantago coronopus*, a Eurasian species are two very abundant exotic weeds that are present. Apparently, *Plantago coronopus* is edible and very trendy and could serve as a substitute for lettuce for South Dunedin gardeners when soil salinity increases due to rising sea levels.

Further up the hill the track traversed between the fence and the cliff edge which caused a certain amount of apprehension for some members of the party. Those who did not approach the edge and look down missed *Libertia peregrinans*, a plant that is known from only two sites on the Otago Peninsula. It is a coastal species typically found growing in dune slacks and is now listed as threatened - nationally vulnerable as its primary habitat has been trashed by stock grazing and invasion by exotic weeds. The cliff edge serves as a refuge for what was once a common plant along the southern coasts.

A small track leading off Karetai Road gives access to a shelf above the cliffs that supports a *Veronica elliptica* dominated shrub community. At this site we found *Pimelea prostrata* subsp *ventosa*, *Linum monogynum* and two species of coastal ferns

Asplenium obtusatum and *Blechnum blechnoides*. A small daisy, *Lagenophora petiolata* and a little creeping epilobium, *Epilobium komarovianum* with distinctive dimpled leaves were seen growing on bare soil. *Angelica pachycarpa*, an exotic member of the carrot family, was recorded here as well. This species has been progressively invading the dune vegetation at Tomahawk and Smaills beaches lower down and it was disappointing to see it gaining foothold in a relatively unmodified site.

The next place we visited was a small native forest remnant further up Centre Road on the property of Donald Lyttle. The original forest was cleared for agriculture and burnt. The present forest is all second growth. This patch of bush has been fenced off to prevent stock grazing for many years but little else has been done during that time. The principal native species are mahoe, (*Melicytus ramiflorus*) fuchsia (*Fuchsia excorticata*) and broadleaf (*Griselinia littoralis*) with a good representation other lowland native tree species and ferns. Two woody weed species, elderberry (*Sambucus nigra*) and hawthorn (*Crataegus mongyna*) are common and form part of the canopy. As there is a plentiful supply of seed from the existing native species the strategy that has been adopted to improve the biodiversity of the site is to cut and poison the weed species and plant native species that are no longer present into the light wells formed by their removal. The first tranche of planting included totara, (*Podocarpus totara*) matai, (*Prumnopitys taxifolia*) kahikatea, (*Dacrydium dacrydioides*) and pokaka, (*Elaeocarpus dentatus*), all important emergent forest trees. So far they have survived the summer drought and seem to be thriving. The reduction of possum numbers through the Otago Peninsula Biodiversity Group's ongoing control programme has also had a positive effect on the forest with many species flowering and fruiting more abundantly than they have for many years. Better crops of seed will hopefully result in more winter food for birds and ultimately improved regeneration of the native flora. Our thanks to Tim Ritchie and Sherrill Passau and to Donald Lyttle for allowing us access to their respective properties

Participants David Lyttle, Natasha Rogers, John Steel, Sinead Spedding, Moira Parker, Lala Fraser, Sharon Jones, Marcia Dale.

For a study of the turf communities on Maori Head, see Brownstein, G, Lee, W. G., Pritchard D. W. and Wilson, J. B. (2014) Turf wars: experimental tests for alternative stable state in a two-phase coastal ecosystem in *Ecology* 95(2):411-424

Willows for baskets, a talk by Maia Mistral, 10th April 2019

Gretchen Brownstein

Maia Mistral's talk showed us how a species we commonly think of as a pest is actually incredibly useful.

Willow (*Salix sp.*) has been used for centuries by humans, moving around the globe with us, the earliest examples of willow use predating pottery. Willows were introduced to New Zealand by the first Europeans and while willows often get bad press these days, they are highly useful. As a group, willows are ideal as they grow fast, are easy to cultivate, are carbon neutral and can be stored for long periods. There are thousands of cultivars which have been selected for different growing conditions and different properties. Throughout history willows have been used for shelters, fishing, fencing, furniture, sculptures, and of course baskets.

In New Zealand, there is a long history of growing and using willows. The Blind Foundation Auckland in its early days had a basket making workshop. The Waimate River Board and Railway used to grow and sell willows. And the Hedges in Christchurch operated a farm from 1850 to 2002. In the late 1900's there were 35 workshops around New Zealand making all sorts of items, including baskets for collecting and transporting kauri gum and coal.

Basket willows as a group have been specially selected for their lightness, flexibility, toughness, and ease of cultivation. There are three major varieties grown for baskets: triandra, viminalis, and purpurea. Each has different properties and hence uses. Willows are traditionally coppiced, and managing the willow beds is labour intensive, which is probably why for a while they fell out of favour. But interest in willows for baskets and other uses on the rise again, especially as we look for alternatives to plastic. Maintaining and

growing these different varieties for future use is now of top priority. There are only a couple of growers left in New Zealand. With the increasing interest, more options are needed. Maia's talk outlined a few, including wild harvest, growing willows on public lands, common gardens, and group processing. There is also a need for more basket makers to keep the knowledge and traditions alive. Given the current need for - and interest in - more sustainable products, willows might just grow on us.

Field Trip to Livingstone-Green Reserve, 27th April 2019

Janice Lord and Gretchen Brownstein

Too often we associate conservation with rare species and remote wilderness areas, and place less value on remnants of familiar vegetation in our local area. However, these remnants are critically important as reference points and reminders of the extent to which human activities have changed the face of Otago. The Livingstone-Green Reserve is a 9 hectare tidal wetland at Taieri Beach south of Taieri Mouth, bordered by a narrow band of native forest. The road that curves around the north end of the reserve and continues inland for some distance is named "Sawmill Road" for obvious reasons. From c.1839 until c.1912 a number of sawmills supplied "Taieri Pine", red and silver beech and Rimu from the area for furniture, boat and house construction and kowhai was also milled for fenceposts¹. Only trees on steep slopes or with difficult access would have escaped felling. Protected pockets of remaining forest such as Livingstone-Green Reserve, Taieri River Scenic Reserve and Kuri Bush QEII covenant help us imagine what the coastal landscape south of Dunedin used to look like and also demonstrate how readily native species can regenerate if protected.

The Livingstone-Green Reserve is on land owned by the Green family since 1852. The Livingstones were also one of the first farming families in the area and the two families intermarried. The wetland area was originally used to grow wheat but repeated flooding led to the abandonment of cropping and instead it became popular as a duck hunting area. The Green family banned shooting on the wetland in the 1970s,

set about removing stock and pest plants from the bush and added walking tracks so that locals could enjoy the area. At the request of the family a team of BSO members (John Steel, Lydia Turley, Gretchen Brownstein and Janice Lord) set out to survey the vegetation in the reserve. The first section of the access track, following the south bank of the wetland rewarded us with a solid set of salt-marsh species. The striped leaves of the umbellifer *Lilaeopsis novae-zelandiae* (each stripe representing highly reduced leaflets) and the gorgeous purple flowers of *Thyridia repens* were special favourites. Before long, though, the team was plunged into brow-knotting debates over the identity of at least four different *Juncus* species and a brief skirmish with *Scirpus* / fight with *Ficinia*. We tackled the challenge with determination and can proudly report that we reached a consensus! From the wetland, the track detoured briefly along Coutts Gully Rd before crossing into the bushy slopes on the wetland's northern flank. Here we were immediately faced with a large expanse of exotic climber (later identified as hops, *Humulus lupulus*), which had clearly been the subject of an extensive control operation. Throughout the forest there was further evidence of dedicated management – tracks, boardwalk, bridges and steps made the slippery slopes passable, numerous trapping stations, evidence of planting and weed control all spoke of the dedication of the Green family to this reserve. We were particularly taken by the signage too – a few plant labels (some ex-Forest Service), many handmade wooden arrows indicating the walkway, a 3-plank bridge with a sign saying "3 plank bridge" and, my favourite, a section with a handrail above a very steep slope with a sign saying "Site of Jimmy's tumble October 2011". The forest itself was initially tall secondary kanuka with a diverse understorey of small-leaved shrubs, *Asplenium* and *Polystichum* ferns. *Melicope simplex* was notably common and of course numerous small-leaved Coprosmas had us all doubting our sanity. We eventually opted for *dumosa*, *linariifolia*, *crassifolia*, *propinqua*, *rhamnoides* with at least one or two others. Even John started mumbling about hybrids.

The surprise, though, was a small section of primary podocarp-broadleaf forest in a hidden side gully. Numerous rimu trees up to 50cm in diameter dotted the slope above, while magnificent fruit-laden miro and matai, easily more than 80cm in diameter, loomed

up from the depths of the gully. Certainly hundreds of years old, here were the trees the sawmillers couldn't reach, hinting at the grandeur of those original Taieri forests. From this gully the track continued winding along the north side of the wetland then took a left up another damp gully (the helpful sign says this is the easy way to the top of the hill and view point). Here the ferns were taller and the vegetation that we bit lush, suggesting this place is more protected from the gales of the southern ocean. We found miro and seedling rimu, as well as large *Fuchsia excorticata*, and a small patch of soapwort (*Erythranthe moschata*, not *Saponaria*) along with young *Dicksonia fibrosa* and *Cyathea smithii* tree ferns. As the tracks continued to the top of the hill, kanuka again became the dominate canopy species. At the view point, the long term dedication of the Green family was again evident in the well cared for native plantings. From here the trail looped back down to the wetland and we retraced our steps back out (somehow the return journey took less than a quarter of the time).



Pseudopanax laetus (with hand for size) (Photo: John Steel)

Overall the Livingstone-Green Reserve was a delightful refresher course in the Dunedin coastal flora and a wonderful example of the value of private conservation projects in under-protected landscapes. A second trip for a more thorough investigation of the forest is already being planned. Anyone wanting a copy of the species list should contact john.steel@otago.ac.nz.

1. Historical information from Parkes W. & K. Hislop "Taieri Mouth and its surrounding Districts. 1840-2018" Revised edition, Taieri Mouth Amenities Society. Published by Otago Daily Times Print, 2018.



Geastrum (Photo: John Steel)

Wild Dunedin: Making a Change Expo, 28th April 2019

Lydia Turley

BSO was invited to have a stall at this event, held at the end of the Town Belt traverse. It was a cool, grey day – great weather for everyone walking, but cold for those of us sitting at the stall. Nonetheless, we had a great day chatting to people, many of whom just wanted to know what we do.

We had a table with a selection of native plants for people to look at, which led to many gardening-orientated conversations and people wanting to know how to get rid of liverworts. We had several mosses and liverworts to look at under the hand lens, and one particular young girl got very enthused and started looking at everything through the hand lens. A copy of Alli's lichen guide had many people stopping to admire the photographs.

Thanks to those who sat at the stall and to everyone who stopped and said hello. It's always good to get out and talk with people who're not already part of the society, and it seemed like we managed to enthuse a few people about how wonderful plants are.

Minutes of Botanical Society of Otago AGM, 8th May 2019

Allison Knight

Chair Gretchen Brownstein

Apologies Robyn Bridges, Moira Parka, Dhana Pillai

Minutes of the 2017 AGM and the Chairman's and Treasurer's reports were posted on the BSO website, and Facebook and distributed at the meeting. The minutes and Treasurer's reports were accepted as read. Gretchen summarised the reports, making special mention of our new website, our Facebook presence, and the forthcoming publication on Dunedin Forest Plants. Our membership is holding steady and our finances are in good shape

Election of Officers

The following were nominated from the floor and elected unopposed.

Chair *Gretchen Brownstein*

Vice Chairman *John Barkla*

Secretary *Angela Brandt*

Treasurer *Mary Anne Miller*

Committee:

Website and Facebook Manager, Newsletter Editor -

Lydia Turley

Publications, Guides to native plants of Dunedin -

David Lyttle

Publications, Lichen Guides - *Allison Knight*

Botany Dept. liaison - *David Orlovich*

University liaison - *Tina Summerfield*

Student liaison - *Ian Geary*

Botanical Art - *Sharon Jones*

Social Officer - *Sarah Kilduff*

Venue Bookings - *Robyn Bridges*

Badges - *Esther Dale*

Membership –

Communications –

There was no other business and the meeting closed in well under 10 minutes.

Botanical Photo Competition, 8th May 2019

John Knight

Botanical photography is surely alive and well with this year's competition attracting the most entries ever: 73 entries submitted by 16 photographers. What a feast of really great photos! The competition comprised 3 categories: Plant Portrait (38 entries), Plants in the Landscape (25 entries), and Plants and People (16 entries). There was also a People's Choice Award, determined by popular vote, and this year there was also an Overall Winning Photograph Award. The judges were Peter Johnson, Kelvin Lloyd and Mike Thorsen with many years' experience between them. Peter Johnson provided an entertaining, informative, positive and perceptive commentary on each entry, giving many useful tips as to what the judges were looking for in a winning photograph. A thoroughly enjoyable and worthwhile evening.

Results:

Plant Portrait: Alyth Grant "On a Wet Forest Floor" (Dusky Sound). A stunning composition of a vibrant red fruit surrounded by soft green mosses and liverworts. [See cover]

Plants in the Landscape: Angelina Young "Tapestry of Snow Tussock" (Mosaic of tussock and herbfield leading the eye down to Lakes Hawea and Wanaka).



Tapestry of snow-tussock herbfield above Lakes Hawea and Wanaka: Isthmus Peak, November 2017 (Photo: Angelina Young)

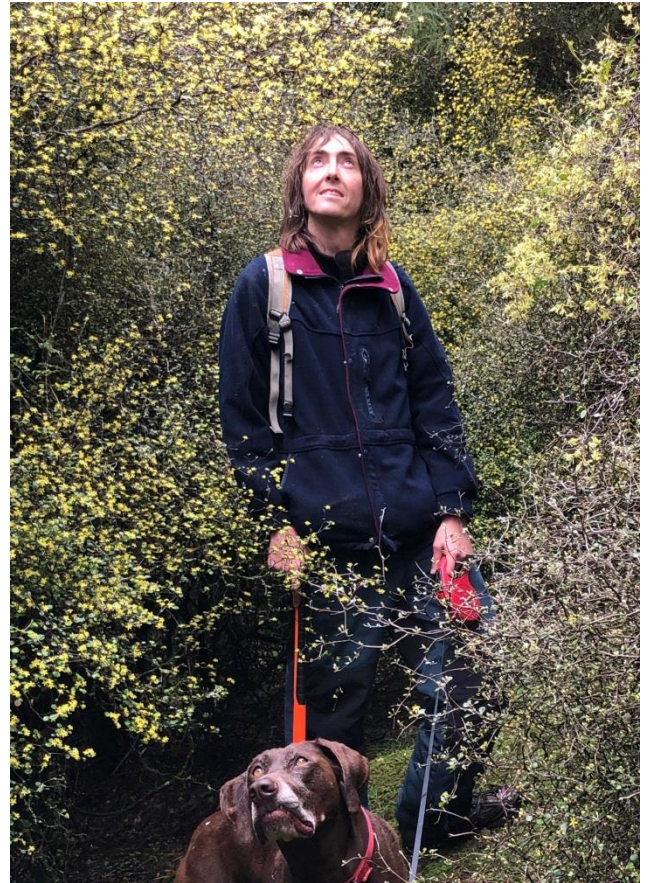
Plants and People: John Knight “Starstruck” (man and dog gazing amidst *Corokia cotoneaster* and *Clematis foetida*.)

People’s Choice: Dave Toole “Who Needs a Raincoat?” (*Lignocarpa carnosula* covered in sparkling raindrops).

Overall Winner: Alyth Grant



Townsonia deflexa: Creeping forest orchid in a patch of sunlight. (Photo: Cara-Lisa Schloots)



Starstruck: Stunning profusion of korokio (*Corokia cotoneaster*) and fragrant clematis (*Clematis foetida*) - Tuapeka West (Photo: John Knight)



Lignocarpa carnosula, Island Pass: Who needs a raincoat? (Photo: Dave Toole)

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Right: Corokia cotoneaster branch (Artist: Sharon Jones)



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