



BOTANICAL SOCIETY

OF OTAGO



Newsletter Number 93
June 2021

BSO Meetings and Field Trips June 2021 - October 2021

9th June 2021, 5:20 pm: Fungi at Orokonui Ecosanctuary. Speaker: David Orlovich, Department of Botany. I have had the privilege of collecting fungi at Orokonui Ecosanctuary on several occasions since it was established. The ecosanctuary hosts an interesting array of fungi, some of which are associated with particular plant species that grow there, and some that are not known from elsewhere in New Zealand. This informal talk will give an overview of the fungi at Orokonui and showcase some of the interesting finds.

19th June, 10:00 am - 2 pm. Lichen Foray at Orokonui Ecosanctuary. Lichens are clever fungi that have discovered agriculture. They are very long-lived and fruit all year round, so there's a good chance of getting up close and personal with some of Orokonui's 'hidden in full view' wildlife. We will help add to a checklist of lichens at the Ecosanctuary. A hand lens or magnifying glass would be helpful for appreciating the amazingly diverse structures, and a camera could help capture the fine detail. Photos can be entered into the Orokonui Photo Challenge or used to extend the indoor displays. Copies of Allison Knight's *Lichens of New Zealand: An Introductory Illustrated Guide* will be for sale at the desk. Bring food and drink if you intend to stay the whole day, or take advantage of the yummy food at the Horopito Cafe at the Sanctuary. A koha to help carry on the impressive work at the Ecosanctuary would be appreciated. The Botanical Society recommends that passengers contribute 10c/km to their carpool drivers - it's a 42 km round trip from the Botany Department. Meet at Botany Department carpark, corner of Great King and Union St, at 10 am to carpool or at 10.30 am at the Ecosanctuary. Please contact Allison Knight 027 4878265, email: allison.knight.nz@gmail.com if you need a ride or can help provide transport.

14th July 2021, 5:20 pm: Almost an island - the remarkable flora and habitats of Banks Peninsula (via zoom). Speaker: Melissa Hutchison. Banks Peninsula comprises approximately 100,000 hectares of volcanic hill country, rising to a height of 920 metres above sea level at its highest point (Mt Herbert-Te Ahu Pātiki). The vegetation pattern is influenced by varied altitudinal and climatic gradients, which have contributed to a unique and diverse indigenous flora (~550 vascular plant species and ~200 lichen species), including a number of endemic species. Prior to human arrival in New Zealand, the Peninsula was largely covered in indigenous forest, but this was rapidly cleared following European colonisation, and by 1920 was reduced to relatively small, isolated fragments, mainly on steep slopes at higher altitudes. Indigenous woody vegetation cover has increased in recent years through natural succession, with primary forest, secondary growth forest and shrubland now covering about 15% of the Peninsula. More than 2200 hectares of land is currently protected in Department of Conservation and Christchurch City Council reserves, with a further 1500 hectares on private land protected through conservation covenants (~120 covenants). The vegetation and flora of the Peninsula has been well-documented by legendary botanist Hugh Wilson, but recent ecological surveys have shown that there are still exciting botanical (and lichenological) discoveries waiting to be found!

24th July, 9 am: Field trip to some local volcanic domes. Mt Kettle (545m) and Mt Cutten (530m) are both phonolitic lava domes formed by the third eruption of the Dunedin volcanic massif. Mt Kettle is named after Charles Kettle, Otago's first surveyor and Mt Cutten after William Cutten, MP and co-founder of the Otago Daily Times. The vegetation around both domes has been extensively modified by early twentieth century settlement when much of the area was divided up into small farms. In the early 1950s an area below Mt Kettle was dammed to form the Cedar Farm reservoir. A good patch of mature and regenerating cedars, *Libocedrus bidwillii*, can be seen from the summit of Mt Kettle. The trip will follow

tracks recently restored by the WEA Walking Group. Meet 9am Botany Department carpark 464 Great King Street North. Rain day will be Sunday 25 July. Contact Robyn Bridges 021 235 8997

8th August, 9 am: Racemans Track. The last field trip of the winter is a trip to the Racemans Track at Whare flat, 20 minutes south of Dunedin. This is a chance to become familiar with using the Dunedin Fern Key to identify some of our local ferns. It will also provide an opportunity to work on those groups, the mosses, liverworts, and hornworts, plants which so enrich our environment yet are largely ignored. A checklist of species for the area will be provided and with the extra pairs of eyes hopefully added to. The start (and end) of the track involves crossing the Silverstream weir so if wet feet are to be avoided, boots will be needed. If water flow is high the start of the McLeans Falls track may be taken as far as the swing bridge which will avoid wet feet, but this track is not in a good state at the moment and its condition will be assessed nearer the time. Leave from Botany Department car park at 9.00 a.m. Contact john.steel@otago.ac.nz.



Mamaku, *Hokianga* (Photo: Philip Dunn)

11th August, 5:20 pm. Seaweeds at the doorstep: the diversity of coastal habitats and the species that are found in the Otago region. Speaker: Wendy Nelson. The Otago region has a great diversity of marine habitats and about 300 species of macroalgae have been reported from the region. I will talk about the seaweed flora of Otago – the major habitat forming species as well as some of the less well known members - and some of the human induced changes and stressors that are influencing native seaweed communities.

8th September, 6pm. Geoff Baylis lecture: Taxonomic revision of native New Zealand forget-me-nots (*Myosotis*, Boraginaceae): An update. Speaker: Heidi M. Meudt, Researcher Botany, Museum of New Zealand Te Papa Tongarewa. Location: Archway 2, 6pm (nibbles at the staff club from 5:15).

New Zealand is a main centre of *Myosotis* diversity, with about half of the c. 90 total species worldwide. Taxonomic revision is a high priority in New Zealand forget-me-nots (*Myosotis*, Boraginaceae), a genus in which most of the species are classified as Threatened, At Risk-Naturally Uncommon, or Data Deficient according to the New Zealand Threatened Classification System (NZTCS). The core focus of my research is to produce a taxonomic revision of all native southern hemisphere *Myosotis* species using analyses of morphological, pollen, genetic and field data. We aim to answer the following questions: How many native southern hemisphere *Myosotis* species are there? How can they be identified? Where are they found? What is their conservation status? Since starting on this project in 2010, my collaborators and I have revised two-thirds of the southern hemisphere species, with the remaining 20 species and tag-names currently under study. This research continues to contribute fundamental data to biodiversity knowledge and databases, and to the NZTCS assessment panel. For example, of the c. 1700 *Myosotis* specimens at Te Papa's herbarium (WELT), almost 30% were collected since 2010, all are databased and imaged, many have been recently curated, and most are online.

(<https://collections.tepapa.govt.nz/search/myosotis%20AND%20image/results>).

In this talk, I will give a broad overview of the *Myosotis* research project results, discoveries, field work, and taxonomic implications to date. I will also highlight work-in-progress and future directions.

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

25th September, 9:00am: Field trip to Portobello QEII Covenant. We have been invited to visit the QEII Covenant on the property of Peter and Jeannie Hayden at Portobello on the Otago Peninsula. The Covenant encompasses a mix of regenerating natives (it is approx. 35 years since sheep were excluded), with broadleaf species pushing up among mainly kanuka forest. Peter has a great network of tracks that take you through various ages and stages of Peninsula vegetation. The other part of the property has a mix of native and exotic species planted over last 25-30 years by a previous owner. Over the last 5 years Peter and Jeannie have been planting additional fruit trees, berry bushes and permaculture garden plots on the balance of the 22-hectare property. They are now actively involved in predator and weed control and 14 rifleman boxes were placed around the property in 2020 to encourage these rare birds to breed locally. There are interesting outcrops and boulder banks as well that have a diverse assemblage of bryophytes and lichens. We will meet at the Botany Department carpark at 9.00 and travel to Portobello. Bring lunch, warm clothing, rain gear and suitable footwear. Contact David Lyttle (email djl1lyttle@gmail.com ph (03) 4545470). Rain day option 26th September.

16th October, 9:00 am: Full day field trip to Herbert Forest. Herbert Forest is a predominantly exotic plantation forest in north Otago managed by Blakely Pacific Limited. Within its matrix, however, are

significant native forest remnants that include some magnificent podocarp stands. We will do a loop track of about 10 km that links together these varied and interesting blocks of native forest. The tracks are well maintained by the North Otago Tramping & Mountaineering Club, but be prepared for numerous stream crossings. Meet at Botany Department carpark at 9am. Contact John Barkla 027 326 7917 or mjbarkla@xtra.co.nz

10th November, 5:20 pm. Modelling Niches and Phylogeny in Celmisiinae (Asteraceae). Speaker: Duncan Nicol. This research is part of ongoing systematic, biogeographic, and ecological studies aiming to deepen the understanding of biodiversity. The subtribe Celmisiinae Saldivia (Asteraceae: Astereae) is a hypothesis of relationships between a number of unresolved genera in the Tasman region and contains ca. 159 species. These genera have a range from New Guinea through Australia and New Zealand. Celmisiinae has a number of interesting features making it useful as a study group to investigate questions with implications for biodiversity more broadly.

Meeting details: Talks are usually on Wednesday evening starting at 5.20 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. Please be prompt as we have to hold the outside door open. Items of botanical interest for our buy, sell and share table are always appreciated. When enough people are feeling sociable we go to dinner afterwards: everyone is welcome to join in. The talks usually finish around 6.30 pm. Keen discussion might continue till 7 pm. Meetings may be held online via zoom while gathering restrictions remain.

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



Ecological processes (Photo: Gretchen Brownstein)

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Cover: Artwork by Sharon Jones. Medium: Watercolour. *Birch Bolete* (*Leccinum scabrum*), Illustrated using live specimens, collected from around the Dunedin area.

Chair's Notes

Gretchen Brownstein

Trips – We ran six field trips last year, spanning environments from coastal turfs to alpine bogs (despite a few COVID-19 disruptions). A very big thank you to the trip leaders! It is a significant amount of work to organise these trips; including arranging land access, doing recce missions to check tracks, sorting out species lists, etc. But on the upside, we get lots of wonderful, positive feedback from attendees! So, thank you John Barkla, David Lyttle, Matt Larcombe, Robyn Bridges, and Angela Brandt!! If you have a suggestion for a place to visit and/or would like to lead a trip, please email Gretchen.

Talks – We hosted nine talks last year on a wide range of subjects: taxonomy, plant/spider interactions, sexy lichens, alpine wetlands, and seaweeds. Thank you to all the speakers, it is a lot of work to put together a talk! With COVID-19, we are becoming better at using zoom and we have joined botanical societies from around the country to make more of our talks and seminars available live via zoom to all our members.

The committee works hard to develop a programme that we think will be of interest the membership. It was great to see so many people participating, as it is about getting together to learn and share botanical knowledge.

Membership – This year there are 68 fully paid members. A big thank you to Mary Anne and Angela for working on keeping the membership database up to date and chasing late payments on the annual subs.

Newsletter – Our newsletter editor, Lydia, has once again done a fantastic job. We produced three volumes of the newsletter this past year. These had a total of 85 pages, including 11 original articles contributed by our members along with numerous reports on the trips and talks held during the year. Members also contributed

lovely botanical photos and artwork to fill the pages. Lydia is always keen for content, get in touch if you would like to contribute.

Committee – A big thanks to the dedicated committee! Many hands make light work. So, thank you to all the old stalwarts (John, Mary Anne, Robyn, David, Angela, Lydia, Sharon, and Allison) and the new committee members (Matt, Aidan, and Taylor) for bringing their wonderful energy and ideas. Sadly, Robyn is stepping down after many years of doing the room bookings and maintaining the membership database. She will be missed, but I'm hopeful we can convince her to keep leading field trips (especially coastal turf ones)!

And lastly, a big thank you to you, our members!! Through members' participation on trips and in talks we all have a chance to share and learn botanical knowledge. Keep going outside, keep checking out that odd leaf/lichen/flower, and keep sharing your findings. Thank you.

Secretary's Notes

Angela Brandt

After seven years as a BSO member, and two years after joining the committee as secretary, I entered a photo in the annual photo competition for the first time. I'm not any kind of skilled photographer. My only qualification, other than owning and knowing how to use a digital camera, is being keen to capture beautiful images (very often of plants!). But my biggest obstacle to entering photos in previous years was that I always had my small point-and-shoot camera set to take pretty low-resolution photos – I wasn't going to print them and could fit more on my camera's memory card that way. So all of my photos until now have been under 1 MB, below the minimum size to qualify for the photo competition.

In the back of my mind, I thought I should fix this so I could submit a photo someday, if I ever got a very good shot. But I always thought of this while looking at all the amazing photos taken by our talented members while voting in the photo competition at the AGMs. The idea would then go right out of my head, so by the time I took my next outing into the bush, I would completely forget to change my camera's settings.

This year, as the committee was preparing everything for the annual photo competition and discussing the idea of swapping in a new category to change things up a bit, I thought I really needed to finally act on my always-good intentions. So when I saw a photo opportunity in January that would suit our new competition category, I changed my camera settings and gave it a go! (Actually, I gave it about 10 goes, hoping there'd be a decent shot amongst those 10...I still marvel at the convenience of digital cameras!) Now that I'm all set up properly, I'll hopefully find many more good opportunities as I head out and about over the next year.

And that's my encouragement to everyone for this year – try something new. Be it writing an article, poem or note for our newsletter, entering a photo in the 2022 competition, or coming along on a field trip (or even leading one!) for the first time. Whether a small thing or a large thing, it is very satisfying to no longer be just thinking, "Someday I'll...".

Editor's Notes

Lydia Turley

One more newsletter out! Thanks, as always, to everyone who made this edition a reality. We could do with some new contributors, so please have a think if there is anything you could write an article about (short and informal is fine!) or if you have any illustrations, pictures or anything you'd like to see in print and send them my way!

The highlight of this edition is the images; Sharon's stunning cover art and the winning photos from our annual competition.

Suggestions and material for the newsletter are always welcome from our members. If you are keen to submit stories, drawings, reviews, opinions, articles, photos or letters – or anything else you think might be of botanical interest to our diverse range of members, don't hesitate to get in touch. Send your feedback, comments or contributions to lydiamturley@gmail.com. Copy for the next newsletter is due on 10 October 2021. Earlier submissions are most welcome.

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

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

Treasurer's Notes

Mary Anne Miller

Please note BSO's postal address has changed. It is now:

Botanical Society of Otago
c/o Department of Botany
University of Otago
P O Box 56
Dunedin
New Zealand

Reminder:

BSO's bank Westpac reminds us they will be cheque-free after 25 June 2021. The alternative for BSO members is online banking. If necessary, Westpac suggests their partner SeniorNet.nz as a

service to help people adjust to this newer technology.

Publications and Newsletters available on loan

The following hard copy publications were recently received by BSO:

Dunedin Naturalists Field Club Newsletter No 139 January 2021

New Zealand Botanical Society Newsletter No. 143 March 2021

Wellington Botanical Society Newsletter April 2021

If you'd like to borrow any of the above please contact me.

Publications for sale

Lichens of New Zealand: An Introductory Illustrated Guide by Allison Knight \$20

Mosses, Liverworts and Lichens: A Guide for Beginners \$18

Contact me if you would like to purchase the above.

maryanne.miller53@gmail.com

New Members

A warm welcome is extended to Rachael Baxter, Sue Maturin, Emma Salmon, Stella Fish, Gavin White, Caitlin Daley and D J Woods. To our existing members, thank you for your continuing support.

Thank you very much to Tess and Tony Molteno for their generous donation.

Statement of Financial Position

Botanical Society of Otago, PO Box 6214, Dunedin North 9059
CC24010

For the year ended 31 March 2021

		2021 (\$)	2020 (\$)
CAPITAL	Current Assets		
	Everyday Account	7,148	6,868
	Audrey Eagle Publishing Account	12,606	12,186
	Business Online Saver Account	5707	5703
	Accounts receivable	0	0
	Inventory – publications, badges, magnets	120	337
	Petty Cash	15	15
	Current Liabilities		
	Sundry payables	0	0
	Working Capital	25,595	23,953
Membership	Total paying members	68	70
	Life members	2	2
	Complimentary newsletters – libraries & allied societies	25	25

Correspondence and News

35th John Child's Bryophyte and Lichen Workshop - Rotorua

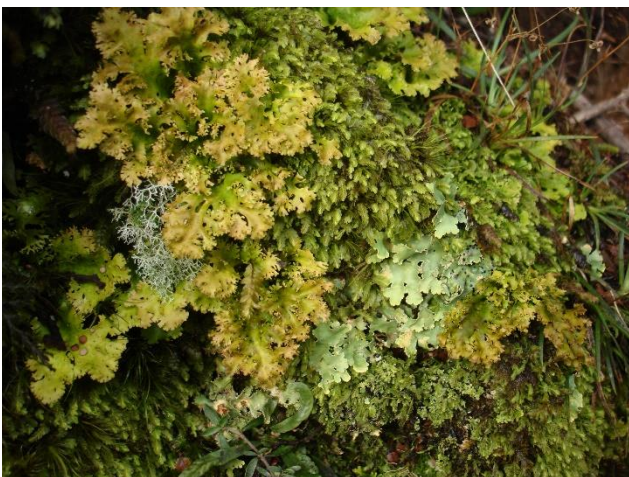
Monday 8th November to Saturday 13th November 2021

Here's your chance to find out more about the lichens, liverworts and bryophytes that are hidden in full view all around you. This workshop is open to anyone interested in bryophytes, lichens and/or epiphytes, from novice amateurs to professional botanists. The aims are to gain and share knowledge of, and to encourage an interest in the mosses, liverworts, hornworts, lichens and epiphytes of New Zealand. Regular attendees are very friendly and willing to help beginners.

For more information contact the organisers:

Shirley Kerr shirley@kaimaibush.co.nz ph: 027 463 5353

Anne Redpath annepathred@gmail.com ph: 07 315 7763



See if you can spot the bryophytes and four species of lichen. Ruahine Range. (Photo: Allison Knight)

Articles

Coastal turfs – revisit to Smaills headland.

Gretchen Brownstein

I recently revisited the headland above Smaills beach, Dunedin, to check out the coastal turf community. Coastal turfs are communities dominated by prostrate forbs, sedges and grasses found along the New Zealand coastline (Rogers 1999, Fig1). The coastal turfs are recognised as a naturally rare ecosystem (Williams et al. 2007) due to their restricted distribution and that they tend to support a disproportionate number of threatened species (Holdaway et al. 2012).



Figure 1. Common turf species: *Samolus repens*, *Selliera radicans*, and *Leptinella dioica* (top photo). And the less common turf species: *Atriplex buchananii* (bottom). (Photo: Cara-Lisa Schloots)

Between 2006 and 2010 we ran a series of experiments on the headland at Smaills beach to examine the drivers influencing the mosaic of coastal turf and pasture community. The distribution of coastal turfs is influenced by maritime salt spray and grazing (see Lee *et al.* 2010, Korsten *et al.* 2013, Rogers and Monks 2016). In the resulting paper (Brownstein *et al.* 2014) we discuss how both spatial and environmental factors appear to be influencing the local distribution. We thought mammalian (sheep and cow) grazing was one of the main factors helping to maintain current distribution of turf on the headland.

Around 2008 the headland was fenced off for restoration purposes and sheep and cows were excluded. I was curious to see what had changed in the last 13 years. Below is a set of photos taken in 2007 and 2021 (Fig. 2). While the area of pure coastal turf is much reduced (showing that grazing was in part maintaining the turfs), the native tussock *Poa astonii* is now doing very well on the headland. Additionally, woody species (e.g. *Veronica elliptica*, *Muehlenbeckia complexa*, and *Coprosma repens*) have established and become wide spread. An indication that this headland is maybe heading back towards a coastal forest habitat that was once dominant on the Otago Peninsula.



Fig 2. The headland in 2007 (left) and 2021 (right). *Poa astonii* has become well established since the headland was fenced off in 2008. (Photo: Cara-Lisa Schloots)

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The strange sex lives of Basidiomycetes

Lydia Turley

Mycorrhizal fungi have become the flavour of the month recently. Locally, research into restoration of beech forest has made us look more closely at the ectomycorrhizal fungi associated with beech trees. Any study of ectomycorrhizal fungi needs to be grounded in an understanding of their ecology and lifecycle. We already know that fungi are weird, and a closer look at their reproductive lifecycle makes them appear even weirder than previously realised.

Basidiomycetes are a group of fungi characterised by specialised spore-producing

structures called basidia and include the traditional “mushrooms”. Hyphae are compartmentalised and movement of nuclei between compartments is prevented by septal pores (Roberson *et al.*, 2010). Most ectomycorrhizal fungi are basidiomycetes.



Basidiomycete mushrooms (Photo: Lydia Turley)

Haploid (containing a single set of DNA) spores are produced on basidia within the fruiting body. These spores are dispersed and land someplace, where they germinate to form haploid mycelium. This mycelium grows until it meets another haploid mycelium. At the point of contact, the two mycelia fuse and create a shared cell, while the remainder of each mycelium remains distinct (Vreeburg *et al.*, 2016). The two mycelia exchange nuclei and form *dikaryons*; each existing as a single individual with two distinct nuclei in each cell. The dikaryon is the dominant stage of the basidiomycete lifecycle, and the fungus goes about its business until it is ready to reproduce. Something triggers formation of a fruiting body (e.g. a mushroom) and in the basidia the two nuclei of the dikaryon fuse to form a diploid which immediately undergoes meiosis in the manner we are familiar with to produce haploid cells and start the process over again.

Of course, that description is too simplistic. One issue is that a newly germinated monokaryotic haploid mycelium isn't guaranteed to meet another haploid mycelium. Instead, it might meet

a dikaryotic mycelium. Since the dikaryon already has two nuclei, it can't exchange nuclei with the haploid mycelium. However, it can still give one of its nuclei to the haploid, in a uni-directional mating. This type of mating (called di-mon mating, or the Buller phenomenon) has several interesting implications.

Firstly, it is weird that fungi exist as dikaryons. In plants and animals, fusion of two gametes is immediately followed by nuclear fusion to form a diploid. If basidiomycetes did the same, then they would mate once and thereafter be stuck as a diploid, unable to fertilise any haploid mycelia they meet. The dikaryotic lifecycle, combined with di-mon mating, allows one individual to mate multiple times (Vreeburg *et al.*, 2016). Since we are talking about gametes, this is the same as allowing one pollen to fertilise multiple ova. Why do basidiomycetes exhibit such extreme promiscuity?

Secondly, di-mon mating involves a dikaryotic individual donating one of its two nuclei to fertilise another mycelium. This has the potential for competition between nuclei to be the one which fertilises this new partner. In fact, differential fitness in this respect has been observed; Nieuwenhuis *et al.* (2011) experimentally crossed various nuclear types and found that some nuclear types exhibited a clear hierarchy of likelihood to fertilise other mycelia when existing in a dikaryon.

Thirdly, this leads to some interesting questions about the population. It is not known how frequent this di-mon mating is in nature. In an area with an established fungal population, it may increase the chances that a young monokaryon (haploid, one nucleus) meets a partner it can mate with. If most matings are of this type, then a nucleus with an allele which makes it superior in fertilising other individuals could spread rapidly throughout a population. If di-mon mating is rare, then why? Perhaps spores tend to land and germinate near other spores, or perhaps

monokaryons preferentially mate with other monokaryons?

The next issue with our model is that not all individuals can mate with each other. In plants and animals we recognise two sexes (in gametes, if not individuals), with mating occurring only between gametes of opposite sexes. Fungi have mating types, analogous to sexes but without the size difference and development roles which distinguishes “male” and “female”. More than half of basidiomycetes have a tetrapolar mating system, in which mating types are determined by alleles at two different loci (Fraser *et al.*, 2007). Two individuals are compatible if they have different mating type alleles at both loci. This reduces the potential for inbreeding between siblings. If a mated pair produces offspring of two mating types, then any individual is able to mate, on average, with half its siblings. Under a tetrapolar system, an individual is able to mate only with the quarter of its siblings which inherited opposite alleles at both loci.

Basidiomycetes can have many different alleles at each mating type locus (Fraser *et al.*, 2007). This means that there can be many different mating types within a population. If an individual encounters another unrelated individual it is highly probable that they will be of different mating types and thus able to mate. Constable and Kokko (2018) simulated the number of mating types in a population with morphologically identical gametes as a function of population size, mutation rate and the propensity of a population to reproduce sexually (as opposed to asexually). They found that frequent sexual reproduction allows the maintenance of large numbers of distinct mating types within a population (Constable and Kokko, 2018). This suggests that the existence of regular mating promotes multiallelic mating type loci which in turn increase the chances that compatible mating types meet.

With a mating system that seems so strange, do basidiomycete populations behave and evolve similarly to the diploid populations we are used to studying, or do the differences run deep? I intend to model population dynamics in these fungi in an attempt to begin to understand the implications of this fascinating system.

Haploid: having one set of DNA

Diploid: having two sets of DNA in one nucleus

Monokaryon: having one nucleus in a cell

Dikaryon: having two distinct nuclei in one cell

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The rediscovery of *Myosotis rakiura* on the Otago Peninsula

John Barkla

On the 4th of March 2021, I visited Sandymount on the Otago Peninsula to undertake a survey of the shrub *Melicactus* aff. *crassifolius* “Cape Saunders”. While searching steep coastal slopes I discovered a small population of the Stewart Island forget-me-not (*Myosotis rakiura*). This appears to be the only record for the Otago Peninsula in over 30 years and probably represents the most northern occurrence of this species.

Myosotis rakiura is an endemic species of south and south-eastern South Island, Stewart and Snares Islands (also islands of Foveaux Strait including Solander Island). It is a scarce species in the South Island but can be locally common on Stewart Island. It has a conservation status of ‘At Risk – Naturally Uncommon’.

Sandymount site

Three plants were growing on a ledge of basalt rock in a shallow gully on a steep, rocky, south-facing slope between ‘The Chasm’ and ‘Lovers Leap’ at approximately 160 m above sea level (Fig. 1). Associated native species included shore spleenwort (*Asplenium obtusatum*), shore hebe (*Veronica elliptica*), blue shore tussock (*Poa astonii*), and *Senecio matatini* subsp. *basinudus*.



Myosotis rakiura, Sandymount (Photo: John Barkla)

Past records of *Myosotis rakiura* on Otago Peninsula

Past presence of *Myosotis rakiura* on the Otago Peninsula is summarised in Johnson et al. (2019). The naturalist and botanist George Simpson (1880-1952) scribbled the note “St Clair and Sandymount” against the entry of *Myosotis rakiura* in his copy of Cheeseman’s Manual of the New Zealand flora (1925). The Dunedin Naturalists’ Field Club (1932) list it from “Blackhead, St Clair, Hoopers Inlet, Seaview, etc.” Martin (1962) stated that it still occurred near Cape Saunders. More recently, a single plant was recognised and photographed by Brian Patrick in 1990 on cliffs at Highcliff.

This large forget-me-not of southern coasts appears to have declined where it reached its northern limit in the Dunedin area. It is still currently known from three small populations below Cargills Castle, just west of Otago Peninsula.

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Meeting and Trip Reports

Fossil wood, a talk by Mathew Vanner, 10th February 2021

Lydia Turley

Mathew gave a very interesting talk about fossil wood. I've heard about fossils of leaves and pollen, but not much about wood. Apparently fossil wood is a good thing to study as it is abundant and robust to erosion, and (unlike pollen) usually fossilizes near where the plant actually grew. I'm left wondering why we don't hear more about wood fossils!

Mathew described his work in the context of a field site on the Chatham Islands. He went fossil-hunting in the Tupurangi formation, a mid-Cretaceous (~100Ma) river delta which existed at the time at approximately 80 degrees South – in what is now probably Antarctica. Most of the original forest of the Chathams has been cleared, but this fossil formation contains fossils of forest plants.

There are three ways to identify fossil wood. The first is to take a thin section, grinding the fossil down to 30 microns thick and looking at it under a microscope. Apparently this method is also used for identifying rocks, and is Mathew's preferred technique. The second method is called "charcoalifying", involves burning out all organic material that isn't cell wall, and can only be used on material that isn't rock. I must confess to being somewhat confused as to how something can be a fossil if it is not rock. The third method is to look at the fossils under a scanning electron microscope. In addition to being very expensive, Mathew claims that this yields great results about half the time and terrible results the other half.

Having figured out how to look at the fossil, we need to observe the wood from three orientations. A transverse cut (producing a circular cross-section) is taken, from which we can observe

axial parenchyma and tracheid pits. A ray cut (from the centre out to the bark) and tangential longitude (like the side of a plank of wood) complete the angles from which we need to look at the wood. These sections and their features are compared to modern wood and other fossils to make an identification.

Mathew had lovely pictures of all these sections from some of his Chatham fossils, and we had fun trying to identify them. Angiosperms are easy to identify because they have large vessels, and the absence of large vessels identified the Chatham wood as being coniferous, despite the modern day absence of conifers of the Chatham Islands.

Overall, it was an interesting talk on an unfamiliar topic. Thanks, Mathew, for sharing your knowledge with us!

Field trip to Oteake Conservation Park, 12th February 2021

David Lyttle

Five people turned up at the DOC Homestead Campsite on Friday evening and settled down for the night, two sleeping in car, two in tents and another in the luxury of their own caravan. On the following morning we headed up Mt St Bathans on a convenient 4WD track up a long leading spur. Our first stop was a bog where we spotted *Microseris scapigera*, a rare native dandelion relative, growing amongst *Oreobulus pectinatus* and *Gonocarpus micranthus*. The vegetation at lower elevations is mainly tussock grassland dominated by snow tussock, *Chionochloa rigida* subsp. *rigida* with grey scrub in the gullies. It has been burned and heavily grazed in the past but the species that survive under these conditions, for example, *Discaria toumatou* (matagouri), *Celmisia lyallii* (false spaniard) and *Aciphylla aurea* (golden spaniard) were all present and thriving. The latter species was represented by the narrow-leaved North Otago form. On a dry north

-facing slope we located three species of *Raoulia*; *R. subsericea*, *R. australis* and the less common *R. parkii*. Other species present on these dry sites included *Scleranthus uniflorus*, *Coprosma petriei*, *Veronica pimelioides* subsp. *pimelioides*, *Kelleria dieffenbachii*, *Pimelea traversii* and *Carmichaelia vexillata*. This low-growing species, which is the local counterpart to the more widespread species *Carmichaelia monroi*, occurred in good numbers on the better-drained open sites. Numerous specimens of another rare native broom, *Carmichaelia crassicaulis* subsp. *crassicaulis*, were scattered through this montane tussock grassland and many of the plants were still in flower. At 1200 m elevation the vegetation began to change subtly and assume a more subalpine character. At 1400 m we reached our first low alpine scree where we were rewarded with an extraordinary suite of plants with *Leucogenes grandiceps*, *Pimelea notia*, *Colobanthus buchananii* and *Brachyglottis haastii* growing on the rock outcrops with *Ranunculus crithmifolius*, *Raoulia petriensis*, *Senecio matatini* subsp. *discoideus*, and the rare scree pea *Montigena novae-zelandiae* growing on the surrounding scree itself. The foliage of *Ranunculus crithmifolius* is so effectively camouflaged it is difficult to spot the plant unless one is literally standing on top of it. The flowering scape bends downwards when the seed ripens, burying the seeds in the soil and thus ensuring their germination in a favourable site. By this stage the party was becoming a bit weary and overburdened with too many new plant names so turned for home. However, on the way down we found some orange fruited *Nertera balfouriana* growing in an alpine bog.

Next day the party was down to four, so we drove up the East Branch of the Manuherikia where we spent the first part of the day looking at the grey scrub shrublands on the valley floor. The main plant of interest here was *Coprosma intertexta* which is locally common growing alongside *Discaria toumatou* and the shrub daisies, *Olearia odorata* and *Olearia bullata*. We were able to

drive to Little Omarama Saddle at the head of the valley which, at an elevation of 1400 m, was the same height as we had reached the previous day. We found more *Ranunculus crithmifolius* but none of the other scree plants we had seen the previous day. We did see a second species of speargrass, *Aciphylla montana* and several specimens of the large gentian, *Gentianella corymbifera* in full flower.

All things considered a very successful trip. What was lacking in numbers was made up for by the enthusiasm of the participants.

Participants: Sam Gale, Dave Holland, Ivan Lin, Kath Graham, David Lyttle.

Helicopter trip to Dead Horse Lake, End Peak 27th March

David Lyttle

The End Peak wetland complex is an example of a southern hemisphere patterned wetland and is the subject of Botany MSc student Cara-Lisa Schloots' project. Cara-Lisa had given a talk on her project to the BSO earlier in the month and I had visited the site earlier in January with Heidi Meudt and Ant Kusabs from Te Papa when it was mostly under snow. The object on that occasion was to study the rare forget-me not *Myosotis glabrescens* which had been found there the previous year. We managed to locate a couple of plants but the conditions were miserable, so I was keen to go back with Cara-Lisa and get a better look at the site and the plants growing there.

Our party of five arrived at Aspiring Helicopters base on the Wanaka Mt Aspiring Road and were duly processed and weighed. The weather forecast was OK to fly so at 12.30 pm we all got in the Aspiring Helicopters Squirrel and after a very short flight were delivered to Dead Horse Lake at 1800 m more or less directly above the base. The pilot promised he would be back by 5.00 pm to collect us. He arrived 15 minutes early

so we had to scramble back to make the rendezvous.

The lake sits in a small hollow formed by glacial action during the last ice age. The vegetation pattern around the lake is quite complex with tussock grassland dominated by *Chionochloa macra* on the more stable sheltered slopes. There is typical Central Otago cushionfield vegetation dominated by *Dracophyllum muscoides* on the more exposed sites. The wetland stretches back from the head of the lake towards some steep talus slopes above which are a line of bluffs. These slopes support a subalpine fellfield community which is where the *Myosotis glabrescens* occurs. It is a very distinctive species and is confined to damp sites predominantly beside flowing streams on slopes that hold snow over winter. There seems to be a reasonably healthy population present in the basin although it is confined to a small area. We did not have time to make a thorough survey. The area is on the transition zone between the wetter mountains to the west and the dryer Central Otago block mountains. The most common speargrass associated with the tussock grassland is *Aciphylla kirkii* which extends southwards to the Old Man Range but is not a particularly prominent species there. In the alpine herbfield on the slopes above the lake we found *Ranunculus buechananii*, and *Anisotome pilifera* growing in rock crevices. Both these species are very susceptible to browsing. Further finds of interest were *Leptinella pectinata* subsp. *willcoxii*, *Epilobium purpuratum* and *Veronica petriei* all species with a predominantly western distribution. Another significant find was *Veronica planopetiolata*. This also occurs a little way to the north on Treble Cone and these two records represent the known eastern limit of this species.

After being delivered back to Aspiring Helicopters base we drove to Highland Creek Hut where we re-joined the rest of the BSO Mahu Whenua party for the remainder of the weekend.

Helicopter flight participants: Cara-Lisa Schloots, David Lyttle, Ivan Lin, Kath Graham, Dhana Pillai.

Field Trip to Quoin Point, 10th April 2021

Stella Fish

Gathering in the Botany Department car park, a group of six set out to Quoin Point despite the cold weather and drizzly forecast.



Quoin Point facing the Ocean (Photo: Stella Fish)

Upon arrival we were greeted by a charismatic bob of *Arctocephalus forsteri* scattered on the rocks and grass; babies scampered surprisingly quickly into the surf whereas adults lazily snorted at us as we picked our way round them (after obligatory cooing).



A bob of seals, one showing off a particularly stunning side profile (Photo: Stella Fish)

Once the seals were behind us and we were no longer in danger of stepping on them, we were finally able to achieve what we had come for, bending over and looking at the halophytic, low growing plants living in this exposed location. Commonly seen was *Leptinella dioica* growing amongst various grasses as well as *Colobanthus muelleri* which enticed us with their small flowers and lovely form.

As more ground was covered, patches of *Muehlenbeckia axillaris* were spotted by Kath both on rocks and turves. Although small, their flowers were more than enough to keep four of us occupied for some time hunting out both the separate female and male plant colonies, with the latter having bright pink stamens; a lovely splash of colour on a grey day. Kath's enthusiasm for these distinct colonies was infectious. As more investigation was done into these patches a fruit was found, tucked away beneath the grass growing with the male plants. Amazingly enough, even when we walked away to investigate another patch we were able to find the fruit again, the plant had really captured our eyes!



A *M. axillaris* fruit, hidden in the grass (Photo: Stella Fish)

As the drizzle began to increase, we stopped in a shelter underneath a tree and were greeted by two lovely ferns perched upon a rocky wall,

Asplenium obtusatum and *Austroblechnum banksii*.



The bright stamen of *M. axillaris* contrasting with the yellow petals (Photo: Stella Fish)

Lunch was a damp affair sheltering behind a group of different *Coprosma* species with one plant harbouring some *Asplenium flaccidum* and *Zealandia pustulata* tucked safely away. Attempts to key out the *Coprosma* species were undertaken and we thought we might have found *Coprosma obconica*. However, work done after the trip has informed us it was just *C. propinqua*. But the excitement kept us warm and kept everyone's spirits up. After lunch, John and I walked along the coast to try to find the elusive *Lepidium tenuicaule*. Along the way, *Myrsine australis*, *Asplenium hookerianum*, *A. lyallii*, *Austroblechnum penna-marina* and others were found. Upon reaching a heavily grazed and exposed area we set to work hunting for our desired plant. After much bending over and searching, *Lepidium tenuicaule* was found amongst a carpet of *Acaena microphylla*: a great end to a wet day.

Many thanks to Robyn Bridges for organising a trip to such a special place.

Participants: John Steel, Robyn Bridges, Gretchen Brownstein, Kath Graham, Dave Woods, Stella Fish.

For a copy of the species list contact john.steel@otago.ac.nz.



Lepidium tenuicaule surrounded by *Acaena microphylla*
(Photo: Stella Fish)

Botanical Photo Competition, 12th May 2021

John Barkla

This year's competition started with a grumble from the presiding judge Rod Morris. Rod's complaint – the standard was too high making the judges' job too difficult!

Peter Johnson, who along with Rod and Kelvin Lloyd made up the trio of judges, had prepared a great powerpoint presentation for the occasion but unfortunately couldn't make it on the night. The presentation was peppered with images from Peter's own garden and creativity and came with notes that “*read like poetry*”. Rod ably led us through the presentation starting with a few facts and figures and comparisons with previous competitions. This year there were 46 entries from 11 contributors which was not too different from the average over the past decade, but a little down from last year.

The category ‘Plant Portrait’ was most popular with 26 entries, followed by ‘Plants in the Landscape’ (16 entries) and a new category, ‘Urban Ecology’ (4 entries).

Rod gave helpful and encouraging feedback on each entry and it quickly became clear that the judges had sometimes had vigorous debate before arriving at a consensus. There was discussion on novel perspectives, and the merits of “gardening” the scene before photographing it.

At the conclusion Rod noted that the new category ‘Urban Ecology’ had not attracted many entries. He wondered if there were alternative categories that might be more appealing. Suggestions from the audience included alpine/forest, texture/pattern, symmetry/asymmetry, berries/bark... Let the committee know if you have a view on this.

Many thanks are due to Rod, Peter and Kelvin for sharing their collective wisdom on what makes a winning image.

Results:

Plant Portrait: John Barkla “*Adenochilus gracilis*, silver beech forest, Takitimu Mountains”

Plants in the Landscape: John Barkla “Defiant before the storm – *Chionochoa macra*, Dunstan Range”

Urban Ecology: Allison Knight “Life behind bars. *Xanthoria* infected by fungus, Orokonui Ecosanctuary”

People's Choice: John Barkla “Defiant before the storm – *Chionochoa macra*, Dunstan Mountains”



Adenochilus gracilis, silver beech forest, Takitimu Mountains (Photo: John Barkla)



Defiant before the storm – *Chionochloa macra*, Dunstan Range (Photo: John Barkla)

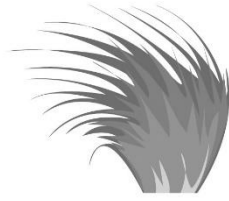


Life behind bars. Xanthoria parietina infected by more than one lichenicolous fungus, Orokonui Ecosanctuary (Photo: Allison Knight)

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