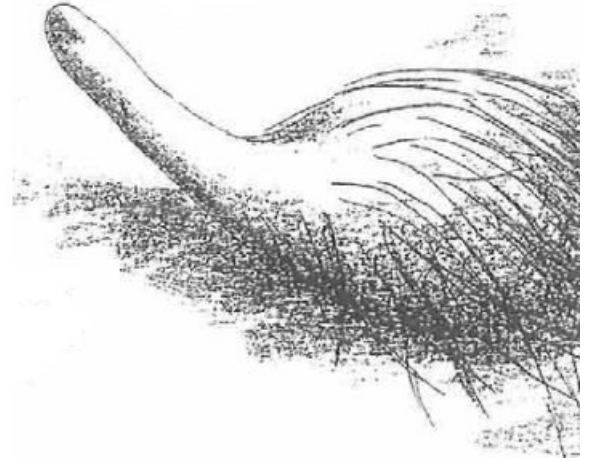
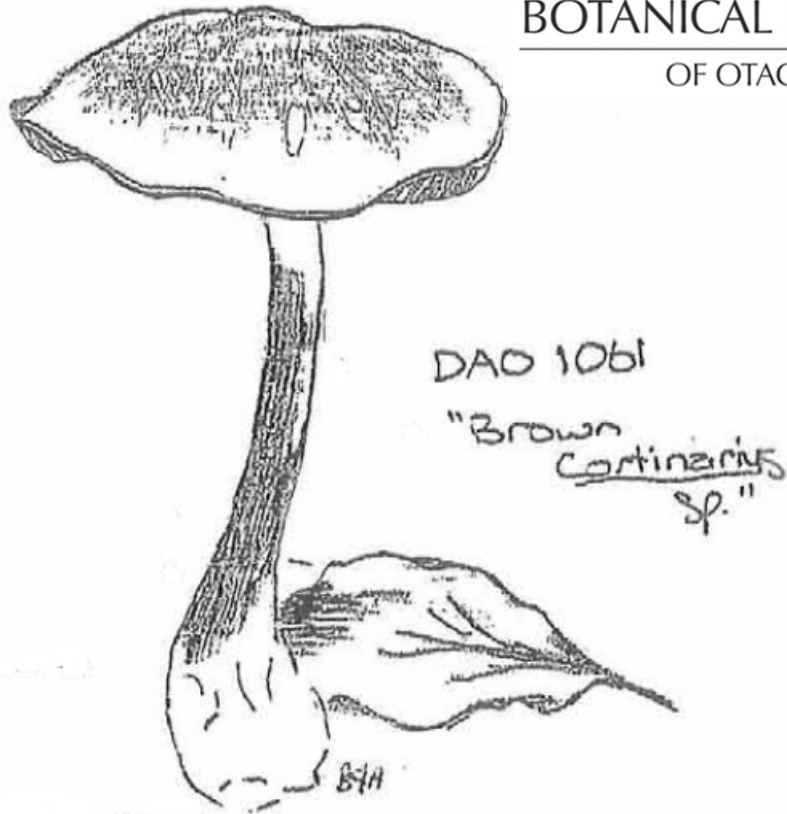


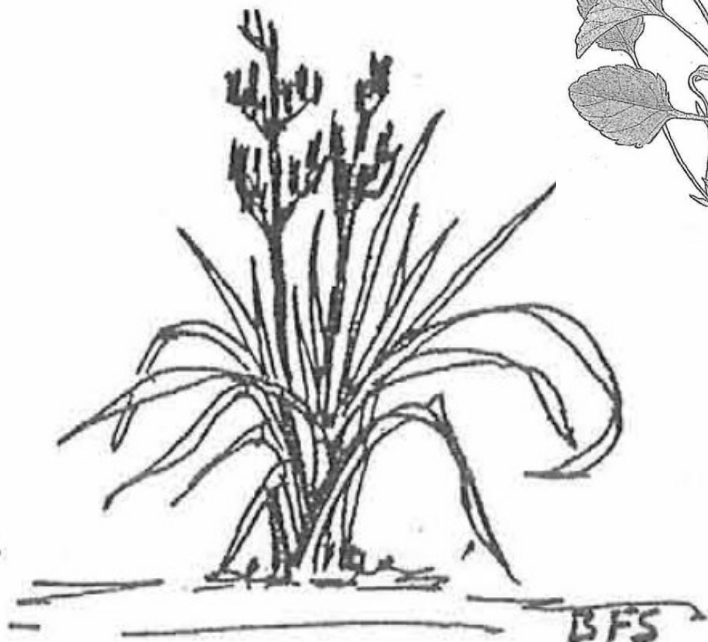


BOTANICAL SOCIETY
OF OTAGO



Newsletter Number 100

November 2023



BSO MEETINGS AND FIELD TRIPS NOVEMBER 2023 — APRIL 2024

Location: Talks are hosted by Manaaki Whenua Landcare Research in the main seminar room, 764 Cumberland Street, Dunedin.

8th November, 5:20pm: The behaviour of mushroom populations. Speaker: Lydia Turley. Mushroom-forming fungi are important components of ecosystems. We can observe mushrooms, but the rest of the fungus is not so easy to observe. How much information can we extract from collections of mushrooms? What can genetic data tell us? Come hear about some of the challenges in studying fungi and how maths can help.

11th November, 7:30am: Tautuku Adventure. This is an adventurous trip to the Lenz Reserve at Tautuku in the Catlins. We will follow local experts along trapline routes through mixed old growth and regenerating podocarp forest. There is potential for exciting plant sightings. This trip requires a high level of fitness; we will be covering up to 10km of very rough routes through dense forest. Bring tramping boots, wet weather gear, lunch, water, and first aid kit. Contact Gretchen Brownstein (brownsteing@landcareresearch.co.nz). Meet at Botany Carpark 7:30am to carpool (drive time: 2hrs one way, ~300kms return trip). Return 7pm.

14th February, 5:20pm: Western Australian wildflowers. Speaker: Bradley Curnow. My presentation on Western Australian wildflowers is a low-key photographic ramble through a tiny fraction of Australia's largest state. Amongst other places I start in Perth at the King's Botanic Garden then travel to John Forrest National Park on the Darling escarpment. We head north to Newman and into the outback at Southern Cross and Kalgoorlie. On the south coast we visit Esperance and a *Banksia speciosa* forest and the superb Cape la Grande National Park. I also have a section of orchid photos.

24th-25th February: Slope Point and environs, Southland trip. Leaders: John Barkla / Gretchen Brownstein. On this trip to the far south we will visit both public and private reserves to see the diversity of plants and vegetation along the south coast, including coastal forests, coastal turfs, coastal cliffs, estuaries and sand dunes. The local QEII reps will lead us around some of the hidden gems of the area. We will be doing a series of short walks (between 5 min to 1 hour at various sites) depending on the site, so there will be interesting plants to see for all levels of fitness. Come prepared to be flexible, with good walking shoes, warm clothing, food, and water. Limited accommodation at Slope Point is available on the Saturday night. Travel 200km (one-way). Please contact Gretchen to book a place on the trip.

13th March, 5:20pm: The Sequoioideae: What can extant lineages tell us about evolution? Speaker: Jess Paull. In ages bygone, gymnosperms were at the height of their diversity. In the modern age, many face extinction due to the looming threat of climate change. What can this group (and others) tell us about our past and our future?

9th March: Blue Mountains. We are planning a field trip to the Blue Mountains with Alan Mark and John Knight. More details to come; check the website closer to the date.

10th April, 5:20pm: An Introduction to the Natural History of Chatham Island Speaker: On Lee Lau. Chatham Island/Rēkohu/Wharekauri on the eastern edge of Zealandia is home to a high proportion of New Zealand's endemic flora and fauna. Join On Lee for a talk about encountering this flora and fauna in some special sites over the past few years while visiting the island to support freshwater fish research with Otago Uni. On Lee comes from a botany background in the Americas and has gained an appreciation for birds and bugs while working at Tūhura Otago Museum for the past 10 years. The talk will include a virtual visit to some of the island's rākau momori in kōpi groves, including the 2023 Winner for Rākau o te tau/Tree of the Year NZ Aotearoa.

13th April, 9:00am: Manuka Gorge Lichen and Bryophyte walk. A short trail of Sycamore trees exploding in a lichen and bryophyte community, with a scattered native understory will lead us to Mount Stuart Tunnel. The tunnel was built around 1875 and is 442 metres long. The cool damp air may require warm clothing. If we turn the torches off, we might be rewarded with a glow worm show. The entrance of the tunnel walls is coated in hornworts, liverworts, moss and ferns. Having a hand lens and head torch on this trip is highly recommended. This is a short walk (~1km return) on well-formed tracks. Contact Jo Sinclair, josinclair6@gmail.com. Meet at the Botany Department carpark 9am. Returning to Dunedin by 2pm.

Note: Please review the trip guidelines for participants, drivers and leaders on our website. bso.org.nz/trip-guidelines



A large swathe of native ice plant adorns a coastal bank (Photo: John Barkla)

Meeting details: Talks are usually on Wednesday evening starting at 5.30 pm unless otherwise advertised. Talks are to be hosted by Manaaki Whenua Landcare Research in the main seminar room, 764 Cumberland Street, Dunedin. Please check the website before each talk to confirm the location.

Items of botanical interest for our buy, sell and share table are always appreciated. The talks usually finish around 6.30 pm. Keen discussion might continue till 7 pm. Meetings may be held online via Zoom when appropriate.

Field trip details: Field trips leave from Botany car park 464 Great King Street unless otherwise advertised. Meet there to car pool. 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: www.bso.org.nz

CONTENTS

BSO Meeting and Field Trip Schedule	2
Committee Notes	5
Chair	5
Secretary	5
Editor	6
News and correspondence	6
BSO photographic competition 2024	6
Articles	7
100 editions of the <i>BSO Newsletter</i>	7
Treading gently over an unseen world	10
Trip and Talk Reports	12
Takahē, scouts for fungal diversity, a talk by Josie McGovern, June	12
Field trip to Ferntree Reserve, June	13
Naturally uncommon ecosystems in Otago, a talk by Scott Jarvie, July	14
Field trip to Taieri Mouth track, July	15
Advancing the inland saline ecosystem, a talk by Cathy Rufaut and Dave Craw, August	16
Field trip to Patearoa and Belmont inland saline wetland management areas, August	17
Field trip to Pulpit Rock, Silver Peaks, September	18
2023 Geoff Baylis Lecture: Down in the weeds, a talk by Dr Carol West, September	20
Committee and BSO Contacts	22
BSO Membership Form	23

Cover illustrations

One thing I particularly enjoyed while looking through old editions of the newsletter was the pencil illustrations in most of the older editions. Some of my favorites are revived to grace the cover of this edition.

Top left: From *Newsletter* number 19. *Cortinarius rotundisporus*. Drawn by Barbara Anderson and identified by David Orlovich as one of the many species of *Cortinarius*. This *Cortinarius* sp. was collected on the May Fungi Foray to Silver Stream on soil under a large and exposed *Astelia fragrans* plant growing just beside the track. Spotted by Paul Dean, this cover picture must be a true group effort. The herbarium number is OTA60258, collected 21 May 2000.

Top right: From *Newsletter* number 32. A magnified view of an unidentified fruiting ascomycete fungus, drawn by Toni Atkinson.

Bottom right: *Passiflora tetrandra*, Young shoot with female flowers and developing fruit. Eleanor Burton, 2004 Art competition.

Bottom centre: From *Newsletter* number 46. *Viola cunninghamii*, uncommon on Otago Peninsula, but present at Sandymount. Drawn by Hugh Wilson, *Stewart Island Plants*, 1982.

Bottom left: From *Newsletter* number 1. No attribution given.

FROM THE COMMITTEE

Chairs notes*Gretchen Brownstein*

This spring the new growth on the ferns has really caught my eye. In the darker understory of the forests the pale greens and light browns of the emerging leaves seem to be more prevalent or maybe I'm just very ready for any sign that winter is over. And on our most recent BSO field trip we found a tiny flowering orchid, *Drymoanthus flavus*, which also hinted that spring is here.

Also, on our most recent trip it was great to see people using iNaturalist for uploading sightings and checking ids. iNaturalist is a fabulous platform for sharing, learning, and connecting with other plant-y type people. For those keen to delve more in identification, Manaaki Whenua has some great online tools (www.landcareresearch.co.nz/tools-and-resources/identification/#plants), including interactive Lucid keys which are great for when you don't have the perfect specimen at hand. NZPCN website (www.nzpcn.org.nz) is also a wonderful resource with an amazing number of high-quality photos to help with ids. And for those keen to keep right up to date with the taxonomy there are the botanical journals, e.g. check out this recent Schmid *et al.* (2023) paper on *Leptospermum hoipolloi*. Those are my go-to places for identification, I'd be keen to see what other people use.

In BSO news, we say a sad farewell to Stella Fish, our website manager. She is headed north to work in the Allan Herbarium on some of her favourite groups. We wish Stella all the best on her next adventures!

I hope everyone has a wonderful summer and keep an eye out for that perfect botanical photo opportunity... The photo competition is happening again in autumn.

Schmid, Luzie MH, Peter J. de Lange, and Andrew J. Marshall. "*Leptospermum hoipolloi* (Myrtaceae), a new species from Aotearoa/New Zealand, segregated from *Leptospermum scoparium* s.l." *Ukrainian botanical journal* 80.3 (2023): 173-198.

Secretaries notes*Angela Brandt*

As another great year draws to a close, I again want to thank my fellow committee members for their stellar commitment to the society and all of our members who make it such a great community. We have another beautiful calendar this year featuring so many amazing photos taken by our talented members, and put together by the dedicated efforts of John Barkla and Jo Sinclair. Be sure to keep your phones and cameras handy when you're out and about during the summer months as you never know when you might capture a potential entry for the annual Photo Competition! Check out the ad in this newsletter for next year's competition – there's another new category to stimulate your creativity and keen eyes.

Welcome to our new members, Peter Horne, Sarah Beadel Esté Smal and Kacey Hutchison! We now have more than 100 members, a very respectable number. But looking back on the year, we also recall how saddened we were to learn of the passing of Lady Pat Mark and Anthony Molteno. Our thoughts remain with their families and friends.

A reminder to everyone that subscriptions will come due early in the new year – keep an eye out for emailed reminders from John Knight and me!

Editors notes*Lydia Turley*

Welcome to the 100th edition of the newsletter! It is an honour to put together this milestone edition. We're celebrating by taking a look through past *Newsletters*. There's so much interesting stuff; articles, keys, lots of lovely art, poetry (in particular, several poems about Audrey Eagle's runner beans) and even a recipe. I highly recommend taking a moment to have a look back through some of the old editions.

I enjoyed seeing what the BSO was up to years ago. I'm a relatively new member and it's great to see and appreciate just for how long the BSO has been running strong. So, please, keep coming to events, keep engaging with the *Newsletter* and I hope we're all still involved when the next anniversary edition rolls around.

New members

A warm welcome to new members Peter Horne, Sarah Beadel, Esté Smal and Kacey Hutchison.

Editors guidelines: Suggestions and material for the newsletter are always welcome. We welcome stories, drawings, reviews, opinions, articles, photos, letters, poetry – or anything else you think might be of botanical interest. Remember to include photo captions and credits. Please keep formatting to a minimum. Send your feedback, comments or contributions to lydiaturley@gmail.com. Copy for the next newsletter is due on 9 February 2024. Earlier submissions are most welcome.

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.



Hymenophyllum malingii (Photo: Lydia Turley)

NEWS AND CORRESPONDENCE

BSO photographic competition

Jo Sinclair

Every year the BSO runs a photo competition showcasing our members' best botanical images from the prior year. The 2024 photo competition is now open! Entries are due Monday, 15th of April.

Categories: broad and creative interpretations are encouraged!

1. Plant Portrait

2. Plants in the Landscape

3. Patterns in Nature

Prizes: \$50 for the winner of each category

Entries will be judged on technical and artistic merit by a panel of three judges. A Members' Choice award will be voted on by members.

Photos will be displayed on the BSO website and winners will be announced at the AGM meeting in May.

See the BSO website for rules and entry forms.



Botanical Society of Otago
Photographic Competition
2024

ARTICLES

100 editions of the BSO Newsletter

Lydia Turley

We thought to celebrate the 100th edition of the newsletter by taking a moment to look back at previous editions.

BSO Newsletter #1 is dated 1986. The meetings immediately include a familiar name:

Thursday October 9: Dr Peter N. Johnson, of DSIR, will talk on: "Botanical highlights of the Otago Peninsula".

And an excellent sounding idea for an event. I gather that the University Botany Department has moved?

Thursday September 18: Wine and cheese social, plus *Coprosma* workshop. 7:30pm, in the Botany Department, University of Otago (enter from Cumberland St., through the gate into the back of the Otago Museum, down into their back yard). Bring your own wine and nibbles. Bring your own problem *Coprosma* specimens if you wish, at least the size of a herbarium sheet. Both activities will be on all evening, partition your time as you wish.

The newsletter reports activities of other societies, including the Dunedin Naturalists Field Club, talks hosted by the Botany Department, Forest and Bird, the Entomological Society, the Tree Society, the Royal Society, the Ornithological Society, Friends of the Botanical Gardens and the Dunedin Young Naturalists Club. What a list! I wonder how many of these societies are still running and if we should try to get in touch.

BSO Newsletter #20 is from July 2000. I found three mentions of David Orlovich's mushroom soup in different parts of this newsletter. The recipe was included, and I figure that a recipe which caused so much enthusiasm needs re-printing (with permission, of course). David says that these days he would probably include some porcini.

BSO Newsletter #40 is from December 2003-Jan 2004. A new, strangely strongly worded editorial policy is described.

David's Fungi (Mushroom) Soup recipe

500g button or flat mushrooms
1 cup red/white wine
½ cup flour
2 L milk
250 ml cream (optional)
dried herbs

3 onions
2 or 3 cloves of garlic
1 ½ cups liquid vegetable stock
100g Enokitake (*Flamulina velutipes*)

Saute mushrooms, onions, garlic, herbs in butter.
Add wine and boil away alcohol
Add flour and cook for a minute or two (add more butter if needed).
Add milk and cream
Stir until it boils and thickens
Stir in chopped enokitake at the end.

Editorial Policy. The Botanical Society of Otago Newsletter aims to publish a broad range of items that will be of interest to the wider botanical community and accessible to both amateur and professional botanists. Contributions of letters, comments, trip and meeting reports, articles, plant lists, book and website reviews, news items, photographs, artwork and other images and items of botanical interest are always welcome and will be published at the editor's discretion. Articles of a scientific nature may be referred, at the editor's discretion, to a scientific editor appointed by the committee. The scientific editor may refer the material to anonymous referees. Refereed papers will be identified as such in the newsletter. BSO will not accept papers proposing nomenclatural novelties or new combinations.

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. Nor do they necessarily reflect the views of the Department of Botany, University of Otago, which is supportive of, but separate from, our society

Some of this wording has survived (maybe I should re-write our editor's guidelines, for novelty?) The refusal to publish nomenclature stems from *BSO Newsletter #36* a year earlier, in which Michael Heads described a new genus *Hebejeebie* with three species (now all in *Veronica*). Apparently the name wasn't popular, and there was backlash from our decision to publish it. But, honestly, what is yet another new *Hebe* going to do other than give people the hebejeebies?

Back to #40, we have a key to the *Polystichum* species of the lower South Island. I didn't know we had so many species; might need to go on a *Polystichum* hunt.

BSO Newsletter #60 is from July 2010. The Baylis lecture is on *Hebe*, a nice continuation

Baylis Lecture Phil Garnock-Jones. Plant taxonomy: how can we tell if we're wrong? Plant taxonomy is practiced in many different ways by different taxonomists, but are there any unifying or general principles that can be applied? In this lecture, I'll look at the two main types of problems that taxonomists try to solve – the delimitation of species and the classification of those species into higher-ranked taxa – using examples from groups I'm familiar with. For example, in *Veronica*, we have new taxonomic revisions of all the New Zealand groups, but we still don't understand the relationships of many of the

species, especially among the shrubby hebes. Forty years ago, we had an outline by Lucy Moore of how the different groupings might be related to each other, a new Flora treatment that included a long list of species of uncertain status (e.g. *Hebe biggarii*), a suspicion that hebes hybridise more than is quite decent, and an almost complete list of chromosome numbers that suggested new understandings at species and higher ranks. Field work throughout New Zealand, new data from chemistry and genetics, and the framing of questions as explicit hypotheses have helped a group of us answer some of the questions, but many puzzles remain to keep the next generation of taxonomists busy.

Oh no, *Coprosma*s are back. There's an online key now, but I still think the wine and cheese evening from '86 would have been a winner.

Google: *Coprosma* key these days and you'll get... A Key to the *Coprosma*s of New Zealand — Part I, 1961 by G. Marie Taylor nee Bulmer and then this very useful and up-to-date interactive key..... Key to *Coprosma* species of New Zealand, 2010 David Glenny, Jane Cruickshank & Jeremy Rolfe. This Lucid 3 interactive key will allow you to identify any of the 53 species of *Coprosma* currently recognised in New Zealand. The key is illustrated with 500 images of species and the features used to identify them and has a factsheet for each species that provides a list of distinct features, comparisons with similar species, description, habitat and distribution details, and references to literature. The key is designed for those with some experience in plant identification and will allow species to be identified without fruit being present. A glossary is linked to each facts sheet to help the user understand the terminology used in the factsheets. Well worth a look if you are interested knowing more about our fascinating native small-leaved shrubs.

The winner of the photo competition caught my eye. Stella and I have suggested a "faces in nature" category for next (or some other) year but there is some concern that it won't have many entries. Not to worry, 2010 would have had a beauty! See the next page.

BSO Newsletter #80 is February 2017. We're into the time period where I've been part of this society. The time has rushed by!

I'm not quite sure whether David Lyttle had been making friends, or ruffling feathers, with this exchange between him and Tom Myers from the Dunedin Botanic Garden (abridged).



'Menegazzia monster' overall winner in photographic competition. (Photo: Allison Knight)

Excerpt from Tom Myers Botanical Services Officer, Dunedin Botanic Garden

Many thanks to David for running Weedy Dunedin. David's observations are valued, and provide feedback that can be directly addressed. As David suggests, most of the weeds found are common to our region and are historical escapees of general horticulture. The Botanic Garden, along with garden clubs and private gardeners all need to be mindful of weediness and legal obligations.

Staff of the Dunedin Botanic Garden put considerable effort into weed control within the garden and are proud of their work. Weeding effort is required for planted areas as well as for regenerating bush and marginal land such as roadsides. Extra help is gratefully accepted from Taskforce Green and from volunteers.

We are also trying to engage with Dunedin public over care for biodiversity, including a recent Bioblitz in 2014 and the Our Living World event in 2016. Both of these events included the identification and recording of weeds with the help of the Botanical Society of Otago.

...

Finally, some weeds have relatives that are not as weedy, and can be confused. For example, the *Gunnera* that David mentions as being in the arboretum is in fact *Gunnera manicata* not *G. tinctoria*, and is not listed on

the NPPA as a pest plant. Likewise, lesser celandine has not been planted in the pond – but other Ranunculaceae species have been.

Excerpt from David Lyttle

Dunedin can be justifiably proud of its Botanic Gardens which are of world class. The staff do a remarkable job considering the resources they have at their disposal.

Whether *Gunnera manicata* is "good" in comparison with the very similar *G. tinctoria* because it has not yet been caused problems in the wild and made its way on to the NPPA schedule is something that should be considered carefully when growing the plant.

Tofino Botanical Gardens in British Columbia has decided reluctantly to stop growing both *Gunnera* species on the basis of their behaviour in New Zealand and Ireland and in their own gardens.

...

I certainly agree with Tom that "judgement call(s) need to be made on growing and managing plant(s)" that show weedy behaviour. I am confident that DBG and its staff have the expertise to be proactive in this respect and remove plants from their collections that have the potential of becoming environmental weeds.



The contentious Gunnera manicata in Dunedin Botanic Garden (Photo: Dylan Norfield)

You could have your own peruse through the archives. Past editions of the BSO newsletter are available on our website at <https://bso.org.nz/newsletter>.

Treading gently over an unseen world

Monique Beaumont

So many organisms live out of sight. Weaving through soils and woods, intertwined in mutualistic relationships with tree roots and feeding off the decay of the fallen. We normally don't realise their presence until they send a fruit body into the visible world, the environment telling them, it's time to reproduce.

I've been stomping over this earth for many years, looking out at the landscapes in awe, without thinking much about the world beneath my feet. I'll never stop appreciating the majesty of the large vascular plants, to be impressed by the mightiest Kauri, Tōtara or Rimu. But more recently, my eyes have been opened to the plethora of little and unseen things of the forest - the epiphytes, bryophytes, lichens and fungi that turn a forest into a lush and magical world, dripping with life and colour.

My favourite views were the endless skies, seas and mountain ranges. Now my favourites include ancient trees covered from tip to toe in epiphytic



Fungi at Trotters Gorge (Photo: Monique Beaumont)

growth, the tiniest of fungi living off a leaf or the beauty of a lichen trailing off silver branches. Looking out on an ancient forest causes my breath and heart to slow. It gives a sense of time being suspended and puts things right with the world.

My intrigue with fungi has grown as I have learnt more about their diversity and how they are an integral part of the world we live in. No doubt these nuggets are old news for many but perhaps for some they will be a moment of enlightenment as they were for me.

Fungi are more closely related to animals than they are to plants!

Animals and fungi diverged from a common ancestor (a unicellular, flagellated organism) and continued to evolve to form completely different body plans and ways of existing. For many years fungi were classified within the plant kingdom. It wasn't until Whittaker (1959) proposed a classification system with Fungi as a separate kingdom that the separation became more widely accepted. But separating fungi from the plant kingdom had been discussed as early as the 18th century (Martin, 1955). Since then, molecular evidence has confirmed that fungi are more closely related to us than they are to plants (Wainright *et al.*, 1993; Medina *et al.*, 2003).

Fungi form mutualistic relationships with trees!

The trees provide sugars to the fungi and the fungi provide the nutrients from the soil such as phosphorus and nitrogen (Bonfante and Genre, 2010). It has been found that there is a kind of 'negotiation' that happens, where fungi can regulate the amount of nutrients it distributes. For example, mycorrhizal networks can direct phosphorus to plants where it is scarce. It is hypothesised that fungi have the benefit of higher carbon in return (Field *et al.*, 2015; Whiteside *et al.*, 2019).

Fungi helped plants on to land.

Scientists hypothesise that early nonvascular plants were able to move from water to land due to a symbiotic relationship with fungi. Fungi, with their long hyphal structures could access nutrients and transport them to plants whose roots were not evolved to source their own. In exchange, plants provided fungi with carbohydrates from photosynthesis. It is thought that the stability of this partnership may have allowed the relationship to continue over evolutionary timescales (Field *et al.*, 2015). From looking at fossil evidence, scientists believed that nonvascular, rootless plants coevolved with fungi called Glomeromycota (one of the divisions in the fungi kingdom). Molecular evidence of the early liverworts suggests that there may have been other fungi working in symbiosis with nonvascular plants, the Mucoromycotina (an earlier diverging fungi). It is now thought that Mucoromycotina fungi may have been the first fungal partners and Glomeromycota followed (Field *et al.*, 2015). This discovery has paved the way for fresh study and understanding.

Appreciating that these organisms/networks were an integral part of building the terrestrial world as we know it today, and as we envisage it from the past, is awe-inspiring.

These days when I take a walk, I'm treading more gently, more attentively. Attuning to the little things, seen and unseen. Trying to reach down with my ears to hear the sound of the earth moving, humming, shaping our world.

This article is an invitation.

An invitation to delve into the unseen and see how it moves you.



Catlins, New Zealand (Photo: Monique Beaumont)

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REPORTS

Takahē, Scouts for Fungal Diversity, a talk by Josie McGovern, 14th June 2023

Alex Wearing

Josie McGovern's talk (M.Sc. student, Department of Botany, Otago University) covered New Zealand's historical and ecological biogeography, the importance of fungi, fungi dispersal methods, New Zealand's avifauna (both extinct and extant), dung, previous research on animals as dispersers of fungi, and her current research on the role of the nationally vulnerable endemic South Island takahē (*Porphyrio hochstetteri*) in dispersing fungi.

Since the arrival of humans in the late 13th century most of New Zealand has been extensively transformed in an uncontrolled experiment in biogeography. Indigenous species have become extinct or reduced in distribution and numbers. There has been a loss of ecosystem services and indigenous dispersal agents. With the loss of seed sources and dispersers indigenous forest recovery becomes more difficult and the resulting forests often have less biodiversity. Plant and animal introductions, and past and present land-uses have and continued to modify the environment.

Fungi are a crucial ecosystem component. Human impacts on the New Zealand environment have had a significant impact on fungal diversity and distributions.

Fungal dispersal of spores can be abiotic (e.g., by wind) or biotic. Biotic dispersal can occur by attachment to exoskeletons, scales, skin, feathers and fur leading to transportation of the spores, and by animals eating food containing fungal endophytes in grass or by moving contaminated materials like soil and branches. Biotic dispersal is important for hypogeous fungi. Fungivory or mycophagy is the deliberate consumption of fungal spores. It seems likely that the germination of some spores is improved through passage through the digestive tract.

Fungal dispersal vectors include insects (which disperse both indigenous and introduced fungi), and lizards. It is not known whether New Zealand lizards

engage in fungivory, but lizards in Australia have been observed digging for and consuming hypogeous fungi. Mammals and marsupials disperse hypogeous fungi through bioturbation. Carnivores such as the Australian dingo are important as secondary dispersers of mycorrhizal fungi.

Bats, as New Zealand's only land mammal, undertake ground foraging, but the interactions between New Zealand bats and fungi are unknown.

New Zealand has lost over 40 per cent of its birds. There were once 31 flightless species. It seems likely that these ground dwelling birds consumed fungi, intentionally or unintentionally, but it is difficult to ascertain their role in dispersing fungi. Moa consumed large amounts of small white stones that ended up in their gizzards. Some white fungi are likely to have been eaten as well. Fungal DNA has been found in moa and kakapo dung.

Currently, New Zealand has 15 flightless bird species, one of which is the takahē. The takahē is endemic, rare, and was considered extinct until its re-discovery in Fiordland in 1948. In 2021 there were about 440 takahē living in the Murchison Mountains, Kahurangi National Parks, and 18 sanctuaries. The sanctuaries account for about two-thirds of the takahē population.

The takahē is a heavy grazer, mostly of tussock tillers. It spends 90 per cent of its waking hours foraging. Captive takahē defecate on average 45 pieces of dung per 4.5 hours of feeding activity. Defecation rates in the wild are estimated to be four to five times higher. Takahē have the potential to encounter and eat a wide variety of fungi and fungal spores.

The study of dung or feces (scatology or coprology) is a source of interesting and sometimes revelatory information. The dung of an animal provides information about its diet, habitat, range, health and diseases. Dung analysis provides snapshots of the ecosystems. It can help show how fungi interact with the ecosystems. Fungal spores are viable after excretion. Dung analysis can also be used to assess the potential of dung as a dispersal agent. But the presence of fungal spores does not in itself demonstrate that dispersal is occurring.

Josie McGovern used metabarcoding of takahē dung collected from the Orokonui Ecosanctuary near Dunedin, to infer the effectiveness of takahē as a disperser of fungal species important to indigenous forests.

Two breeding pairs of takahē were studied. One collection site was a small wetland surrounded by a *Eucalyptus regnans* forest. The other site was in low kanuka (*Kunzea robusta*) forest. DNA was extracted from 70 dung samples.

Takahē dung shows greater fungal species richness than was found in a research project (for a Postgraduate Diploma in Science) previously undertaken by Josie McGovern on fungi in the dung of sheep on farms near Dunedin and Rotorua. Ordination analysis showed dissimilarities in the fungal communities for the sheep and takahē dung samples from different locations.

Takahē dung contains fungal spores from multiple functional groups. It seems likely that takahē offer a way of dispersal for fungi (as might other indigenous bird species such as kiwi and weka). Takahē dung had 13 species of *Cortinarius* mushrooms (compared to the seven species recorded from a sample of visitors to Orokonui) known for its crucial association with beech (*Fuscospora* and *Lophozonia*) and manuka (*Leptospermum scoparium*).

Josie McGovern raised several interesting points in her talk. If fungal dispersal is occurring, there is a need to ascertain whether it really matters which species are facilitating dispersal. Introduced species could possibly fill some dispersal gaps. In Australia, introduced rats can potentially fill the role of extinct small marsupials in spreading fungi. In New Zealand, possums and red deer have fungi present in their dung. They may be dispersing fungi. Introduced animals do seem to be more effective in dispersing introduced fungal species.

Several possible research questions were also discussed. There is a need to determine how might fungal species fluctuate in ecosystems, the types of ecosystem services that takahē perform, whether the inoculation of manuka and *Eucalyptus regnans* with takahē dung could lead to the establishment of mycorrhizal associations. There is a need for a more explicit consideration of the role of environmental factors. Ongoing research involves more

dung collection from Orokonui takahē. The aim is to have a sample size of 180.

Josie McGovern is to be commended for undertaking research on the role of takahē - and by inference other indigenous birds - on fungal dispersal and diversity. This topic deserves more attention.

Field trip to Ferntree Reserve, 17th June

Andrew Vikhert

On Saturday the 17th of July, we took a walk through Ferntree Reserve, Dunedin. We immediately noticed there were many plants around us. Some were of local flavour: a grand old rimu, plenty of putaputa-wētā, a variety of fern friends and coprosmas, a speckling of kōtukutuku and kanuka. Some oddities, however, became prominent soon. *Pseudopanax laetus* and *Coprosma autumnalis* established themselves apparently well throughout the reserve, along with other typically more northern species. Patches of *Pomaderris kumerahou*, *Hoheria populnea*, and *Olearia paniculata* were encountered. Part of the canopy was formed by three beech species: red and black ones, and South American *Nothofagus dombeyi*. The variety of curious exotics and non-local natives might be explained by a long history of plantings in the area. The Ferntree Lodge just over the fence is said to be Dunedin's oldest persisting house, and seems to be in the epicentre of this diversity.

There was a decent amount of light in the sparse understorey, allowing us to enjoy sunny weather throughout the morning.

I have no doubt everyone would agree with me if I say it was a right cruisy trip.

Naturally, we couldn't keep ourselves off the neighbourhood hedges and park margins on our way back. That's where we met a young kamahi, a neat mistletoe tangle, and what possibly was a mountain neinei, *Dracophyllum traversii*, bathed in sunlight.

There were many other encounters that day, but before I spin out of control recalling them all, let me finish with a memorable highlight of the native passionfruit vine, *Passiflora tetrandra*. A first one for me

and at least some others.

With thanks to all who made it happen, signing off,
A.V.

Naturally Uncommon Ecosystems in Otago, a talk by Scott Jarvie, 12th July 2023

Alex Wearing

Scott Jarvie (Terrestrial Ecologist, Otago Regional Council (ORC)) provided a comprehensive overview of the naturally uncommon ecosystems (NUEs) in the Otago region and outlined and discussed recent efforts to delineate their extent and monitor their condition. Also outlined was the development of a regional threat classification for indigenous vascular plants in Otago.

NUEs in New Zealand have a total extent of less than 0.5% (i.e., 134,000 ha)¹. Sites can be small (e.g., 100m²) or quite large (000's of ha)¹. NUEs would have naturally occurred over a small area before people arrived in New Zealand. Seventy-two types of NUEs have been identified¹. There are probably more. Some NUEs have not been adequately identified or captured (e.g., 'wet' and 'dry' moraines, ephemeral wetlands). There are six categories of NUEs: coastal, geothermal (not present in Otago), induced by native vertebrates, inland and alpine, subterranean or semi-subterranean, and wetlands.

The physical factors that have a strong influence on NUEs include soil age, parent material or chemical environment, parent material and particle size, topography, landform and drainage, disturbance regime, and climate¹.

NUEs contribute disproportionately to higher biodiversity, are typically small (<1 ha to 1000 ha) and non-forested, and often support unique biodiversity and/or rare species. Many NUEs are poorly understood. They are often not distinguished in national-scale land cover-classifications.

NUEs often contain many threatened species. A hierarchy of Red List of Ecosystems has been created². Forty-five of seventy-two NUEs are classified as threatened (i.e., critically endangered, or endan-

gered, or vulnerable)². A large proportion of NUEs occur on private land in lowland and coastal regions.

Otago has 38 of the 72 types of NUEs, especially in the inland and alpine, and wetlands categories. One NUE, inland saline (salt pans) is only found in Otago.

To illustrate information requirements, and current and proposed research approaches in Otago, Scott Jarvie talked about inland saline sites³ and coastal turfs⁴.

There has been a huge loss in the area of inland saline ecosystems, from between 11,000-40,000 ha to about 100 ha. They provide habitat for seven threatened plant species and two threatened lichen species. Saline ecosystems are now critically endangered. Plant invasions, changes in soil moisture, fertility, pH, and past and current land-use practices have all had deleterious impacts on saline ecosystems. Sites are literally disappearing. Many of the sites are on private land which can complicate their ongoing survival and conservation.

To secure the future of saline sites there needs to be better recognition of the physical processes that are responsible for their formation and continuation. In consequence, attention has been given to developing geo-ecological monitoring protocols for the inland saline NUEs.

There is potential to restore or recreate some of the conditions for saline sites by removing some 'unwanted' species and scraping off the surface layer of incipient soils which have different and less saline conditions.

Coastal turfs are tightly interlaced ground-hugging short-stature herbs, grasses and sedges, occupying hard-rock landforms or the most exposed headlands, and subject to persistent salt-laden onshore winds and occasional high-water events. It is possible that coastal turf ecosystems may have expanded in size following the removal of coastal forest. There are 18 significant coastal turfs in Otago. Currently, most are critically endangered. They are threatened by land-use change (e.g., agricultural and urban development), coastal erosion, severe storm events, and invasion by plants with weedy propensities. Coastal turfs are frequently dynamic and 'move' to follow spatial envelopes of salt-spray

disturbance.

An Envirolink Tools Grant (to promote the transforming of scientific knowledge) has recently been awarded to the ORC to facilitate mapping, ground-truthing and standardizing of data pertaining to NUEs. The result will be a information and knowledge resource that can used by all councils.

Many NUEs are disturbance dependent. Ongoing persistence may be problematical at sites where much of the land-use and landscape character is 'locked' in place and disturbance is currently reduced or absent.

Different NUEs, their physical features and processes, and species persistence, are differently robust - or vulnerable - with respect to on-site and externally derived change (e.g., land-use impacts, deleterious impacts of plants and animals) and in their capacity to self-repair. Some very small and/or rare UNEs are vulnerable to chance events (e.g., flash floods, land movement, fire). Climate change is also likely to have a detrimental effect on many UNEs.

Much has been achieved in recent years, but there is still much to be achieved. Scott Jarvie's talk effectively described some of Otago's NUEs and highlighted the need to devote more attention to studying and conserving all of Otago's NUEs, and to ensure that they are not overlooked 'bits and pieces' of Otago's natural environment.

Notes

- 1- Williams, P.A., Wiser, S., Clarkson, B. and Stanley, M.C. 2007. New Zealand's historically rare terrestrial ecosystems set in a physical and physiognomic framework. *New Zealand Journal of Ecology*, 31, 119-128.
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- 3- Allen, R.B. and McIntosh, P.A. 1997. Guidelines for Conservation of Salt Pans in Central Otago. *Science for Conservation* 49. Department of Conservation, Wellington.
- 4- Brownstein, G. E., Mason, N. and Monk, A. 2021. *Coastal turfs of Otago: monitoring plan*. Envirolink Grant 2242-ORC002. Contract Report LC4218, Ma-naaki Whenua for Otago Regional Council.

Field trip to Taieri Mouth Track, 22nd July

Lydia Turley

David Lyttle and I left Botany department as a trip of two – good company, but disappointing numbers. Luckily we were joined by Alex Wearing (superstar report writer, who I hadn't been field tripping with before) at the start of the track and Lucy not far along.



A beautiful day at Taieri Mouth (Photo: Lydia Turley)

We started by looking at *Asplenium*. David pointed out the differences between *A. gracillimum*, with wide pinnae, *A. appendiculatum*, with pinnae which are more long and lanky, and *A. hookerianum*, with round lobed pinnae. I tried sketching them – not very well, but a good exercise both in drawing and in observing the differences in shape. David took photographs for iNaturalist. He commented on the need to photograph "good" specimens – ones which look the way they're supposed to look – because it is too hard to identify some *Asplenium* with an atypical growth form from a photograph, so the not-"good" specimens just don't get identified.

We wandered along, poking around and looking at things. David picked a bit of *Stellaria parviflora* the native chickweed and passed it to me. Chickweed sounded edible, and I can report that it was tasty (mild and a bit nutty) and I'm still alive. I was handed a *Crassula* to key out. Why? Something to do with David not getting any younger and the new generation needs to learn these things. I'm sure he's right. All that I have to report is that I gave up on the keying after not finding any flowers. Sorry David.

Numerous small leaved shrubs surrounded the track. I tend to try to pretend I don't see these, but David was trying to pass on his extensive botanical knowledge, and Lucy seemed to be enjoying the small leaved shrubs. There were *Coprosma*; *rotun-*

difolia, with its round leaves; *linariifolia*, with its long leaves (I'll reluctantly admit that these two are not too hard); *propinqua*, with small pointy leaves; and *rubra*, which is not at all red. Other small leaved shrubs included *Corokia cotoneaster* - in flower – and *Helichrysum lanceolatum* – another name I have a problem with, as I could see nothing lanceolate about the specimen.



Corokia cotoneaster flower (Photo: Lydia Turley)

Alex kept wandering off-track to look at podocarps. He had a tape measure with him (very organised!) and explained that his field service training meant it was second nature to stop and measure every podocarp he saw. He was certainly thorough. We saw a few tōtara seedlings; one patch had over 20. Alex was interested in rates of regeneration close to the track vs away from it. It seemed that the seedling abundance was higher on the trackside – possibly due to increased light, or less leaf litter. Other adult podocarps were present (I recall matai and kahikatea) but fewer seedlings of those species were observed.

Mushrooms were still abundant, and we saw some gorgeous ones. Highlights included bright yellow mushrooms, a purple *Cortinarius*, cute clumps of *Flammulina velutipes* (yum! Again, I'm not dead yet) and coral fungi in bright yellow and a nice lavender. Many of the open dry banks next to kanuka and gorse contained small brown mushrooms. I suspect we kept seeing the same species of these. David said they were something mycorrhizal on kanuka.

We stopped for lunch in the sun, and discussed native plant propagation, carbon credits, biodiversity credits, and do shrubs count for "Trees That Count" (hint: it's the trees that count). We'd moved at a good pace for botanists, but not fast enough to

justify continuing on to John Bull's gully and all the exciting plants and fungi sitting on the next few hills en route. The weather was lovely; just enough sun and warm to be pleasant without needing to remove gloves and other layers, and we entirely missed the rain which



My favorite of the coral fungi we saw (Photo: Lydia Turley)

fell on Sunday. It was a nice group of people and a very enjoyable walk and botanise.

Advancing the inland saline ecosystem, a talk presented by Cathy Rufaut and Dave Craw, Geology Department, University of Otago on Wednesday 16th August 2023

Richard Ewans

How on earth do herbaceous estuarine plant species like glasswort end up in the Maniototo? It's all about the salt. Cathy and Dave gave Otago BotSoc a fantastic insight into the geological and other abiotic processes that underpin inland saline ecosystems and their unique halophytic botanical features at August's talk, and how their ground-breaking restoration work is progressing.

Inland saline ecosystems (salt pans) are extremely rare in New Zealand, and Otago is the only region this critically endangered naturally uncommon ecosystem occurs in. Some estimates suggest that at the time of European settlement in New Zealand as much as 40,000 hectares (ha) of Otago was occupied by saline-alkaline soils collectively. This is now more like 100 ha due to changing land use in Central Otago; notably intensification of farming and horticulture, irrigation, subdivision development, and

weed invasion.

This massive loss and fragmentation of habitat means that many of the halophyte (salt-tolerant) plants that rely on this ecosystem are now highly Threatened. These include saltgrass / *Puccinellia raroflorens* (Nationally Critical), salt pan cress / *Lepidium kirkii* (Nationally Critical), and Buchanan's orache / *Atriplex buchananii* (Nationally Vulnerable), with weed invasion and development being continuing threats.

Cathy and Dave led us through their research on the geochemistry of the formation of the typical mixtures of salt minerals that, when expressed at the ground surface, lead to the formation of salt pans, which are typically quite bare. This work is the subject of several recent publications (see below).

Weed encroachment perpetuating accumulation of sediment and soil means many of these salt pans are overrun with vegetation and their saltiness is essentially buried. Cathy and Dave along with many collaborators have recently undertaken small scale scraping trials at several salt pan sites in Central Otago to remove weed infestation and resurface the salt chemistry that halophytes rely on. Early results show promise with some halophytes quickly recolonising the new habitat available.

This type of interdisciplinary research and experimental work is critical to understanding how to restore ecological functionality to some of our most beleaguered and unique ecosystems. It was heartening to see some answers to very difficult restoration questions being shaped, and to note the support and interest of Otago Regional Council, QEII National Trust and Department of Conservation. Thanks to Cathy and Dave for a great talk and acknowledgements to their co-authors Dhana Pillai and Steve Read.

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Field trip to Patearoa and Belmont Inland Saline Wetland Management Areas, 19th August 2023

Bradley Curnow

A freezing Maniototo morning greeted the participants to these unique reserves. First up was Patearoa reserve which has a QEII covenant. The trip was primarily to observe the science experiment being undertaken with human induced scalping-scraping of plots below the salt line area of the reserve. The halophytic and nationally vulnerable *Atriplex buchananii* was noted as being the main native coloniser of these plots. The invader *Plantago coronopus* was also present. Another halophyte observed below the salt line was the grass *Puccinellia raroflorens*.



Puccinellia raroflorens (Photo: Bradley Curnow)



Atriplex buehneri & *Plantago coronopus* (Photo: Bradley Curnow)

Above the salt line we came across both *Carmichaelia petriei* and the rarer *C. vexillata*. The most fun was had trying to find *Lepidium solandri* which was difficult given the plant's dormant winter state.



Carmichaelia vexillata (Photo: Bradley Curnow)

We also came across some lovely *Poa cita*, a *Melicytus alpinus* and many *Raoulia australis*. Also found were *Stellaria gracilentia* and *Vittadinia australis*.

After a late lunch we travelled to the Belmont Management Area which has a DOC covenant. An interesting and unusual site for large mats of *Selliera radicans* along with a population of *Salicornia quin-*

queflora which is only found in one other location in Central Otago. Both plants are normally a coastal halophyte. According to the plant list compiled by Kate Wardle, the area is home to a population of *Schoenoplectus pungens* which we failed to find and also missed was *Aciphylla subflabellata*. Sadly, neither reserve now appears to be home to the nationally critical *Lepidium kirkii*.



Poa cita (Photo: Bradley Curnow)

Thanks to Cathy Rufaut & Dave Craw (Department of Geology, University of Otago) and Dhana Pillai (Alexandra) for a well-led day out.

Field Trip to Pulpit Rock, Silverpeaks, Otago, 9th September 2023

Jo Sinclair

It was a cracker of a spring day to walk the Green Ridge, to Pulpit Rock, Silverpeaks. Once the Bot Soc team reached Gold Miners Direct from Steep Hill Road and felt the sun on the skin without the hint of a gentle breeze, it was a unanimous decision to tweak the original circuit plan. Robin was a fantastic team leader, referring to the history of the area while pointing out the beautiful stones laid in the path, remnants of the gold mining days.

Dax the dog quickly took the lead position and had incredible patience, constantly stopping for us humans to botanise along the path. At the start of the walk, Allison spotted *Baeomyces heteromorphus* and *Dibaeis arcuata*, growing side by side on the dusty ditch. These two lichen species could easily be mistaken for one another. Seeing the two species side by side made their dissimilarities more apparent.



Bryophyte, lycopod, ferns, and lichen wonderland on the ridge (Photo: Jo Sinclair)



Left: *Dibaeis arcuata* Right: *Baeomyces heteromorphus* in ditch (Photo: Jo Sinclair)

Various ferns densely covered the gaps along the forest floor, until reaching the old coiled wooden path that led us into Manuka forest, scattered with *Blechnum procerum*. Many familiar natives dotted in between including *Carpodetus serratus*, *Pseudopanax crassifolius*, various *Coprosma* spp; *Coprosma foetidissima*, *Coprosma areolata* and many more. *Dracophyllum longifolium* seemed to steal the show as the morphology slightly changed from shade to sun, with the older *D. longifolium* trunks in the sub-alpine zone getting hugged by the moss *Alleniella hymenodonta*.

beady botanist eyes spotted new orchid growth. Once the eyes darted away from the glorious bank, they were once again rewarded with the hills rolling through the backdrop.

Having lunch on Pulpit Rock provided the perfect view. Old fire scars made apparent across the hills where the varying shades of green are replaced with a layer of Manuka. John bravely continued to climb along the rocky edge, spotting the fourth lycophyte of the day. With full bellies and the warmth of the sun, we all

agreed that spending the day heading to Pulpit



Above: Fire scars on mountain ridge.

Right: Lunch spot on Pulpit Rock (Photos: Jo Sinclair)



Alleniella hymenodonta on *Dracophyllum longifolium* trunk (Photo: Jo Sinclair)

The word of the day was 'wow' as we walked along the ridge. It was a lichen and bryophyte dreamland sprinkled with *Hymenophyllum* spp. Allison offered her words of wisdom of lichens while Gretchen's



Team left to right: Gretchen Brownstein, Dax Brownstein, Allison Knight, John Barkla, Marilyn Barkla, Robyn Bridges. (Photo: Jo Sinclair)

Carol began her talk with a brief summary of her 40 year career, which included an MSc on regeneration on Tiritiri Matangi, a PhD study of the population ecology of tawa, and employment with Botany Division DSIR before her appointment as an advisory scientist in conservation ecology for the Department of Conservation Southland Conservancy.

Carol defined a weed as “a plant growing where it is not wanted or in the wrong place” and the photo of Darwin’s barberry provided a familiar example of a horticultural plant that has jumped the garden fence. In 1984 while with Botany Division, DSIR, Carol

Rock was a fantastic decision. Dax then led the way back towards the cars.

The company was superb with lots of laughter and stories while botanising along the way. I learnt more plant and lichen names than the brain could retain, while getting inspiration from a group of botanists, lichenologists and trampers with many years of expertise. A very inspiring and encouraging bunch. Good thing there are many more BSO trips to come.

The 2023 Geoff Baylis Lecture. Down in the Weeds, a talk by Dr Carol West, Honorary Research Associate, Department of Conservation, 13th September

Moiria Parker

Sir Alan Mark, patron of the Botanical Society and long time colleague and friend, introduced Dr Carol West to the meeting.

In 2022 Carol received the Allan Mere award for her contributions to the study and preservation of New Zealand’s flora spanning more than 40 years. Her talk focused on one aspect of those contributions – the management of environmental weeds.

worked on the ecology and impact of the vine *Clematis vitalba*, which can form a solid carpet by rooting at the nodes as well as climbing high enough to kill a kahikatea tree. The fluffy seeds are wind dispersed and are even used by birds to line their nests. The vine has all the tricks to be a menace, apart from prickles, and can persist forever. *Clematis vitalba* was the first environmental weed to be declared a Class A Noxious Plant. Until then only agricultural weeds were placed in this category- it was felt by some that manuka should be included.

Following the BioSecurity Act 1996 DoC compiled their first Strategic Plans for managing invasive species. But there was no budget to manage environmental weeds. Weed management was funded by the recreational budget and the focus was on controlling gorse and blackberry in their camping areas.

Nowadays there are 385 environmental weeds that are actively managed somewhere in New Zealand. Priorities are determined by rating each weed species on a scale of 0 - 3 according to environmental factors (the impact on both regeneration and the dominant species and persistence over time) and the biological success rating (maturation, seed production, seed bank persistence, dispersal, establishment and vegetative reproduction).

The type of weed control is determined by the stage at which the weed is spreading. A weed-led programme is appropriate for a weed at the early establishment or expansion phase, whereas a site-led programme to protect high value places is the only option at the explosion and entrenchment phases.

Carol described in detail three examples of successful environmental weed control, gorse in Fiordland, marram in Rakiura and *Spartina* in the New River estuary, Invercargill

Gorse can become established on the Fiordland coast. It originates on the banks of West Coast rivers, is carried downstream to the sea and then transported by the Southland Current along the coast. To prevent these isolated gorse bushes from spreading they need to be sprayed. Carol was successful in securing resources for spray work, which eventually could be done using a helicopter so the entire coast could be worked in a single day. She emphasized the necessity for long term surveillance and the help of local fishermen who report any gorse sightings on the Fiordland coast to DoC.

Marram grass was planted at Mason's Bay, Rakiura, to stabilize the sand dunes. However, the grass seed blows inland onto the back dunes and the marram becomes more widespread. Carol worked with Mike Hilton, University of Otago, who for the past 21 years has been overseeing the Dune Restoration programme to remove marram grass from Rakiura. The sand dunes at Mason's Bay are one of the very few sites for the Nationally Critical *Gunnera hamiltonii*, of which there are only 7 known plants in the wild.

The grass *Spartina* was planted in the New River Estuary, Invercargill, in the 1930s to reclaim land for industrial development. *Spartina* binds silt, spreads rapidly and a 14ha area of *Spartina* in 1939 had increased to 800ha by 1987. Carol was successful in getting *Spartina* included in the Regional Pest Management Strategy and therefore control of this exotic grass could begin.

Basic methods were used initially, as shown by the photo of Brian Rance dragging a hose through the mud to spray the outliers. The task was made easier using a hovercraft to carry the chemical herbicide. Use of an Argo was even better and finally a helicopter with a boom spray. By 2003 the efforts of the

"Weed Squirters" had reduced the area of *Spartina* to 1ha and rushes had replaced this exotic grass.

However, annual surveillance is necessary as *Spartina* is still present in drainage ditches. Fortunately John Taylor's dog, Wink, has been trained to find *Spartina*, which seems quite remarkable to me.

Carol's work has also involved the Rangitāhua, Kermadec islands, located 1,000km North of Auckland. Rats, cats and goats have already been eradicated from these 3000ha islands, leaving just the weeds that originate from both Auckland and Polynesia. Of the 168 exotic species present on the islands, nine species are targeted for eradication, which has already been achieved for pampas, bamboo, radiata pine and Lombardy poplar. Still to be eradicated are Mysore thorn, *Passiflora edulis* and purple guava, however their locations are mapped and there is ongoing surveillance.

Carol commented that one of the difficulties of weed control is that the less of a weed there is, the less it is regarded as a problem. Yet the earlier control work is started the better - the increasing costs for dealing with wilding pines being a perfect example.

Carol concluded with a reference to *Macrolechia lyallii*, Subantarctic tree daisy, which occurs naturally on the Snares and Titi Islands but is thought to have been introduced, probably by sealers, to the settlement of Hardwicke on the Auckland Islands. Nowadays Ewing Island is the main stronghold, with several plants on Enderby and a single plant on Adams Island. DoC has a Feasibility Plan to eradicate *Macrolechia lyallii* from the Auckland Islands within 10 years at the same time as the mammalian eradication programmes.

Carol's talk emphasized the difficulties of controlling environmental weeds. The authorities need to be persuaded that the species will become a problem, then resources need to be found and finally continual surveillance has to be implemented.

Thanks to her persistent efforts to protect New Zealand's flora, there have been a number of successes where invasive weeds have been controlled or eradicated. As a local "weed squirter", to use Carol's phrase, I found her talk quite fascinating and I am thankful that we have made progress from the days when DoC weed management meant tackling blackberry and gorse in the camping areas.

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*Masses of Durvillaea on the coastline of The Snares heave in the swell, occasionally revealing humanoid faces.
(Photo: Stella Fish)*




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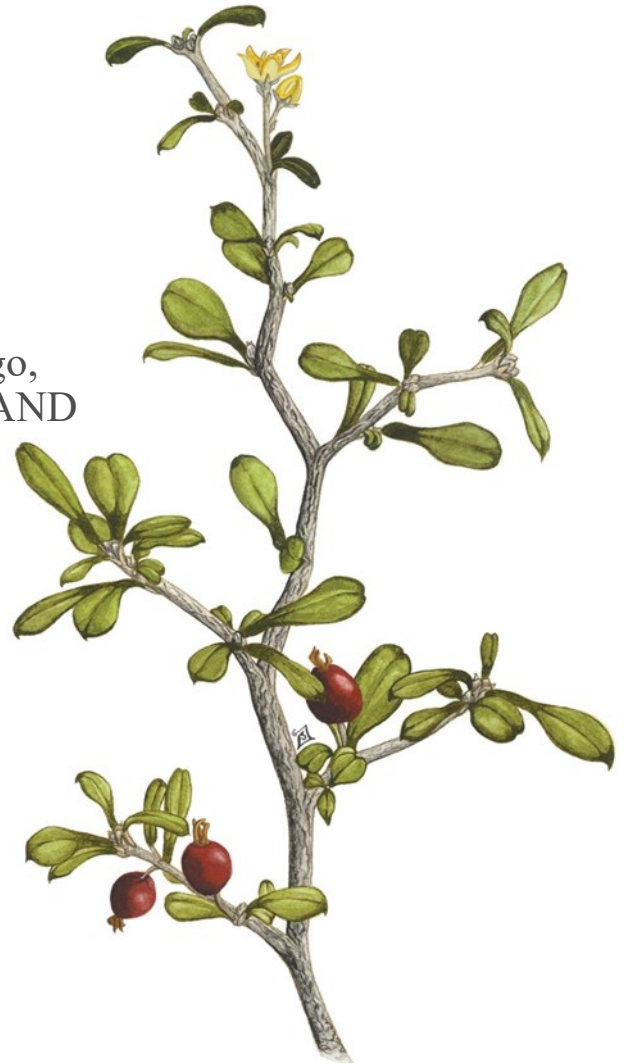
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Right: Corokia cotoneaster branch (Artist: Sharon Jones)



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