BOTANICAL SOCIETY
OF OTAGO

Pentachondra pumila

Newsletter Number 104

March 2025

BSO MEETINGS AND FIELD TRIPS MARCH — AUGUST 2025

Location: *Talks are held in the Benham Seminar Room 215 in the Zoology Benham Building, 346 Great King Street.*

12th March, 5:20pm: Re-evaluating some common and rare *Cortinarius* species using modern and traditional molecular techniques. Speaker: Andy Nilsen. Work by Andy Nilsen and David Orlovich. Herbaria hold invaluable biodiversity data, but many collections, particularly historical ones, lack DNA barcodes necessary for accurate identification. This is especially problematic for type collections, which serve as a taxonomic reference for a species. Older specimens are often degraded, making successful DNA barcoding challenging with traditional methods. We applied both traditional and modern sequencing techniques to type and non-type collections from the New Zealand Fungarium (PDD) and the State Herbarium of South Australia (AD), successfully retrieving DNA from specimens over 100 years old.

One key application of this work has been revisiting New Zealand sequestrate *Cortinarius* species and the elegant blue webcap, *Cortinarius rotundisporus*. The true identity of these species has long been difficult to establish due to morphological similarities and a lack of molecular data from type collections. Here we discuss current progress in establishing these species' phylogenetic placements and some of the difficulties arising from this research.

15th March, 9:00am - 3:00pm: Truby King Reserve, Seacliff. A day trip to explore the diverse botanical features of the Truby King Reserve (TBK). The TBK once formed part of the grounds of the Seacliff Hospital. It is now administered by the Dunedin City Council. There are survivals of the original - mostly introduced - tree plantings (which are currently being mapped). There are many more trees that have spread from the original plantings, many - native and introduced tree and shrub species - that have arrived spontaneously, and there are also ongoing informal plantings of - mostly - native trees. Some of the species present, such as sycamore, require ongoing control. The TKR has a good network of tracks, and it is a good place to visit if you like tall trees. We will investigate the different stands of TKR to see what mosses, liverworts, fungi and lichens are present, and what is happening to the woody debris that has been left in situ following cutting and pruning. Bring good walking shoes, something to eat and drink, and clothing for the weather on the day. Meet at the Botany Department car park at 9 am and return time 3 p.m. Contact Alex, 0210510014.

9th April, 5:20pm: A Samoan Sojourn. Join John and Marilyn Barkla on their cycle-tour perspective of the amazing nature and people of Savai'i, the largest island of Western Samoa. There'll be a glimpse of the bewildering array of tropical plants, along with plenty of beaches, fales and much more.

12th April, 9:00am: Field trip to Bungtown Conservation Area and Lake Mahinerangi. The Bungtown Conservation Area is a small (c. 3.5 ha) reserve in the headwaters of the Waitahuna River. It's a great example of an upland copper tussock bog with stands of bog pine (*Halocarpus bidwillii*). There's also a population of the declining *Carex tenuiculmis* sedge. After exploring this area we'll visit the nearby shore of Lake Mahinerangi where some lake shore turfs have tiny herbs such as the nationally vulnerable *Gratiola concinna*, mudwort (*Limosella australis*) and declining Maniototo button daisy (*Leptinella maniototo*). Meet at the Botany department car park at 9 am. Return by 4 pm. Leader John Barkla 027 326 7917.

3rd-4th May: BSO Fungal Foray, Piano Flat, Waikaia Forest Waikaia Forest at Piano Flat is an isolated remnant of the mixed beech forests (red beech – *Nothofagus fusca*, mountain beech – *Nothofagus cliffortioides* and silver beech – *Nothofagus menziesii*) that once covered much of the area. The area supports a unique invertebrate fauna with several rare species being found there. Beech trees are dependent on various mycorrhizal fungi for their survival and growth. It has proved to be a regional

hotspot of fungal diversity with many species of mycorrhizal fungi associated with the beech. It is suggested that anyone wishing to participate travel down on Friday evening so they can get an early start on Saturday morning. People can either travel back on Saturday evening or on Sunday. Accommodation is available at the DOC Campsite at Piano Flat or the Waikaia Motor Camp. You will need to bring your own tents, food cooking gear etc if you wish to stay overnight. Contact David Lyttle 027 654 5470 for further details.

14th May, 5:20pm: AGM and photo competition. At the AGM we will vote on a new constitution (available on our website https://bso.org.nz/downloads).

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

11th June, 5:20pm: Losing our edges: adjacent land-use intensification facilitates plant invasions into indigenous shrubland fragments. Speaker: Gretchen Brownstein. Native shrublands were once common across the Canterbury Plains, but over time, conversion of land to other uses including irrigated pasture have contributed to their gradual decline. In this talk I will be discussing a study we recently published which found that spillover of nutrients and water from adjacent intensive agriculture is facilitating invasions by exotic plants into reserves set up to protect the last remnants of these native shrublands. We show that nitrogen enrichment, likely from irrigated animal effluent, is detectable 10 m inside reserve boundary fences. And we observed increases in exotic herbs and grasses, along with declines in native species, up to 30–40 m in from irrigated boundaries. These distances are significant as some of these reserves are only 100 m across, meaning that more than 60% of these reserves can be affected.

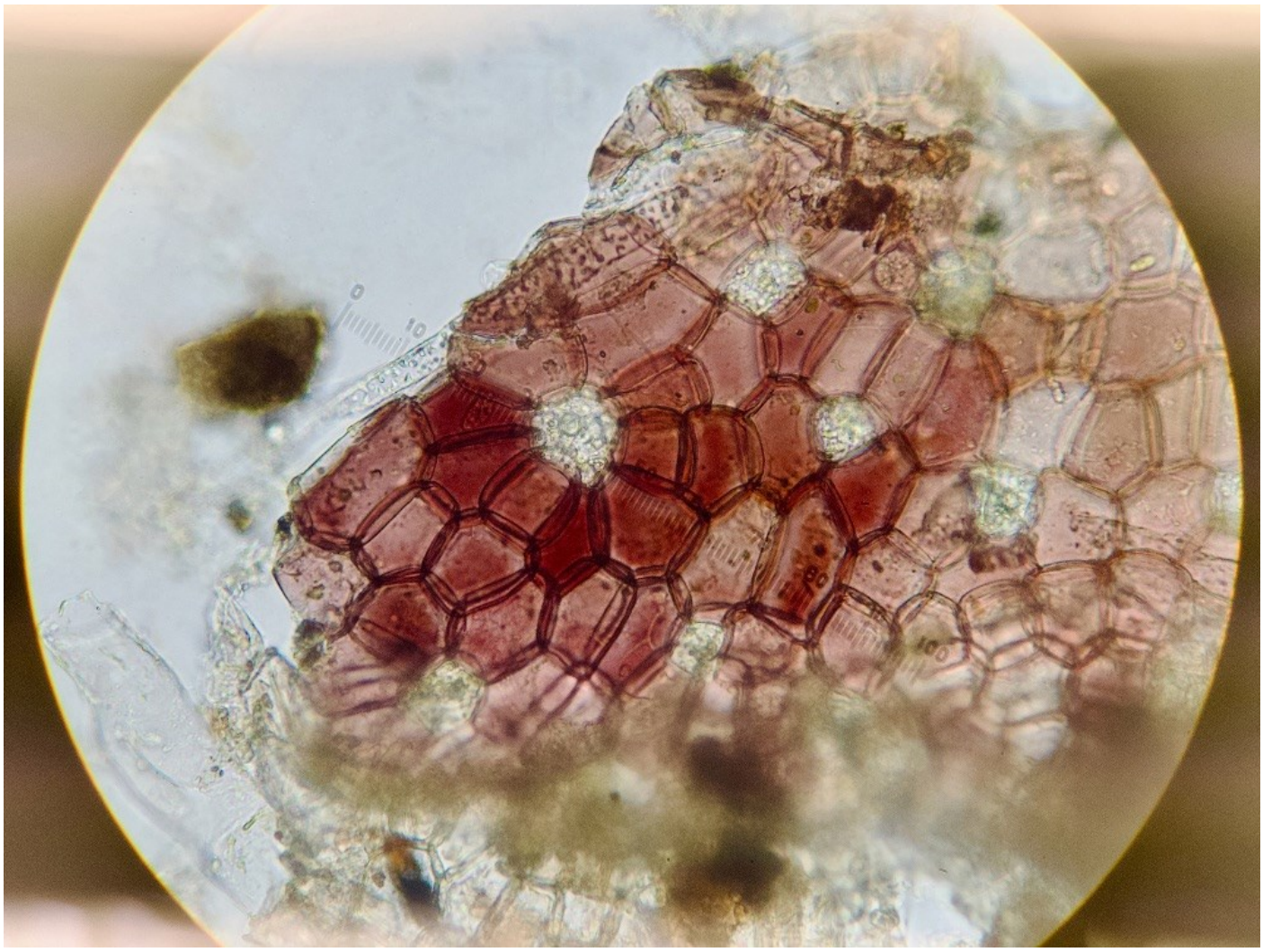
The ongoing effects of more intensive land use adjacent to the reserves could be managed with better rules around buffers. However, our study highlights the larger problem of establishing representative reserves that are too small. To maintain viable indigenous populations in other landscapes will require protection of blocks in the 100s of ha to avoid past mistakes in reserve design made on the Canterbury Plains.

14th June, 10:00am: Andersons Lagoon. Wrap up for an easy winter walk to Andersons Lagoon. This little known gem close to Palmerston (last BSO trip in November 2019) is accessed via a planted area along a grass pathway which opens onto a small but interesting saltmarsh and marginal plant communities at the closed mouth of Stony Creek. Contact Maia Mistral-Armour 027 2388498

9th July, 5:20pm: Cyanobacteria. Speaker: Nicole Heaton. Cyanobacterial blooms pose a significant threat to freshwater ecosystems globally, fuelled by eutrophication and warming temperatures. More recent studies have shown that the associated heterotrophic bacteria community may have an influential role in cyanobacterial bloom dynamics. Are these interactions affecting blooms in the Ōtākou region?

13th August, 5:20pm: Flowers of Annapurna. Speaker: Mike Small. The Annapurna Circuit is one of the great hikes of the world. More than 150 kms of trails pass from an altitude of 80m with subtropical rainforest to as high as 5500m high-alpine/ subarctic areas near the world's highest mountain pass at Thorung La. Culturally diverse, it is also a biodiversity hotspot as a result of the intersection of several floristic regions and extremes of precipitation and altitude. Floral diversity also results from numerous geological uplifts that formed the Himalaya and the monsoon after India collided with Asia 50 million years ago. This talk follows the trail and the flowers during the monsoon flowering season of 2024.

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



Liverworts pore: Lunularia cruciata *(Photo: Jo Sinclair)*

Meeting details: Talks are usually on Wednesday evening starting at 5.30 pm 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.

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.

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

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Artist: Kelly Phillips

PSEUDOWINTERA COLORATA

HOROPITO

Cover illustration by Kelly Phillips: "*Pentachondra pumila*". *Second place in the 2024 Audrey Eagle botanical illustration competition.*

FROM THE COMMITTEE

Chair's notes

Gretchen Brownstein

Kia ora koutou, welcome to 2025 and I hope everyone had a great summer holiday. My partner and I did a road trip to Northland. Along the way I played the classic road trip game of "name that plant" and the lesser-known variant "Spot the Naturally uncommon ecosystem". In my day job I've been working on projects related to Naturally uncommon ecosystems (NUEs) for the last few years. We are about publish a revised list of NUEs and a lucid key for helping identify them on the ground is under construction (hopefully out by end of this year). You can check out the current list and information about the ecosystems here:

https://www.landcareresearch.co.nz/publications/naturally-uncommon-ecosystems/

The big celebratory news is that the Loder Cup was awarded to our very own John Barkla! The Cup is awarded by the Minister of Conservation each year to a person or group of people to celebrate their outstanding conservation work in Aotearoa New Zealand. At the award presentation it was wonderful to hear all the people talk about the different contributions John has (and continues to) make. You can read more about John's wonderful achievements on page 10.

In news from the committee: we have been working to update the BSO constitution. This came about when the committee was thinking whether the BSO needed to be an Incorporated Society and as some of you may know, the new rules around Incorporated Societies have just come into effect. While the BSO is not incorporated and the committee decided to stay unincorporated, we are a 'small' society and have charity status, hence there are rules and legislation about how we operate. And part of that is having a fit for purpose constitution. To that end, the committee has agreed some updates to the constitution. The current constitution and proposed updated constitution can be viewed on our website (https://bso.org.nz/downloads). We will vote on whether to adopt the updated constitution at the AGM in May. So please have a read of both and come to the AGM.

Secretary's notes

Angela Brandt

Ngā mihi o te tau hou - happy new year! Once again we have a fantastic programme of events planned for this first half of the year. But there is still space for both talks and trips later on, so please get in touch with any member of the committee if you have an idea for a speaker or a place to visit on a field trip.

The Committee has been reviewing our Constitution and determined that it needs a refresh. So keep your eye out for a notice about amendments to the Constitution and mark the AGM date of Wednesday, 14 May, in your calendar to be ready to vote on these amendments. We'll also be electing our Committee, and welcome all members to consider joining to help keep our Society going strong!

Welcome to our new members, Claire Hagglund, Kunle Adebowale, and Jordyn Ashcroft! Welcome back to Taylor Davies-Colley! And a reminder that, if you haven't yet paid your subs for 2025, please be sure to do so by the end of March so you don't miss out on entering our annual Photo Competition and voting on your favourite entries for the Members' Choice award. You'll only receive a reminder email from me if we haven't yet received your subs for this year.

Editor's notes

Lydia Turley

Many thanks to all our wonderful contributors and a special thanks to Alyth Grant for proof-reading. You are all wonderful.

The cover illustration is a very cute work from last year's botanical drawing competition. It's time to start getting your pictures organised for the photograph competition. I'm looking forward to seeing the creativity generated by this year's category *Life under the lens*. Illustrations and photographs for the *Newsletter* cover are always most welcome.

I was recently introduced to a wordle-like game based on guessing plants with taxonomic information: https://flora.metazooa.com/ It is limited in scope but feels like good botany practice and I've been having fun.

Editors guidelines: Suggestions and material for the newsletter are always welcome. We welcome stories, drawings, reviews, opinions, articles, photos, letters – 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 lydiamturley@gmail.com. Copy for the next newsletter is due on *10 June 2025.* 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.

2025 Subscriptions are now due.

Every year the BSO runs a photo competition showcasing our members' best botanical images from the prior year. The 2025 photo competition is now open! Entries are due Monday, 14th of April.

Categories: broad and creative interpretations are encouraged!

- Plant portrait
- Plants in the landscape
- Life under the lens

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. https://bso.org.nz/photo-competition

NEWS AND CORRESPONDENCE

BSO Constitution

The Committee of the BSO has been working to update the BSO constitution. The old constitution originates from 2001 and needs some updates to reflect how we currently operate and how we would like to work going forward. The current constitution and proposed updated constitution can be viewed on our website (https://bso.org.nz/downloads). We will vote on adopting the updated constitution at the AGM in May; please read the documents and come to the AGM.

Wild Dunedin Festival of Nature

The power of lichens

Friday 11th April, 11:30 - 12:30 pm and 1:30 - 2:30 pm.

The lichen symbiosis is very powerful. Lichens colonise bare rock and pave the way for other life forms. Between them they make over 1000 unique chemicals. Join lichenologist Allison Knight on a walk in the Botanic Garden to take a closer look at the awesome miniature world of lichens living on rocks, including a species that can survive exposure to outer space!

Bring a hand lens or magnifying glass if you have one. Meet at the Information Centre, Dunedin Botanic Garden.

Limit: 12 per session. Free. Book: wilddunedin.nz

Pyramids, Plants and Penguins

Wednesday 16th April, 2pm, Okia Reserve Pyramids

Join the Yellow-eyed Penguin Trust and David Lyttle from the Botanical Society for a talk at 'Dunedin's Pyramids' then explore Okia Reserve.

Bannister Student Grant

Applications are invited for the Jennifer & Peter Bannister Student Grant for Botanical Research, from the Botanical Society of Otago (BSO), to assist a student studying for the degree of PhD, MSc, BSc (Hons) or B. Appl. Sci. in any tertiary institution in New Zealand, whose thesis project deals with some aspect of New Zealand's flora and vegetation. Priority will be given to projects relevant to the Otago and Southland regions.

The research project to be supported will be chosen on the basis of appropriateness to the objectives of the BSO, namely to encourage the study of botany, and to stimulate public interest in the plant life of New Zealand.

Funds of up to $2,000 per year (contingent on available funding) will be provided directly to the successful student(s) as a contribution to research-related expenses associated with the project.

Application rules and form can be found here: https://bso.org.nz/scholarships

Closing date: 31 March 2025

Audrey Eagle Publishing Fund application

The AEP Fund is held in trust by the Botanical Society of Otago (BSO). The aim of the Fund is to promote the dissemination of New Zealand botanical literature by contributing to publication costs.

The Fund originated in 2006 from a donation of $7,000 given to Audrey Eagle CNZM, from various sources, to publish supplementary notes to accompany her notable contribution to New Zealand botanical publications, *Eagle's Complete Trees and Shrubs of New Zealand*. The Supplement, published by BSO, came out in October 2006 and profits from this were the basis of this self-perpetuating fund. The Fund was considerably enhanced in 2014 when the first recipient, Allison Knight, not only paid back the loan but also contributed all profits from her publication *Lichens of New Zealand - an introductory illustrated guide*.

Applications to the fund are accepted at any time. Please contact the BSO committee to discuss your project.

The application can be found here: https://bso.org.nz/downloads

ARTICLES

Obituary: Ann Wylie, 1922 - 2024

Allison Knight

Ann Wylie, a long-standing member of the Botanical Society of Otago, died on the 27th December 2024, aged 102. She showed a keen interest in the society, for many years, walking down from Roslyn to attend talks, especially the annual Geoff Baylis Lecture. At her funeral on the 3rd of January this year Alan Mark spoke of his long association with Ann and his reminiscences are recorded below.

Dr Ann Wylie's Funeral Service: Jan.3, St John's Anglican Church, Roslyn.

Alan Mark

Following the formal speeches, I spoke and introduced myself as from the Botany Department and the person who probably had the longest association of any others, with Ann, as a staff member. I pointed out we both did our undergraduate studies in the Otago Botany Department; that Ann went to the University of Manchester where she worked with world-famous and somewhat controversial human biologists and geneticists, particularly Darlington. Ann returned to Otago soon after I returned from the United States in 1959, and we remained together as staff members, until Ann retired a few years ahead of me; I retired in 1999. Ann developed and taught the first Otago courses in Genetics and Cytology, while I initiated an Ecology programme.

Ann spent much time keeping right up to date with her fields of interest, which were developing extremely fast at this time, rather than indulging in her own research. Interestingly, she kept the relevant literature as reprints in a single pile at one end of her table, and showed an uncanny ability of relocating the crucial reprint(s) with remarkably little effort and delay. Ann was also renowned for her very sharp eyesight that enabled her to detect any spelling errors in draft manuscripts or proofs, so that she was keenly sought for this role in the Department. If Ann had read your text or proof, without comment, you could be sure it had no bloopers. Her name and reputation will live on at the University of Otago with the establishment of the Ann Wylie Genetics Prize, awarded annually to a top student in the Genetics programme.

Pat Mark and Ann Wylie on Ann's 100th birthday

Ann never owned a car and nor did she ever drive, but she was a keen walker. She lived in Henry St., Roslyn, with a special and cherished garden. She walked to work each day and Pat, my wife, and I would take her home if we happened to have our car. She certainly appreciated a lift, particularly if it was raining, and it was quite simple for us as we lived beyond her in Helensburgh.

Ann retired slightly before me in the late 80s and took up her interest in music almost full time: she actually took some university courses and I think, even completed a degree at this time.

I had much pleasure in organising a celebration of her 100th birthday at the University Staff Club with her and several of her friends.

I visited Ann many times over her final years at the Yvette Williams Retirement Village, in Roslyn, where my wife, Pat, also spent her last few years, and I spoke to her just a week before she died, when she seemed to be in good spirits, but alas.

John Barkla Awarded the 2024 Loder Cup

David Lyttle

The Loder Cup is awarded by the Minister of Conservation each year to a person or group of people who best represent the objectives of the Cup, to celebrate their outstanding conservation work in Aotearoa New Zealand. The 2024 Award was made to John Barkla who needs no further introduction to members of the BSO. We are delighted John's botanical and conservation work has been recognised by this award and that he joins the select group of Otago botanists who have been similarly honoured in the past.

Gerald Loder was an English barrister, businessman and politician who subsequently became Lord Wakehurst of Ardingly. He gained prominence as a horticulturalist, botanist, and plant collector creating extensive gardens on his property, Wakehurst Estate (West Sussex). He developed an interest in the flora of New Zealand and the cultivation of its indigenous plants. In 1926 he donated the cup that bears

John Barkla is presented with the Loder Cup

his name “to encourage and honour New Zealanders who work to investigate, promote, retain and cherish their indigenous flora”.

The letter from the BSO written in support of John’s nomination for the Loder Cup reads as follows:

John Barkla has been a member of the Botanical Society of Otago for over two decades and has served on the Committee up until the present time performing a variety of roles. He was BSO Chairman from May 2006 to May 2009. John has made major contributions to the activities of the Society leading trips, running the annual photographic competition and contributing articles to the BSO Newsletter. John is a talented photographer and has for many years taken on the responsibility of producing the annual BSO Calendar which showcases photographs from members. John’s eye for a good image is impeccable and his insistence on good production values has made the calendar a much sought after and desirable item every year.

John is one of the New Zealand’s best field botanists and has an unparalleled knowledge of the flora of Otago, particularly the alpine flora. Over the years John has been a mentor to many BSO members leading numerous field trips where he has patiently shared his botanical knowledge with us and introduced us to the great diversity present in our regional flora.

As a technical advisor for the DOC Otago Conservancy John has made an enormous contribution to the work of the Department both locally and nationally. He is one of the principal authors of the publication Conservation status of New Zealand indigenous vascular plants, 2017 in which the conservation status of all known New Zealand vascular plant taxa was assessed using the New Zealand Threat Classification System (NZTCS). During his time working for the Otago Conservancy John has been involved in many projects dealing with rare and threatened plants and has developed an uncanny ability to locate rare plants in the field. Examples of this skill are the rediscovery of *Veronica lilliputiana* and *Myosotis rakiura* on the Otago Peninsula and the only known extant population of a small daisy, *Abrotanella christensenii* (now known as *Solenogyne christensenii*) near the outlet of Lake Wanaka in Central Otago. John has a particular interest in the ecology and conservation of lowland *Olearia* species several of which are at risk or in the threatened category. He has made extensive records of the distribution of native mistletoe species in the Dunedin area, another group of plants that are at risk mainly due to possum browse.

As well as his technical and scientific work John has been involved with a number of community initiatives notably Project Gold, a DOC project dedicated to the protection and enhancement of kōwhai trees in Otago by gathering seeds, growing seedlings and planting a new generation of kōwhai. John carried out a vegetation survey on the Hereweka/ Harbour Cone Block for the local conservation group Save The Otago Peninsula (STOP) prior to its purchase by the Dunedin City Council in 2008. This survey was among the factors that persuaded the Council to purchase the block and has assisted in identifying and protecting the remaining fragments of native forest present there. John is frequently asked for advice on choosing, propagating and planting of native plants for restoration projects. Among the groups he has advised are the Yellow-eyed Penguin Trust, the Haehaeata Natural Heritage Trust (Central Otago) and Puketeraki Nursery (Karitane).

John was an early contributor and enthusiastic advocate of the original New Zealand citizen science website NatureWatch which subsequently merged with the international website iNaturalist. He has become a very active member of the iNaturalist community contributing over 25,000 observations of just under 3000 different species. He is highly respected by that community for this botanical knowledge and plant identification skills.

Because John has spent his professional life working in a Government Department where, by its nature, work tends to be collaborative, and the contributions of the individuals who produce it are not generally publicly acknowledged, he has not necessarily received the credit that perhaps should be due to him. John is an outstanding botanist and because of his outstanding contributions to botanical science and conservation in this country would be a worthy recipient of the Loder Cup.

What's that bryophyte

Jo Sinclair

How do you tell the difference between a moss and a liverwort? You just get your eye in, was my initial response. Right before I mistook a young *Hymenophyllum flabellatum* fern for a non-vascular plant. My eye was too quick and I hadn't used my checklist, which is a process of elimination that has helped me as an enthusiastic bryologist in training place non-vascular plants into their allocated group. So, here's a slightly more tangible response.

A cluster of moss sporophytes and gametophytes (Photo: Jo Sinclair)

Observing the morphological characteristics

The first observation is to carefully look at the bryophyte's entire form. The gametophyte is the independent life stage of the bryophyte and the sporophyte that emerges from the gametophyte produces the plant's spores. Both these structures have morphological clues which can set bryophytes apart. If sporophytes are present your second observation becomes a little easier.

Sporophytes morphological characteristics

Liverwort sporophytes generally do not contain chlorophyll. Their seta are white or translucent, look fragile and they are short lived, sometimes they are only visible for a few days. This is a much shorter period compared to the other groups. Their capsules are simple and some species will open into a

Hornwort sporophytes and gametophytes (Photo: Jo Sinclair)

windmill like appearance when ripe.

Hornwort and moss sporophytes do have chlorophyll and are longer lived. Hornworts are 'horn like' or elongated. The opening of moss capsules can be more complex, consist of a neck and a lid known as an operculum. When the operculum detaches, a circle of peristome teeth is revealed.

Looking out for stomata

Stomata, which regulate gas exchange, are not found in liverworts and are located within the sporophytes of the other bryophytes. For hornworts, they are positioned on their sporophyte wall (horn like feature) and for mosses they are located within the

Liverwort sporophytes and gametophytes (Photo: Jo Sinclair)

Dicnemon calycinum *peristome teeth (Photo: Jo Sinclair)*

capsule's neck. Some interesting research suggests that the location of stomata for bryophytes could be involved in sporangia's drying process, aiding dehiscence and spore dispersal[1].

Gametophytes morphological characteristics

After reviewing the sporophyte (when present), I move onto assessing the gametophytes morphological characteristics. Assessing if the bryophyte is foliose (leafy) or thalloid.

The structure of moss gametophytes is foliose, thalloid for hornworts, and liverworts can be either thalloid or foliose. Thalloid bryophytes do not have distinct leaves. Their thallus thickness generally varies and can form matts or ribbons on the substrate they occupy.

Marchantia *sp. Liverwort forming mats of puzzling faces (Photo: Jo Sinclair)*

Leaf arrangement and structure

Bryophyte leaves are also known as phyllidia. Their leaf like arrangement and structure can vary between mosses and liverworts which can help determine what you are looking at. Liverwort leaves are often in a flat arrangement, in rows of two or three and are lobed or divided, which is less common in mosses. Many moss leaves are arranged in a spiral pattern around the stem.

The nerve of bryophytes

Plants evolved without knowing our human guidelines. The first moss I keyed out was *Cyathophorum bulbosum*, which consist of leaves in two rows and

Metzgeria *sp. Liverwort with a ribbon like thallus (Photo: Jo Sinclair)*

Frullania *sp. Flat leafy liverwort (Photo: Jo Sinclair)*

Philonotis tenuis *leaves forming a spiral pattern around the stem (Photo: Jo Sinclair)*

a smaller row of leaves underneath. But their leaves also have a nerve (costa or midrib), and liverwort leaves usually lack this feature. So, the checklist begins. If the bryophyte has leaves with a nerve, then you can usually place it as a moss with confidence. But keep in mind that there are always exemptions. Notice how the thallus of *Metzgeria* sp. above has a midrib? Good thing is you can still use the checklist to put you on track. Does *Metzgeria* have leaves? No. Because mosses are only foliose you can rule it out as a moss.

Chemical differences

These small plants offer a pretty big punch chemically. This might not help you to ID one in the field, but their biological active compounds are incredibly interesting and research into this area has only been scratched upon.

Liverworts compartmentalise their chemical cocktails into oil bodies which is a unique feature for this bryophyte group. These oil bodies have been found to consist of secondary metabolites that are thought to be involved with deterring herbivory, anti-viral and anti-cancer activities[2]. Some studies suggest that around 90% of liverworts consist of these oil bodies. Perhaps oil bodies were prioritised over stomata… just a thought.

Well known moss species like *Sphagnum* have antimicrobial properties and was used as a wound dressing during the First and Second World Wars[3]. Some hornworts harvest cyanobacteria within their thallus which can fix nitrogen and produce cyanotoxin compounds[4]. These properties may help them to colonise damp disturbed areas as hornworts can be pioneer species. Often when I peruse under fallen logs or recently disturbed stream edges, I find the rewarding presence of hornworts.

Bryophytes share similar attributes which can make them difficult to distinguish. Especially when they are found intertwined within the same microhabitat. However, each group has some specific morphological and chemical differences that make them unique and equally fascinating. I find having a basic checklist helps me to process what bryophyte I am looking at. All plants have morphological clues. The key is observing them again and again, and to know where plants might just trick you.

Thank you to the BSO who funded my attendance fee at John Child Lichen and Bryophyte workshop in Whangarei 2024. It is always a joy to spend time with like-minded people who enjoy seeing the forest through a 10x loupe while sharing findings and wisdom.

References

1: Renzaglia KS, Villarreal JC, Piatkowski BT, Lucas JR, Merced A (2017). Hornwort stomata: Architecture and fate shared with 400-million-year-old fossil plants without leaves. *Plant physiology* 2: 788-797

2: Kanazawa T, Morinaka H et al (2020). The liverwort oil body is formed by redirection of secretory pathway. *Nature Commun.* 11, 6152

3: Opelt K, Berg C, Berg G (2007). The bryophyte genus Sphagnum is a reservoir for powerful and extraordinary antagonists and potentially facultative human pathogens. *FEMS Microbiology Ecology* 6138-53

4: Frangedakis E, Shimamura M et al (2020) The hornwort: morphology, evolution and development. *New Phytologist* 229, 735-754

Threat assessments of selected mushroom fungi in Otago

Scott Jarvie

Working with a fungi expert, Dr Jerry Cooper from Manaaki Whenua Landcare Research, the Otago Regional Council has recently assessed the regional conservation status of selected species on non-

lichenised agarics, boletes and russuloid fungi in the Otago Region.

The Regional Threat Classification System methodology was developed to be complementary to the New Zealand Threat Classification System, and provides information relevant at the regional context by applying a species population threshold adjusted to the regional land area under consideration.

Following a general process for assessing the threat of extinction of fungal taxa as described in the ORC report at the regional level, a total of 331 from the national checklist were identified in Otago. Nine fungal taxa were regionally assessed as Threatened (1 = Regionally Critical; 8 = Regionally Vulnerable), 203 as Not Threatened, and 119 as Data Deficient.

In the report *Deconica baylisiana* was listed as the only fungal species to be Regional Critical, the most severe threat status which parallels the national assessment of National Critical by Cooper *et al*. 2022, with the main population of this species being within the Otago Region. The national assessment stimulated interest in the species, with subsequent sites being found that will inform future threat assessments. Despite this interest, at both the regional and national scale little information is known on how this species is dispersed, or what additional threats it may face. Future work could investigate new locations, dispersal mechanisms and threats.

Currently, the number of described indigenous fungal species in Aotearoa New Zealand is around 6,000 and it's estimated another 14,000 species remain to be described. This regional assessment is based on the national assessment in Cooper *et al*. 2022. That report covered 961 species which is just 16% of the total described. More work is needed at both the national and regional scale to better understand the status and threats to all our fungal species.

Knowledge of fungi lags behind many other groups, and as a consequence there is limited data on species populations and the changes in, and threats to, those populations. Aotearoa New Zealand also has a very limited pool of experts able to interpret the available data. In recent years, the increasing popularity of Community Science platforms, like iNaturalist, has led to an explosion in interest in poorly understood groups like fungi. Our base-line data is increasing, along with considerable increase in the number of people with the interest and skills to document fungi. Nevertheless, the increasing level of data is associated with variable quality. From a scientific perspective it is critical that the professional community engaged in biodiversity management support these kinds of activities through both national and regional efforts.

The ORC thanks Dr Jerry Cooper for leading the assessment, Professor David Orlovich from the Department of Botany, University of Otago, for providing access to species occurrence data from the University of Otago Herbarium, and Dr David Lyttle for the use of his photo that graces the frontispiece and back cover of the report. The report is titled:

Jarvie, S., Cooper, J. (2024). Conservation status of selected species of non-lichenised agarics, boletes and russoloid fungi in Otago. Otago Regional Council, Otago Classification Series, 2024/7. 45 p.

In addition, the ORC has completed regional conservation statuses for other taxonomic groups that may be of interest to Botanical Society of Otago members, including indigenous vascular plants, which can be found here: https://www.orc.govt.nz/environment/biodiversity/regional-threat-assessments/

Species lists for mosses, liverworts and hornworts in the Otago Region

Scott Jarvie and Aimee Pritchard

Working with bryologist Aimee Pritchard from the Department of Botany – Te Tari Huaota, University of Otago – Ōtākou Whakaihu Waka, the Otago Regional Council has had species lists compiled for mosses, liverworts and hornworts found in the Otago Region.

Following the taxonomic names from the national checklists, a total of 350 mosses, 231 liverworts and 8 hornworts were identified in Otago. To our knowledge, this is the first time species lists have been compiled at the regional level for these groups in Aotearoa New Zealand.

In the species list, information is provided for taxa on the functional group, the report name from the New Zealand Threat Classification System if assessed nationally, the national conservation catego-

ry and status if assessed, distributions, endemicity including at national- and regional-scales, nativeness, the source of the distribution information as well as the confidence of the species being in the region, and if a type locality is in Otago.

The species list will be available from the ORC webpage soon.

We thank the following researchers from Manaaki Whenua – Landcare Research for support with these lists: Dr Jerry Cooper for advice on type localities, Dr Aaron Wilton for advice on the Global Biodiversity Information Facility, Dr David Glenny for advice on bryophytes. We thank Dr Matthew Larcombe from the University of Otago – Ōtākou Whakaihu Waka for support.

John Child Bryophyte and Lichen Conference 2024 Whangārei Heads

Aimee Pritchard and Jess Paull

Thanks to funding from the Botanical society of Otago, we were both able to attend the 37th John Child Bryophyte and Lichen Conference 2024 held at Whangārei Heads.

The 37th annual John Child Bryophyte and Lichen Workshop commenced on the 8th of October in Whangārei Heads. This annual conference is an opportunity for cryptogam nerds to geek out with like-minded individuals, and for aspiring novices to begin their journey. The camp in Whangārei Heads was about an hour east of Whangārei proper, situated in a scenic bay in the shadow of the mighty Mt. Manaia. Each morning, we were greeted with a new, glorious view of High Island and the bays of McGregors and Taurikura. It is a beautiful piece of coast with the ability to walk to High Island at low tide. It was an amazing place to attend a workshop.

The trip on the first day of the conference was an introduction to the world of bryology and lichenology for people new to the field. Wanting to avoid the problem of ‘too many chefs in the kitchen,’ we opted to take this opportunity and visit some of the areas farther away from the camp that wouldn’t feature in the workshop—including a little sightseeing, since it was Jess’ first time in the North Island beyond Auckland airport. Our first stop of the day was the Waro Limestone Reserve, where we went on the search for mosses that were particularly fond of growing on limestone. We found and collected some interesting specimens to take back to base camp and ultimately, Dunedin. Our next stop was an educational visit to Ruapekapeka Pā, where we learnt about Māori history in the area and saw our first ever Pūriri tree (*Vitex lucens*), which is endemic to the Whangārei region. We thought through any tree species we knew trying to identify it, but nothing seemed to fit. After walking through the small remnants of native forest, we had an ‘ah ha’ moment and the name ‘Pūriri’ came out of the recesses of Aimee’s mind. We successfully identified our first Northland-specific species! Later that night another member of the workshop managed to catch and show us a Pūriri moth (thanks, Paul!) We continued our journey and visited Opua and Paihia, where we enjoyed delightful fish and chips (botanically), saw the ‘famous’ Paihia toilet, and toured a historical gar-

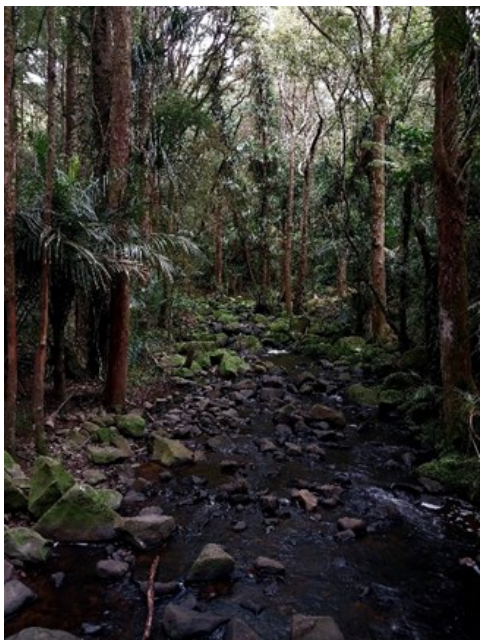
Our daily views from camp in Whangārei Heads


The Waro Limestone Reserve and a limestone Funariaceae with abundant capsules

den. We finished our trek here and made our way back to base to look at our limestone mosses.

The second day of the conference we were joined by two other workshop attendees and two members of New Zealand Geographic (the editor Catherine and photographer Adrian), who wanted to follow a few 'moss people' around for an article on the workshop. We went to Pukenui Forest with Catherine and Adrian, which is part of a 1700-hectare land full of walking tracks administered by Whangārei District Council and DOC. We spent the day botanising, but also being followed, interviewed, and recorded. We had many opportunities to nerd out and speak about some of our favorite things – mosses! We were very impressed by the attention span of the reporters while we enthusiastically explained things about mosses; how they grow, where they grow, and how amazing they are. At the end of the morning trip, a few hours of recordings, and a couple of hundred photographs later, enough was said and we made our way to A H Reed Memorial Park. This is a stunning remnant of original Kauri forest, with the ability to walk through the canopy on a wooden boardwalk. If you are interested in the article that resulted from this trip, you can find it here: https://www.nzgeo.com/stories/the-possibility-of-mosses/. It is always an enriching experience to be with others that have the same interests as you, and understand what you are talking about.

On the third day, we discovered that although everything seemed bigger on the North Island, the mosses were not! At Abbey Caves Reserve with Paul and Jo Sinclair, we learned that *Hypopterygium tamarisci* displays a dwarfed form when compared to its South Island counterpart. It stumped Jess who thought she'd found a new species to




A grove of Nīkau palms in Pukenui Forest (left) and the leaves of a Pūriri tree (right)

Mount Manaia (left) and our picnic spot on our last day in Whangārei Heads (right)

learn. It was a fascinating example of how different localised morphology can be for a species, and another exciting discovery during the conference. In the afternoon, we met up with the rest of the conference attendees at Mair Park. Here we learned a bit more about the native vascular plants from the locals, said goodbye to Catherine and Adrian, and climbed the summit of Mount Parihaka for a wonderful view of Whangārei. To close off the evening, we and a few others gave our presentations in competition for the Tom Moss award. Besides the prize, though, it was also an opportunity to share our research in the field with the other bryologists of New Zealand, which sparked many interesting questions, conversations, and contacts afterwards.

On our last full day on the conference, we decided to tackle the climb of Mount Manaia. This mountain is a sacred site within the region because it is the resting place of important chiefs, including the embodiment of Manaia, the eponymous ancestor of Whangārei. On the walk we were treated to our last glimpses of Kauri, as well as plenty of majestic Tōtara, Nīkau and Pūriri. To celebrate our final day in Whangārei Heads, we opted for a picnic on the beach with dinner from a local fish and chip shop. Watching the sunset, it was clear how meaningful this conference had been for both of us, and how much we had each learned.

We both got a lot out of this conference, including meeting enthusiastic people in our (rather small) field of botany, the opportunity to share our research through evening talks, and seeing new botanically interesting areas full of species that are uncommon or not found in the South Island. We would like to extend our immense gratitude to the Botanical Society of Otago for the funding to allow us to attend this event.

The attendees of the 37th John Child Bryophyte and Lichen Conference

REPORTS

An exploration of the flora of Western Australia, a talk by David Lyttle, 9th October 2024

John Barkla

David took us through a 12-day trip that he and Belinda undertook to Western Australia (WA) during late August and September 2023. He started by setting the scene – reminding us of the size, dryness and great age of the landscape and its rocks. The Yilgarn Craton of the Great Western Plateau, which occupies most of the state, has been above sea level for over 2.5 billion years, giving it some of the oldest soils on the planet. There's a long-term drying trend that has left behind salt plans and salt lakes. Soils are generally infertile, lacking phosphate and other important nutrients.

David and Belinda initially headed north up the coast from Perth before drifting southeast through the 'wheatbelt' to the southern-most point of the trip in the Stirling National Park (NP). David introduced us to some of the more conspicuous plants they encountered but noted the difficulty in working out plant names given the large and generally unfamiliar flora of the region. He posted many of his observations on iNaturalist and some of those had been identified by knowledgeable locals.

An early stop was Yanchep NP where we were introduced to *Banksia menziesii, Hakea prostrata* and the primrose orchid (*Caladenia* sp.), a frequently encountered orchid. The next place was the Pinnacles in Nambung NP, with its curious limestone formations arising from a sandy plain. Interesting geologically but less so botanically.

Further up the coast near Port Gregory was an unusual pink lagoon that derived its colour from algae. The street art Northampton was briefly appreciated, with some ceramic animals catching David's eye. Then it was on to Lesueur NP where the botany really started to impress. The vegetation in this area comprised low scrubby clumps and notable were iridescent-coloured kangaroo paw (*Anigozanthos* sp.), various banksia, smoke bush and a blushing spider orchid (*Caladenia lorea*). We were also introduced to one of the region's numerous sundews (*Drosera magna*) and the rose cone flower (*Isopogon dubius*). Other oddities included the impressive cycad *Macrozamia fraseri* and a trigger plant (*Stylidium* sp.). The southwestern part of WA is a hotspot for *Stylidium* with 70% of the world's 250+ species occurring here. I was particularly interested to see a dryland mistletoe (*Amyema* sp.).

Kalbarri NP was the northern extent of their trip and here David and Belinda visited the red sandstone gorges of the Murchison River. They encountered some elaborate national park facilities but few flowers due to the dry season. They did spot some *Grevillea* spp. and impressive sandplain woody pear (*Xylomelum angustifolium*) in the Proteaceae family.

Heading south, next up was the Mullewa area, where the normally reliable wildflowers were in short supply due to very dry conditions. Never-the-less we were treated to stunning wreath flowers (*Leschenaultia macrantha*), pink velleia (*Goodenia rosea*), and desert quandong (*Santalum acuminatum*) – hemiparasitic on the roots of other plants. The poison peas (*Gastrolobium* spp.) were mentioned, particularly their ability to accumulate monofluoroacetate (the key ingredient in the poison 1080). The local possums apparently have a high degree of tolerance to it.

The Wongan Hills – Mount Matilda area was found to have great floristic diversity. This included *Grivillea* with conspicuous black stamens and many manuka-type shrubs, and banksias of course. Some plants, including *Eromophila* spp. (related to ngaio) show tenuous links to New Zealand plants. Further south was Lake Grace, one of the larger saline lakes in WA.

David then paused the travelling and illustrated some of the major plant families and genera that they had been encountering. The family Droseraceae is very well represented by over 100 *Drosera* species in WA that exhibit a diverse range of forms, sizes and flower colours. Some are scrambling and there are even blue-flowered ones.

The Proteaceae is an enormous family with many familiar genera such as *Banksia, Conospermum*, *Dryandra* and *Grevillea*. David showed many beautiful images that illustrated the range of forms and

colours. Discussion about *Eucalyptus* (gum tree) nuts soon led onto the gumnut babies Snugglepot and Cuddlepie, the creation of Australian children's author Cecilia May Gibbs. Some of the other 1000 species of Myrtaceae in WA got a mention too.

Fabaceae was well represented with *Gastrolobium, Chorizema, Kennedia, Daviesi, Hovea* and *Isotropis*, to name but a few. Orchids too are a significant and conspicuous part of the flora with over 400 species present in the southwestern part of the state.

David and Belinda finished their journey in the Stirling Range NP – the southernmost point of their trip. The steep rocky terrain looked challenging but even so there were some fine images of scented banjine (*Pimelea suaveolens*) and white banjine (*P. ciliata*), as well as an interesting *Styphelia* sp.

David mentioned that every small town seems to want to have a point of difference – his penultimate image was Wagin's point of difference - an oversize giant ram built to commemorate the Australian wool industry. A warm thanks to David for a great introduction to the flora of western Australia, made all the more impressive by his stunning photography.

The Sequoiodeae: What can extant lineages tell us about evolution? A talk by Jess Paull, 13th November

Alex Wearing

Jess Paull, a Ph.D student (Department of Botany, University of Otago), studying the microbiomes of mosses, shared her passion for the Sequoioideae in a wide-ranging talk that also discussed what this extant lineage can tell us about past and future evolution.

The Sequoioideae are gymnosperms (=seed plants). They are a sub-family of the family Cupressaceae with three genera each containing one species. All three species are endangered.

The Sequoioideae were once a widespread taxon. The first recognisable Sequoia in the fossil record is 200 million years ago during the Jurassic. Its greatest diversity was when the geography of land masses was very different from today.

Metasequoia glyptostroboides (dawn redwood) occurs in south-central China in the border region of Hubei and Hunan provinces and Chongqing municipality. The dawn redwood was thought to be extinct until 1941. Its has a maximum height 50m, and maximum diameter of 8m.

Dawn redwood is the only deciduous sequoia. It is at risk of extinction in the wild due to a small population of about 6,000 and ongoing deforestation. It is legal to collect seed, so there is the possibility that the dawn redwood will disappear from its natural range when remaining mature trees die. On the plus side dawn redwood is extensively planted in arboreta and grown as an ornamental plant throughout the world (including in New Zealand).

Sequoiadendron giganteum (giant sequoia) occurs between 1200m and 2400m on the western slopes of the Sierra Nevada Range in central California. Its habitat is characterised by warm dry summers and snowy winters. The giant sequoia is found in 75 groves and the number of mature trees in each grove range from 6 to 2,000. Outlier trees do not occur.

Giant sequoia can live for more than 3200 years. It has a maximum height of 95m, and a maximum diameter of 11m. Giant sequoia are the world's most massive living organisms. Reproduction is by seed.

Jess and her friend Macky in Muir Woods (redwood)

Giant sequoia is a fire adapted pioneer species. The bark is up to 46cm thick, very fibrous and is resistant to burning and insulates trees from the heat of fires. The young trees are not shade tolerant.

There has been extensive logging of giant sequoia. Much of the felled timber was wasted because it shattered on impact. The timber of giant sequoia was mostly used for fenceposts, shingles and matchsticks.

In 1853, the cutting down of a very large giant sequoia sparked the conservation movement in the United States and became an inspiration for the national park system.

Sequoia sempervirens (coast or coastal redwood) occurs near the west coast of the United States from the extreme south-west of Oregon to Big Sur in California, a range 750km long, that varies in width from 8 to 75km.

Coast redwoods are found in areas subject to coastal fog drip which provides much of their moisture. Constant temperatures and moist soil produce the best growth. Maximum height is linked to fog availability.

Coast redwood is the only monoecious sequoia. Jess Paull said that coast redwood was potentially a result of hybridisation between *Metasequoia* and *Sequoiadendron*.

Recent research has demonstrated that coast redwood has broad peripheral leaves that make up 95 percent of a tree's leaf area and do all the photosynthesis, and axial leaves that make up only 5 per cent of the total leaf area but which are responsible for up to 30 percent of the tree's total water absorption capacity[1]. Coast redwoods can vary their two leaf types to suit their local climate[1].

Coast redwood can live for more than 2000 years The coast redwood is recognised in most sources as the world's tallest living tree. It has a maximum height of 116m, and a maximum diameter of 9m. Coast redwoods reproduce by seeds and by sprouting from root crowns. The young trees are moderately shade tolerant.

Coast redwood has been extensively milled. It was an important source of timber for building and – after fires – rebuilding of San Francisco.

The coast redwood has been promoted as a carbon sequestration champion that could help mitigate climate change, due to its combination of long-life and large size.

With reference to carbon emissions in New Zealand forest biometrician Mark Kimberly has written "Suppose parents or grandparents decide to plant enough trees to cover their child's expected lifetime carbon dioxide emissions. They need to plant 498 totara, 349 kauri or 208 red beech trees. With exotics they'd achieve the goal with 169 radiata pine, 114 *Eucalyptus regnans* or just 99 [coast] redwood trees.[2]" Presumably the long-lived and very large redwoods could keep on absorbing carbon for multiple generations of people.

There are 500,000 giant sequoia, coast redwood and dawn redwood trees in the United Kingdom, the majority of which are giant sequoia[3]. This compares to 80,000 giant sequoias growing in California. Sequoia do not appear to be self-seeding in the United Kingdom, so each were probably planted.

Coast redwood has naturalised in New Zealand[4], at Redwood Forest (6 ha) which is part of Whakarewarewa State Forest Park, near Rotorua. Some trees have grown to heights greater than 70m in just over 100 years. It would be interesting to speculate about the possible maximum height attainable for coast redwood in New Zealand. It is possible that coast redwood in New Zealand may not achieve the same lifespans as trees growing in California.

The Sequoioideae have survived to the present day because of the presence of small areas of favorable climates. Both the giant sequoia and coast redwood are affected by climate change, drought, higher temperatures, hotter fires from the increased buildup of woody litter because of past fire suppression, disease caused by insect attacks, and by human impacts.

Jess Paull said that 40 per cent of gymnosperms were at risk of extinction, as opposed to 20 per cent of all plants. Possible explanations for this are (1), the active displacement theory which posits that the rise of the angiosperms led to the decline of gymnosperms which were outcompeted for limited resources, and (2), that gymnosperms are living fossils – archaic, ancient species that have survived for a long time. Where morphology resembles an earli-

er fossil record of that species, gymnosperm diversity in populations is assumed to be relictual. But similar arguments could be applied to bryophytes, and as Jess Paull said, they are doing “fine”. An extant gymnosperm may look like an ancestor, but it is not necessarily the same as its ancestor. There is likely to be genetic drift and stabilising selection. Resemblance may be more superficial than real. Gymnosperms are not ‘fighting’ their last stands and seem likely to continue to be part of the plant kingdom on all landmasses and in all phytogeographical regions where they presently occur. Gymnosperms can be seen as “persisters.”

Jess Paull posed the question, that with reference to gymnosperms, what can extant lineages tell us about the past. Her answer was not much with certainty.

Jess Paull gave a very interesting talk about three very interesting and notable species, which expanded to consider some ideas about evolution and species ‘fitness’/persistence.

Notes

1 www.theconservation.com/redwood-trees-have-two-types-of-leaves-scientists-find-a-trait-that-could-help-them-survive-in-a-changing-climate-179822. Written by Alana Chin. Published14 April 2022.

2 The Mark Kimberley quote is from: Graves, A. 2024. Arboreal discrimination, *Listener*, 14 December, 90.

3 www. theguardian.com/environment/2024/mar/16/hidden-giants-how-the-uks-500000-redwoods-put-california-in the-shade. Written by J. Tapper. Published 16 May 2024.

4 Historical information on the history of plantings of all three redwoods in New Zealand is given in St Barbe Baker, R. 1965. *Famous Trees of New Zealand*. A.H & A.W. Reed, Wellington.

Field trip to Quarantine Island, 23rd November

Gretchen Brownstein

In November thirteen members of the BSO joined the regular Quarantine Island Kamau Taurua volunteers on Quarantine Island Kamau Taurua, a public Recreation Reserve and an Historic Area in Otago Harbour.

The day started with a boat ride from Port Chalmers over to the island where we got a warm welcome and a little history of the island from Clair Hagglund. We then had a cuppa and some baking to fortify us for our explorations. People then split into groups of 3, 4, or 5-ish people and headed across the island in various directions. Allison’s group explored a lovely lichen covered rock. John Steel’s group headed for the top path through the regenerating bush. While my group opted to explore the cliffs and cracks around the base of the island. All groups picked up a weeding tool or loppers just in case we found a weed that really needed dealing to.

All groups returned to the house for lunch a bit later than initially planned because, as we all know, botanical walking time is related to the number of interesting plants, not track length! After lunch we attempted to help with herding the island’s sheep into some pens for sheering. Our unsuccessful efforts proved that botanists don’t make good sheep dogs.

Despite failing at sheep herding, it was a successful botanical day out. Many thanks to the Quarantine Island Kamau Taurua community for hosting us. If you would like a species list from the day, please contact John Steel or myself.

The view along the Northeastern edge of Quarantine Island Kamau Taurua (Photo: Gretchen Brownstein)

Field trip to Quarantine Island, 23 November 2024

Alex Wearing

Smooth waters accompanied the passage of a contingent of Otago Botanical Society members to Quarantine Island/Kamau Taurua (= a place to set nets), a place with rich Māori and European histories, and an interesting and diverse flora. After morning tea, botanists scattered like seeds expelled from a cone. Some assisted in weeding, some in skink monitoring, but most wandered off in search of plants and prospects.

Quarantine Island is located at approximately the halfway point up Otago Harbour. It is the largest island in Otago Harbour with an area of 15 ha and a maximum elevation of 58 m. Most of the island comprises scoria erupted by the Dunedin volcano (active between 16 and 10 million years ago)[1]. There are also dykes that are more, or less, resistant to erosion than the scoria that they intruded[1]. Differential erosion has produced the present landscape of headlands and guts. Much of the island perimeter consists of steep slopes. There is an extensive summit area with gentle slopes (currently mostly covered with pasture grasses).

Quarantine Island was a significant place for Māori to gather food and resources. Several middens have been found on the island which contain shells and fish bones[1]. Māori had some impact on vegetation of Quarantine Island, with respect to increasing the frequency of disturbance events (including fire). European settlers used Quarantine Island as a quarantine station (1861-1924), military hospital (1915-1919), and for farming[2] and tourism (1924-1968). European settlement led to transformational changes in the botanic landscape. Bush was cleared and much of the island converted to pasture. New plants (mostly introduced, but also some native species not naturally occurring in Otago) were intentionally and unintentionally introduced. Cypresses and pines were planted for shelter and as sources of timber and fuel. Gardens (for food and pleasure) were established. Many of the introduced plants had weedy propensities. Introduced animal species had deleterious effects on the native vegetation. Buildings and tracks were added to the landscape. The impacts and extent of transformation was greatest on the gentler terrain. The upshot was a considerably larger biota, although it sems likely that some native plant species temporarily disappeared from Quarantine Island. The new biota had many introduced - plant and animal - species - whose continuing presence was inimical to the long-term presence of many native species. But native species did persist, notably on the rugged western side of the island, on rock outcrops and cliffs/bluffs, and in deep guts.

Conservation concerns have prevailed since 1958[1,3]. Quarantine Island is now a public recreation reserve and historic precinct managed by the Quarantine Island/Kamau Taurua Community Council Incorporated and the Department of Conservation. Conservation efforts are focused on native bush restoration, the control of problem plants and animals, biodiversity monitoring, and caring for historic buildings.

To produce a comprehensive account of the plants and vegetation of Quarantine Island would require several visits. The following notes are based on few hours of wandering.

Aficionados of Hall's tōtara (*Podocarpus laetus*) will appreciate Quarantine Island. Sprawling Hall's tōtara trees have long intensely twisted branches from near the base of their trunks. But straight single-stemmed Hall's tōtara occurs very close to multi-branched Hall's tōtara reflecting different life-histories. It seems likely that some tōtara seedlings and saplings survived the clearance phase. Some Hall's tōtara saplings (> 2m tall) exhibited evidence of severe physical damage but had resumed growth vis lateral branches. A Hall's tōtara seedling growing amidst rocks in a deep gut was covered in small branches and litter. The unwanted mantle was lifted

Looking back along the top track on Quarantine Island Kamau Taurua (Photo: Gretchen Brownstein)

off to give the seedling a renewed chance of upward growth. This deep gut was steep, and some of its ground surfaces were very unstable. But there were also small 'micro-islands' of relative stability, upon which species such as Hall's tōtara, cabbage tree (*Cordyline australis*), taupata (*Coprosma repens*), bush lily (*Astelia fragrans*) and elderflower (*Sambus nigra*) had managed to establish.

In the low forest stands there were many impressive large ngaio (*Myoporum laetum*) (which was flowering). There were several large kōwhai (*Sophora microphylla*), and its seedlings were numerous at some sites. Several coprosmas, korokio (*Corokia cotoneaster*), kōhūhū (*Pittosporum tenuifolium*), matipo (*Myrsine australis*), and lancewood (*Pseudopanax crassifolius*) were seen in forest stands. Regeneration was plentiful at many bush sites. Two species of mistletoe (*Ileostylus micranthus* and *Korthalsella lindsayi*), which was common at some sites, were seen. Many species were characterised by patchy distribution and their commonness also varied (e.g., māhoe (*Melicytus ramiflorus*), broadleaf (*Griselinia australis*) and ngaio).

Kānuka (*Kunzea ericoides*) and mānuka (*Leptospermum scoparium*), natural and planted, stands were present. Planted rimu (*Dacrydium cupresinum*), mataī (*Prumnopitys taxifolia*), and miro (*Pectinopitys ferruginea*) were seen alongside a track - but with a view to the future - some of the saplings were planted too close together.

On the lower parts of some steep slopes, close to the seashore, *Veronica elliptica* was common. Nearby, further upslope *Olearia avicenniifolia* was present. Aspect and exposure had a strong influence on the vegetation. On exposed aspects there were impressive examples of krummholz/flag-form woody vegetation

The yellow flowers of tree lupins (*Lupinus arboreus*) were attractive, but also served to advertise their unwanted presence. Patches of broom (*Cytisus scoparius*) were also present.

The writer of this report has a predilection for woody plants, but I did notice impressive numbers of flax (*Phormium tenax*) seedlings on some grassland slopes, blue wheat grass (*Anthosachne australasica*) on open grassy slopes, the orchid *Microtus unifolia* on deflated grassland surfaces, and the glasswort (*Salicornia quinqueflora*) on coastal rocks. Considerable fern diversity was observed at several sites

With respect to the botanic landscape the contrast between grass pastures with isolated and small groves of tall cypresses and pines (which draw the eye, especially when viewed from the Otago Peninsula), and native low forest is visually striking, as are the paddocks which are now being 'infilled' with native plantings (that extend over three decades).

In future, the area of Quarantine Island under native woody vegetation will increase. It seems likely that there will be a higher proportion of Hall's totara in the canopy then was present before people arrived. It could be a long time, and require intervention, before Quarantine Island bush has canopies with all the podocarps that occur in coastal Otago. In future, there is likely to be more spontaneous regeneration to supplement the plantings. It is not feasible to eliminate all problem plant species. Control and their spatial restriction are more realistic, although it may be possible to eradicate planted species that are not naturalised, and which are dependent on human intervention. With the spread of bush some of grassy and herbaceous - introduced and native – plants[4] might become less common/widespread, but many are likely to persist.

Acknowledgements

Abundant thanks are due to Gretchen Brownstein for organising and leading the trip, to Claire Haglund and Quarantine Island volunteers for their hospitality and sharing of knowledge, and to John Steel for his invaluable Quarantine Island Checklist.

Notes

1 More information on Quarantine Island/Kamau Tarua) can be found at www.quarantineisland.org.nz

2 There are still a few sheep on the island, which graze the areas of pasture grasses.

3 An interesting information erected many years ago informed the visitor, "In 1996 this dampish south facing slope was largely in weaker grass into which the natives could reinvade" thereby facilitating natural succession.

It would be worthwhile to monitor species growing on possible temporary habitats (e.g., the orchid, *Microstis unifolia*, growing on deflated surfaces).

Catlins adventure weekend, December

Gretchen Brownstein

In early December the Botanical Society had a weekend of botanising in the Catlins. We gathered on Friday night at the Tautuku Forest Cabins to make some (ambitious) plans for the weekend. We ended up with three groups for the Saturday: the Coastal Walkers, a Catlins River Wanderer , and the Third Clearing Mission.

The first two groups had a relaxed start to the day. The Catlins River Wanderer trekked up and back along the Catlins River trail, enjoying the orchids and the peaceful bush. The Coastal Walkers admired the rata just coming into flower around Papatowai and Lake Wilkie. Then fuelled by a coffee from the Lost Gypsy, they carried on do Shanks Bush Nature Trail.

The well caffeinated Third Clearing mission (Gavin, John, Brian, and Gretchen) set off just after 8am starting at the McLean Falls track and then heading cross country on trap lines aiming for a small clearing at the top of the Tautuku catchment. The group set a cracking pace (even by tramping standards) as we were keen to maximise botanising time in the clearing. The first bit of the track was through unlogged forest, so it still had a mixture of big podocarps (rimu, miro, and lowland tōtara) and broadleaved species (*Griselinia littoralis* and *Pterophylla racemosa*). Speeding along we noted the southern rātā (*Metrosideros umbellata*) was flowering and recorded eleven species of filmy fern on the trackside. About halfway along the ridge the track crossed into previously logged forest with kamahi (*Pterophylla racemosa*) and many amazing, massive, multi-stemmed rata. After 3.5 hours on the hoof, we reached our target clearing. Packs were quickly dropped, and the hand lens came out.

The clearing is small fen a couple hundred meters across with a stream flowing the length of it. The ground is generally boggy and wet with a small gravelly island in the middle. Vegetation is shrubland-tussock of mostly *Olearia laxiflora* (just starting to flower), various *Coprosma* spp. including *C. decurva*, and copper tussock (*Chionochloa rubra* spp. *cuprea*). The groundcover was mix of *Isolepis* species and *Juncus* species (including *Juncus pusillus*, and *J. planifolius*), with the usual sedges and the small herbs (*Carex gaudichaudiana, Nertera depressa, Lobelia angulata*, and *Gonocarpus micranthus*). But what caught our eye was the number of orchids (seven species, including the naturally uncommon *Pterostylis cernua*), that unfortunately were just past peak flowering. After 3 hours of lovely botanising in the sun (with a very brief lunch break) having added 29 species to the list, we headed back along the track. While Gavin couldn't entice us into a detour to a second clearing, we took a slightly slower pace on the way out, managing to add another couple of species to the list (including an orchid or two). What was noteworthy was the overwhelming evidence of deer and pigs; there were very few palatable species within browse height and in one spot the understory was completely bare. Also noteworthy was that we made it back to the car before dark!

Saturday evening, we shared a potluck meal, and all three groups tried to top each other's best find of the day (orchids were a theme).

Sunday dawned rainy and without power. The caffeine addicts were rescued by Mike's camp stove. We read books, chatted, and tidied up the species lists while waiting out the rain. By lunchtime the weather had cleared, and the group headed to the dune forest behind Tautuku Beach. This was a proper botany ramble; the first 1km of well-maintained trap line tracks covered in just under 2 hours. The dune forest is unlogged podocarp / broadleaf, including big kamahi, rātā, and rimu. Again, interesting filmy ferns and more orchids. The low wet bits contained a range of *Carex* species (including *Carex dipsacea*). As the track approached the river, mānuka became the dominant tree species. The track ended on the beach, just shy of the river mouth, and the return walk was a relaxed bare-foot amble along the beach enjoying the warm sunshine.

All in all, a successful trip and it's looking like the Catlins Adventure Weekend might feature again in the BSO trip calendar.

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Please submit copy for next newsletter to Lydia Turley by 10th June 2025
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Catlins adventure weekend (Photo: Gretchen Brownstein)

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Right: Fuchsia excorticata *(Artist: Kelly Phillips)*

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