BOTANICAL SOCIETY

OF OTAGO

Newsletter Number 79

October 2016

BSO Meetings and Field Trips

Wednesday 12th October 5.20 pm Botanical Show and Tell. BSO periodically runs a member's night. This is a chance for members to bring some item of botanical interest to the meeting and talk about it. This year prizes will be presented to the winners of the Audrey Eagle Botanical Drawing Competition and their drawings will be on display. Some of the drawings may be for sale and members are welcome to bring other botanical art for display and/or sale. Other items of interest may be plants, books, photos or other printed material, a brief PowerPoint presentation or anything with a botanical theme. So turn up with your treasures, trophies, experiences and questions and share them with fellow BSO members for an entertaining and lively evening.

Saturday 29th October 8.30 am Field trip to Knights Bush, Tuapeka West. Knight's Bush is one of the last remaining remnants of indigenous forest on the banks of the Clutha River. There are diverse plant communities spread over the 228 ha block and these support a rich community of lichens! Remnants of the original kowhai and small-leaved shrubs commonly hang on to the sunny north-facing slopes; kanuka stands from historic to recent are evidence of milling operations through the 19th and 20th centuries and the extensive Nothofagaceae forest is also at various stages of regeneration (and taxonomy!). There is a stand of ancient totara and matai on a south-facing slope which dates back hundreds of years while on the river flat kahikatea are emerging again from the broad-leaved forest and totara are regenerating well. A biodiversity reserve within the forest has been fenced to aid regeneration. 4WD is needed to get across the access paddocks and boots with good grip are advisable. There is way more than can be seen in one day, so you are welcome to stay in the primitive log hut (book ahead) or to carry a tent in. You are also welcome to take home seedlings from under the biodiversity fence. Rain date Sunday 30th October. Contact Allison Knight 4878265 or 027 4878265

Saturday 5th November 8.00 am Field Trip to Fiddlers Flat, Manuherikia River. Fiddlers Flat is a relatively new conservation area arising from the tenure review of Home Hills Pastoral Lease. It is alongside the Manuherikia River below Falls Dam near St Bathans. Terraces and small rock outcrops support a range of dryland vegetation communities that include at least 10 nationally threatened plants (including three species of native brooms). This trip involves 2 hours driving each way (approx. 340 km). Depart Botany car park at 8am return 6pm. Contact John Barkla (03) 476 3686 or email jbarkla@doc.govt.nz.

Wednesday 9th November 5.20 pm Alpine Flora of the Cordillera Blanca, Peru. Speaker: Jaz Morris, Teaching Fellow and PhD candidate, Botany Department, University of Otago. In mid 2016 Jaz Morris travelled to Peru as a member of a New Zealand Alpine Team Expedition to the Cordillera Blanca mountain range. In between mountaineering trips from base camps in Quebrada (Valley) Paron and Quebrada, Santa Cruz, Jaz managed to find time to do a little botanising amongst the colourful alpine flora of the Andes. With striking similarities and differences from the alpine flora of New Zealand, the botany of this area is extremely attractive. Large trees in the Rosaceae covered in beautiful mistletoes and *Passiflora* spp. grow to 4800m in elevation before yielding to an alpine flora of cushion plants, cacti, tussock, and the ubiquitous taulli, a very pretty form of lupin. Jaz will show a range of photos of general botanical interest taken on his travels.

Wednesday 7th December 6.00 pm End of year dinner at Buddha Stix, 678 George Street. Come and share an Asian Fusion Thai Feast. Cost $35. Please book with Robyn before 5 pm on Monday 5th December. Phone 021 235 8997. Email robyn.j.bridges@gmail.com

Saturday 10th December – Sunday 11th December Field Trip to the Mavora Lakes Park. Mavora Lakes Park is an impressive landscape of mountains, lakes, forest and tussock grassland. There are a variety of different vegetation types including beech forest, wetlands, river flats, tussock grassland and lakeside turfs. It is possible to gain access to the Livingstone Mountains on the west and the Thomson Mountains on the east. There are stunning views up the Winton Burn and the Mararoa Valley from the head of North Mavora Lake. Access to Mavora Lakes is via a gravel road off SH94, 30 km north of Mossburn. We anticipate we will be running a number of field trips to different locations to cater for different interests and levels of fitness. A possible trip for the more adventurous would be to climb Mt Cerberus (1568 m) where we could look at the distinctive alpine flora of the Livingstone Mountains. We will stay at the DOC campsite at the Mavora Lakes. Fees are $8.00 per person per night. We will travel to Mavora Lakes on Friday afternoon and spend Saturday in the field with another opportunity to botanise on Sunday morning. Facilities are basic. Bring your own tent, sleeping bag, cooking gear, food, sandfly repellent etc. Be prepared for adverse weather at both the camp site and in the field. If you wish to come on this trip contact the trip leader David Lyttle (03) 454 5470 or email djlyttle@ihug.co.nz

North Mavora Lake with Livingstone Mountains on the right.(Photo: David Lyttle).

Saturday 4th February 8.00 am Field Trip to Herbert Forest. One of the positive aspects to come out of plantation forestry has been the setting aside of areas of native vegetation that might otherwise have missed out on protection. Blakely Pacific's forestry operations at Herbert encircle a number of such

areas. Subject to forestry operations this field trip will take us into one of several examples of dry, coastal podocarp forest. Leaving early and returning late afternoon. Further details on our website nearer to the time. Contact John Steel 021 2133 170, email john.steel@otago.ac.nz

Wed 22nd February 5.20 pm Botanical gems of Stewart Island/Rakiura. Speaker: John Barkla, Department of Conservation. Over the past year John and Marilyn have undertaken a couple of long tramping trips through Stewart Island/Rakiura reacquainting themselves with the island's amazing biodiversity they first experienced over 25 years ago. John will talk about the special plants and ecosystems for which Stewart Island/Rakiura is now the national stronghold.

Wednesday 8th March 5.20 pm Breaking Down Decomposition: Using Teabags to Investigate Decomposition Rates along Aspect and Elevation Gradients. Speaker: Dr. Barbara J. Anderson, Ecologist and Research Scientist, Landcare Research. Barbara and her colleagues use the newly developed Tea Bag Index (TBI) to investigate the relative effects of microclimate on decomposition rate along aspect and elevation gradients on Mt. Cardrona, Central Otago, from 500m to 1936m. The Teabag Index exploits the difference in relative decomposability of Green Tea and Red Tea to construct a decomposition curve over a single three month time period. This allows them to estimate both the decomposition rate and the litter stabilisation factor. Taking advantage of the standardised and cost-effective nature of the Teabag Index they were able to investigate both the fine-scale and whole mountain differences in decomposition rate.

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

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

http://www.otago.ac.nz/botany/bso/

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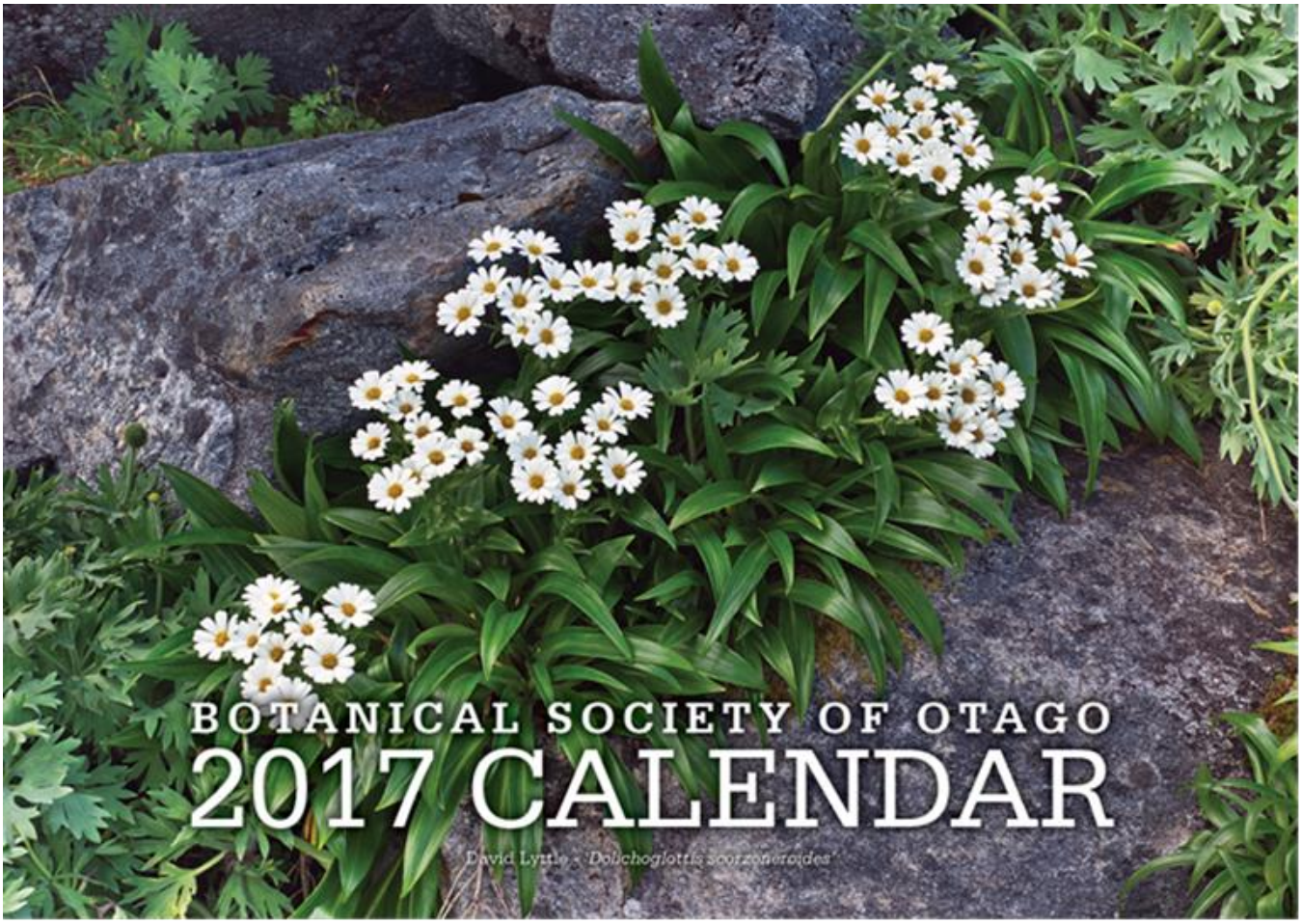


The Botanical Society of Otago's 2017 calendar is on sale now

$20 ea. (or multiple copies for $18 ea.)

[add $2.50 for mail orders]

Available 1 – 3 pm from the Botany Department Reception, University of Otago (**cheque or correct amount of cash only**) & at Society meetings
For electronic payment email the Botanical Society of Otago (bso@otago.ac.nz)
with your name, address, and whether you want to collect the calendar from Botany Department reception or have it posted, and payment details will be sent
All proceeds to the Botanical Society of Otago http://www.otago.ac.nz/botany/bso/

Chairman's Notes

David Lyttle

The past months have been a busy time for the BSO with a very full programme of lectures and field trips. At our June lecture by Associate Professor Richard Gill on desert plant communities in south west United States we were introduced to the phenomenon of biological soil crusts made up of bryophytes, lichens and algae. Similar crusts occur on the dry saline soils of Central Otago. In July Dr Justin Marshall, University of Otago explored the horticultural technology used by the Chatham Island Moriori to manage the production of fruit from *Corynocarpus laevigatus* which provided them with an essential food resource. The 2016 Geoff Baylis lecture was given by Dr Nick Mortimer from GNS Science, Dunedin who traced the geological history of the New Zealand continental land mass. Understanding the origins of present day New Zealand is a prerequisite to understanding how New Zealand's distinct biota came into being. It was gratifying that this lecture attracted one of the best attendances for a Geoff Baylis Lecture we have had in recent years. The winter field trips have also been very popular especially with the student members of the Society showing that the BSO is in good heart. In July we participated in the "Our Living World" adjunct to the New Zealand International Science Festival by setting up displays and running a field trip on weeds at the Dunedin Botanic Gardens. We are becoming quite practised at presenting material at these events but we are not getting particularly good attendances from the general public for whom these presentations are intended. It is important that the BSO continues to engage with the public both to promote the Society and botanical science in general, so any suggestions on how we might raise our profile are welcome. It was almost a relief that both August events; the lecture by Dr Barbara Anderson and the field trip to the Lower Taieri Gorge were cancelled; the lecture because of illness and the field trip because of weather. We hope to reschedule them for next year.

I recently purchased a new lens for my camera, a 16-35mm wide angle lens. It is a marvel of optical engineering and performs pretty much in line with its specifications which hopefully justifies the price I paid for it. Until now I have mainly been using a macro lens for my photography which enables me to get down close and look at my subjects in great detail. The virtue of a wide angle lens is that you can place plants in the landscape and this leads to an entirely different perspective of the natural world. Picture 1 (below) was taken at Dans Paddock in the Dart Valley with matagouri (*Discaria toumatou*) forest occupying the alluvial fan formed by the massive eroding gully beneath Turret Head. Beech forest occupies the valley slopes and gives way to tussock grassland above treeline which in turn gives way to screes bluffs and bare rock.

Picture 2 (below) is of the Kakanui Mountains from a high alluvial terrace where State Highway 85 approaches Kyeburn from the north. We still have matagouri existing in a pastoral landscape but overall, the more abundant species is scotch broom (*Cytisus scoparius*) with exotic conifers, willows and poplars present as well.

Picture 3 (below) is a view of Lake Hayes in the Wakatipu Basin. Native vegetation is almost absent from the lake margin except in a few places where a few token species have been replanted (with scant regard to eco-sourcing). The main tree pictured here is hawthorn (*Crataegus monogyna*) loaded with fruit, with willow and other exotics abundant as well.

The ecological parameters governing the type of vegetation present in these landscapes have not changed; human activity has largely extirpated the original native vegetation and replaced it with a suite of exotic species that are now thriving virtually unchecked. In his 2015 Geoff Baylis lecture "The discovery of slowness: life in the plant lane" Professor Steven Higgins was at pains to point out that the evolution of plants and the landscapes they inhabit is a slow almost imperceptible process to the human observer. Increasingly we have come to accept these modified landscapes formed by human activity as normal, desirable and even marketable.

The Government's initiative to make New Zealand predator–free by eliminating rats, stoats, and possums by 2050 is laudable but in reality is at this stage only aspirational. At least the threats facing our native vertebrate fauna have impacted sufficiently on public consciousness for it to have become a political issue. However for our indigenous plants the situation is not so fortunate. The New Zealand Threat Classification System (NZTCS) assesses the conservation status of species according to the risk of extinction they face within New Zealand. Since the 2012 round of assessment many species have lost ground and this trend is likely to continue into the future. The goal of re-instating native plants in our landscapes needs to be given serious consideration. It is not a question of sacrificing productive land but of managing amenity areas and non-productive land so that native vegetation, rather than the exotic weeds that presently occupy these spaces, is encouraged to thrive.

Secretary's Notes

Allison Knight

What's come in the mailbox since the last newsletter? Other botanical societies continue to pass on all sorts of interesting news and ideas. Wanganui Museum Bot. Soc. are full of good ideas, like emailing out a plant list before field trips. Doing this certainly added interest to John Steel's very successful field trip to Waianakarua Scenic Reserve. There was an exceptionally good turnout and several new and uncommon plants and over 60 lichens were added to the list. Next year we hope to implement Wanganui's idea of holding a workshop on how a herbarium works and how to prepare significant plants, including weeds, lichens and mosses to create a permanent record. Waikato Bot. Soc. passed on details and the registration form for the annual John Child Bryophyte and Lichen Workshop,

which will be held in the Coromandel in the first week of December. This is open to anyone interested in learning more about these non-vascular plants that together make up more than half of New Zealand's flora. Wellington Bot. Soc.'s programme includes an interesting summer trip based in North-West Nelson with its fascinating geology and plant life. A contingent from Otago is planning to join them in mid-January.

For the academically inclined, Auckland Bot. Soc. are calling for applications for their Lucy Cranwell Grant for Botanical Student Research, which are due on 9th December. The recipients of our own Peter Bannister Student Field Grant have recently been chosen and it is good to see them finding time to participate in Bot. Soc. activities. A notice in the New Zealand Plant Conservation Network June newsletter alerted us to the QEII Trust's call for applications for the Brian Molloy Doctoral Research Scholarship. Applications for the next round close on 12 October. Finally, the University of Otago August Bulletin brought the news that Monica Tromp, who spoke to us in March on her work on analysing diet by examining ancient dental plaque, has been awarded a post-doctorate position at the new Max Planck Institute for the Science of Human History in Germany. Congratulations, Monica!

Winter largely passed me by while I was enjoying the lichens of Scandinavia, first on an adventure kayaking trip round some of the thousands of islands off the coast of Sweden, then in Helsinki during an international lichen conference (IAL8). We can be inspired by overseas botanists, too. Helsinki Botanic Garden is setting up all sorts of innovative and educational gardens, including one laid out in the form of a phylogenetic tree, a sensory garden to be walked round in bare feet and, my favourite, dedicated lichen and moss gardens – it would be great if Dunedin could follow suit!

The climax of my trip was a wonderful field trip to Lapland with a very international group of keen lichenologists, reindeer walking all over the road and lichens everywhere, some familiar and some not. You can hear more about that next year....

Treasurer's Notes

Mary Anne Miller

Please note the 2017 subscription form is on the last page of this Newsletter. You can ensure continued membership for the coming year by paying subs from now on. Also note the rate of membership remains the same as the previous year. Please contact me if you're unsure of your membership status - we previously had a five year subscription system operating, which made it difficult to keep track of payments.

maryanne.miller53@gmail.com

Editor's Notes

Kate Caldwell

A massive thank you to everyone who has contributed to this bumper issue of the newsletter. If you have ideas or suggestions for the newsletter, or if you would like to contribute an article, photograph or drawing to the next issue, your submissions are welcome.

Thank you to BSO member Rebecca Brown-Thompson for allowing us to reproduce her beautiful illustration of *Melicytus flexuosus* on the cover of this issue. To see more of her work visit:

http://www.rbrown-designs.com/gallery.htm

Please submit copy for the next newsletter before 15th January 2017.

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 kate.caldwell@dcc.govt.nz 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.

New Members

A warm welcome is extended to new BSO member Ian Geary. We also thank Toni Wilson for her kind donation.

Correspondence and News

Wellington Botanical Society Summer Trip, 11–18 January 2017:

Field trip North-west Nelson Base camp: "The Outpost", Mangarakau. http://theoutpost.kiwi. Sleeps 28 indoors; plenty of tent sites. Located in DOC reserve between Kahurangi National Park & Tai Tapu Marine Reserve. Near NZ Native Forest Restoration Trust's Mangarakau Swamp - largest remaining wetland in Nelson / Marlborough region. Fascinating native plants & wildlife. About 5-hr drive from Picton, & 1 hr west of Collingwood. Full details & booking form in Wellington Botanical Society Newsletter, September 2016 or visit http://wellingtonbotsoc.org.nz/trips_2016.html

Have you seen these fungi?

Andy Nilsen

Hi all BSO members,

We are currently working on an exciting project that requires the cultivation of some interesting fungi, but first we need to find them! The project aims to elucidate the molecular mechanisms behind the evolution of the truffle-like fungi. In order to do this, we are cultivating truffle-like fungi and their next closet mushroom-like relative. Using comparative genomics and transcriptomics we hope to tease out the underlying mechanisms that has led to the truffle-like morphology. We are currently searching for *Clavogaster virescens*, *Leratiomyces ceres* and *Stropharia rugosoannulata*.

Clavogaster virescens *(Photo: Andy Nilsen)*

Leratiomyces ceres *(Photo: Wikipedia)*

C. virescens has a distinct pale blue closed cap. *L. ceres* is recognised by its orangey-brown to dark brown cap with its stipe (stalk) blushing red at the base.

Stropharia rugosoannulata *(Photo: Wikipedia).*

S. rugosoannulata (wine cap stropharia) has a burgundy cap and a solid stipe with a fleshy ring. They are all saprotrophs and can be found growing on woodchips, soil or decaying wood. If you happen to see any of these fungi could you please contact us ASAP, noting their location, or if you collect them we could organise to grab them off you. The specimens need to be in relatively good condition, e.g. not too old and maggoty, so we can excise tissue from the stipe. Your help would be much appreciated!

Contact: Andy Nilsen andy.nilsen@otago.ac.nz 0220463623 or David Orlovich david.orlovich@otago.ac.nz

Gymnopanella nothofagi, a new Chilean species worth watching out for in New Zealand

John Steel

A new species and genus of fungus has been discovered in the Chilean beech forests at a similar latitude to those in Otago and Southland, New Zealand (Sandoval-Leiva et al. 2016) so it will be worth keeping a lookout for it here when exploring our beech forests. At 36 x 20 mm it is rather on the small side, but it does occur in clumps which should make it easier to spot. The cap is rounded fan- or kidney-shaped on a short stipe, light reddish brown to wine red and has a distinct gill arrangement. You can find the full details in Sandoval-Leiva, P.A.; McDonald, J.V.; Thorn, R.G. (2016) *Gymnopanella nothofagi*, a new genus and species of gymnopoid fungi (Ompholataceae) from Chilean Nothofagus forest. Mycologia, 108(4):820-827.

Gymnopanella nothofagi (*Photos: Pablo Sandoval-Leiva)*

Peter Bannister Student Field Grants

Mary Anne Miller, PBSFG Administrator

It is my pleasure to present reports from the 2015 Peter Bannister Student Field Grant recipients. The fund which provides the grants was established in 2014 by Jennifer Bannister in memory of Professor Peter Bannister, University of Otago 1979-2005, and is administered by the Botanical Society of Otago.

Grants are awarded to suitable applicants for fieldwork expenses while studying botanically related topics at the University of Otago. The 2015 grants were awarded to Esther Dale (PhD, Department of Botany - $500), Ben Robertson (PhD, Department of Marine Science - $500), Max Buxton (MSc, Department of Botany - $500) and Ian Geary (MSc, Department of Geology - $500).

The three reports presented here cover a fascinating diversity of topics: from the first record of moths as sub-antarctic pollinators; to investigations of paleobotany in the Beachlands area of Auckland; and the evolutionary ecology of some NZ plant lineages. Ben has been granted an extension to his fieldwork so his report, on nuisance macroalgae in shallow coastal ecosystems, will be presented next year.

The 2016 PBSFG committee of Jennifer, Bill Lee and and myself met recently to assess this year's applications and we are pleased to announce that Andy Nilsen (Department of Botany) who is looking at the comparative genomics of sequestrate fungi and their agaricoid relatives, and Miki Nomura (Department of Geography) who is investigating forest-grassland transitions over time, will receive a grant of $1075 each. We look forward to their reports later next year.

Peter Bannister Field Grant Reports

Are moths the missing pollinators in New Zealand sub-Antarctic islands?

Max Buxton

Island systems tend to have small white flowers with greater instances of environmental (e.g. wind) pollination than their mainland counterparts. New Zealand sub-Antarctic Islands do not conform to this, having a fantastic array of large, brightly coloured flowers with many species being reliant on insects to facilitate pollen transfer. With bees and butterflies not present on these islands, moths and flies are strong contenders as pollinators but the role moths play is unknown – a trend that is seen worldwide.

Armed with a Peter Bannister Student Field Grant and a National Geographic Young Explorer Grant, MSc student Max Buxton (Department of Botany, University of Otago) with supervisors Dr Janice Lord (Department of Botany, University of Otago) and Dr Barbara Anderson (Landcare Research NZ) began the rough voyage to Enderby Island. Enderby Island is the northern-most island of the Auckland Island archipelago, located c. 460km south of Bluff, New Zealand.

Moth trapping took place over four consecutive nights; two nights of extensive trapping in the megaherb field and two nights trapping along an exposure gradient. Moths were removed from the traps each morning, euthanized, and prepared for storage. Moths were later ‘swabbed’ for pollen, and identified by Dr Robert Hoare (Landcare Research, NZ).

Pollen from *Bulbinella rossii* and *Dracophyllum longifolium* var. *cockayneanum* were found in large numbers on moth bodies, with *Acaena minor* and *Gentiana concinna* pollen being present but in low quantities. This finding shows that *B. rossii* and *D. longifolium* may be more reliant on moths for pollination than previously

thought. *B. rossii* is visited by a range of invertebrates, (e.g. flies and weevils) but such observations have not been made for *D. longifolium*, so it is possible that the moth-plant interaction may be more important for *D. longifolium* than for *B. rossii*.

While the presence of pollen on moth bodies alone is not definitive proof of pollination, it does indicate an association and is frequently used as a proxy for pollination. This is the first documentation of moths behaving as potential pollinators in this harsh environment. Repetition of this project in different times of the year and in different habitats is likely to reveal additional plant-moth interactions; e.g. an unidentified moth has previously been observed visiting *Ozothamnus vauvilliersii*, but this species was yet to flower on our trip so its relationship with moths remains unknown.

Max Buxton setting up a Heath moth trap in the megaherb field, Enderby Island. (Photo: Barbara Anderson)

Diversification and biome shifts in woody New Zealand lineages

Esther Dale

My PhD research looks at the role of biome shifts in lineage diversification. I'm using three New Zealand woody genera as focal lineages: *Melicytus, Myrsine* and *Pseudopanax*. I've been collecting all the species in these genera so I can take various trait measurements to understand the processes and changes involved in diversification of these lineages. Many of these species I was able to order from specialist native plant nurseries, but the less common species were more difficult to acquire, especially since I require ca. 10 individuals of each. Botanic gardens have been an excellent source of

material for the rarer species. I used the funds from the PBSFG to visit Otari/Wilton's Bush in December 2015 to collect material of some of the rarer species in these genera. I was able to collect *Melicytus drucei, Melicytus flexuosus, Myrsine chathamica, Myrsine kermadecensis, Myrsine oliveri, Pseudopanax chathamicus, Pseudopanax kermadecensis* and *Pseudopanax macintyrei.*

These collections are excellent source material because of their wild origin and provenance information. As much as I would like to visit the Chatham, Kermadec and Three Kings Islands, it is much easier to visit a garden on the mainland! Initial measurements of Specific Leaf Area, wood density and cold tolerance show trait values cluster by current biome in some lineages and by ancestry in others. When multiple traits are compared within these lineages they often show contrasting trends.

Collecting *Pseudopanax kermadecensis* samples.

I would like to thank the Peter Bannister Student Field Grant Fund for the travel funds that enabled me to make these new collections for my experimental investigations. They form an essential component of my PhD research, enabling me to get a greater coverage of key taxa than I would have otherwise been able to obtain.

Queensland fieldwork: investigation of northern New Zealand's fossil floras

Ian Geary

In July 2016, I spent a week in Brisbane as part of the fieldwork for my PhD in paleobotany. The fieldwork involved identifying taxa with which the plant fossils might share affinities and visits to possibly-analogous modern communities for insight into Auckland's possible paleoenvironments some 4 million years ago.

At the Queensland Herbarium (BRI) I viewed and photographed hundreds of specimens over three days. The herbarium has extensive carpological collections, which were ideal for quickly testing hypothesized affinities. This allowed confirmation of some groups, such as fossils of *Elaeocarpus, Nothofagus* subgenus *Brassospora*, Menispermaceae and Casuarinaceae. Of equal importance was the rejection of other groups, such as the large fossil fruit morphotypes I had previously regarded as sharing affinities with *Terminalia* (Combretaceae). I met with and discussed modern and fossil plants with several botanists. Paul Forster suggested an affinity with Cupressaceae for a fossil cone, which differs considerably from those of modern *Libocedrus*. Contacts were suggested with students at James Cook University who are actively researching the evolution and phylogeny of *Elaeocarpus*.

I spent one day at the Queensland Museum collections at Hendra. I enjoyed viewing the beautifully preserved, silicified Australian fossil fruits of *Elaeocarpus* and Menispermaceae. I also feel privileged to have met two of

Australia's senior paleobotanists, Mary Dettmann and Trevor Clifford. The three of us spent much of the day discussing all things paleobotanical and a new affinity (Vitaceae) was recognized for some of the fossil seeds.

Another day was spent with Ray Carpenter and Paula Peeters, visiting estuarine and rainforest communities. Highlights included finding a large *Callitris macleayana* (Cupressaceae) and studying its 2 cm cones at Mount Glorious, and dodging 3-4 cm *Acmena ingens* (Myrtaceae) fruits dislodged and dropped by enthusiastically feeding wompoo pigeons.

My fieldwork in Queensland, partly funded by the Peter Bannister Student Field Grant Fund, was very useful and highly enjoyable. I now know considerably more about plant groups from Queensland, New Caledonia and Papua New Guinea with which some of the Auckland fossils share affinities.

Observing fallen foliage and cones of a large Callitris macleayana *at Mount Glorious*

Callitris *cone*

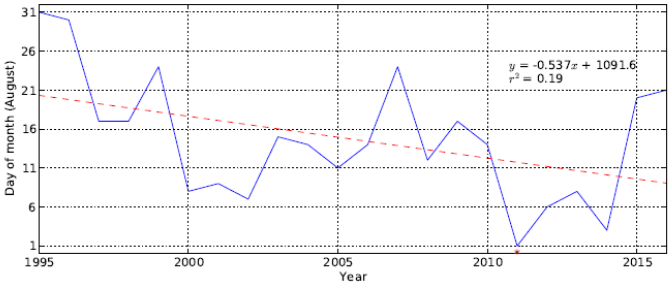
Articles

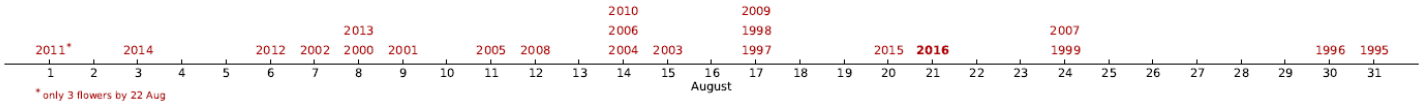
Magnolia Day 21st. August 2016 – What? You missed it?

John Steel

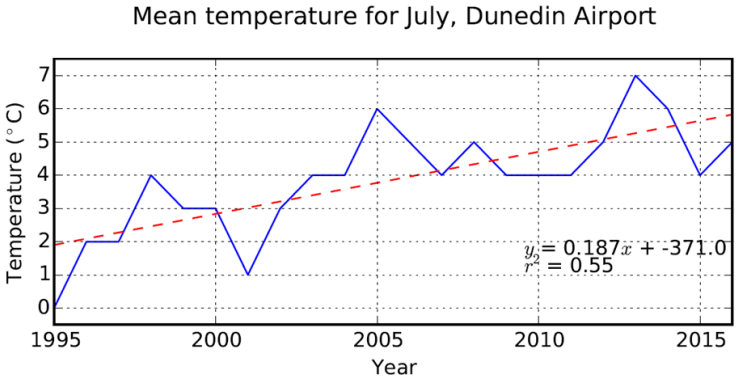
You are probably not on your own. Every spring I make a point of at least once walking through the Quadrangle behind the University's Registry building to view the large *Magnolia campbellii* in full bloom outside the Geology building: it is a beautiful sight. What I didn't know until just recently is that the first blossom is keenly awaited by many as it signals the first day of spring for several of the offices that surround it and some of their staff members have kept records of the event. Current records began in 1995 when John Williams of the Geology Department kept a note of the appearance of the first blossom. With John's retirement, the mantle of blossom-flowering-time-keeper for the Geology Department fell to Hamish Bowman and he kindly provided the graphs below. Interesting to note is a trend towards earlier flowering. "Why so?" you might ask. "Climatic change!" I hear you shout. Or maybe there's just an increasing amount of hot air coming from the Registry building? Or maybe older trees just flower earlier?

Magnolia Day 2016





Just to stir the pot a little, Hamish added this graph for the July temperatures at Dunedin airport for the same period and no, that's not an aeroplane tracking off to the right – make of it what you dare.



No peal of bells herald its arrival, no champagne is drunk, no one dresses up in silly hats, but the staff in the Registry and Geology knows that spring has arrived. However, these guys are serious and Hamish has set up a webcam to record the flowering sequence and if you are quick you can watch last year's arrival in quick-time on http://muck.otago.ac.nz/magnolia_cam/Nooncam_2015.gif and http://muck.otago.ac.nz/magnolia_cam/MagnoliaCam_2015_full.webm: interesting to watch the sequence of flowering. For more information you can read: All Eyes on the Magnolia, *Otago Bulletin Board*, 1st. September, 2015; Grant C. (2016) Magnolia Day 21st August 2016, *Otago Bulletin Board*, 13th. September; or the University of Otago Property Services Division's (2002) pamphlet, *Commemorative Register* (which, come to think of it, I haven't seen for a while) and you can also check out Magnolia Day on Yammer.com. Better still, go and see for yourself, but by the time you read this it will probably be all over! Never mind, it's less than a year until Magnolia Day, 2017.

John William's calendar record of the Magnolia's flowering.

The magnolia was donated and planted in 1965 by Dr. Geoff Baylis, Head of the Department of Botany from 1945 to 1979 and Professor Emeritus until his death in 2003, and is now dedicated to his memory. It was in full bloom on the 14th. September when the 15th. Geoff Baylis

lecture was given – by Nick Mortimer, a geologist.

Big thanks go to Hamish Bowman for his help, but especially for recognising *Magnolia campbellii* just for being a tree doing what trees do. Over winter the University with its grey buildings and leafless trees becomes a bit on the gloomy side and the old magnolia does a great job of bringing the place back to life – welcome to spring!

New site of the Critically Endangered grass *Poa spania*

Mike Thorsen

Poa spania is a Critically Endangered small (3-10cm tall with flower heads to 22cm tall), delicate, grass that was first described in 1994 and is known from solely one limestone tower near the Awahokomo Stream in the Waitaki Valley of North Otago (Molloy et al. 1999, de Lange et al. 2013, pers. obs.). Here it is threatened through grazing and burrowing by rabbits and by competition with exotic plants that are swamping the highly fertile site (Molloy et al. 1999, Head and Buunk 2005, de Lange et al. 2010). The site is now subject to an intensive hand-weeding programme and rabbits are excluded by a fence (Joy Comrie and Nick Head pers. comms.). Its population size is largely unknown, and it has not been found on other limestone outcrops in North Otago or Canterbury, despite intensive survey of many of these sites by several botanists. The site where it occurs also hosts several other species that are thought to occur nowhere else. While some of the species that occur only at this site are known to have been distributed more widely, others, such as *P. spania*, are thought to be single-site endemics (Molloy et al. 1999, Alice Shanks, Brian Molly & Nick Head pers. comms.). Such extreme narrow-range site endemism is unparalleled in New Zealand, and begs the question: is this single-site endemism an artefact of our knowledge of species distributions?

Twelve years ago, when I started work as a botanist for the Department of Conservation (DOC) in Otago, the two other resident DOC botanists muttered something along the lines of "great, a new person – you can 'do' the grasses" (thank you Geoff Rogers and John Barkla!). Where I had previously worked (Northland, East Cape, Hawkes Bay and the Chatham Islands) there is not a large diversity of grasses, and therefore, like many botanists, I had only a basic familiarity with grasses and their identification. In contrast, the vegetation of much of Otago is dominated by grasses and tussock grasslands. So, probably foolishly, I took their direction to heart and since I didn't really know much about grasses I'd better start to learn about them and so started collecting grasses for identification. These early collections were often rushed as I raced to learn the flora of an entirely new region.

One of these rushed collections was a small delicate grass that I collected on 10 November 2004 during a quick visit to a limestone outcrop at the now Wai o Toura Scenic Reserve at Gards Road in the Waitaki Valley. Originally I thought the specimen was *Poa acicularifolia*, an identification I soon realised was in error. I then

re-identified it as either *Poa spania* or *Poa lindsayi* and sent the specimen (CHR 572431) to the Allan Herbarium in Lincoln where it was identified as *P. lindsayi* by Kerry Ford. An identification which I accepted. But as time passed I became more familiar with *P. lindsayi*, which is widespread, though usually sparsely distributed, throughout Otago. When adding these *P. lindsayi* specimens to my collection of pressed specimens, which includes duplicates or photocopies of specimens sent off for identification, a discrepancy in appearance became obvious between the Wai o Toura collection of *P. lindsayi* and my later collections of this species. On 2 September 2014, I requested Kerry to check her original identification against *Poa spania* and she agreed with this new identification on the basis of anther length and the lacerate and pubescent ligule of the Wai o Toura specimen (the extravaginal branching noted by Molloy et al. (1999) is not easily visible in the specimen).

Confirmation that *P. spania* occurs at Wai o Toura is evidence that the extreme narrow-range site endemism present at the Awahokomo site is most likely to be an artefact of our knowledge of the distribution of plants, which is complicated by both the large changes in vegetation cover that are occurring in New Zealand and the difficulty with identifying grasses and consequently the shortage of people who are competent to identify grasses.

Realising that *P. spania* also occurred at Wai o Toura required us to confirm its current status there. The notes with the original specimen were brief: "occasional plant on limestone bluff" and the locality grid reference was for the general site only. On 26 November 2015 I returned to Wai o Toura accompanied by DOC's Graeme Loh (who was instrumental in achieving legal and physical protection for Wai o Toura and is now removing box thorn from the site – often by very forceful means) and several other people with the intention of rediscovering the location of *P. spania*. Guided by my recollections of the initial visit we searched for a small grey grass amongst many many other grasses, some of which are also small and grey! Discovery of a detached culm (flower stalk) gave us hope before discovering one small (30cm diameter) patch of the grass, half of which is growing within a mesh cage protecting a *Carmichaelia hollowayi* plant. No other plants were found at the site.

The plant of Poa spania *at Wai o Toura (blueish leaves in middle front of picture – use your imagination) partly enclosed by a wire mesh exclosure over the broom* Carmichaelia hollowayi *in the back left of picture. (Photo: Mike Thorsen)*

Interestingly the plant at Wai o Toura appears to be rhizomatous, a character not seen in the Awahokomo plants. However, this feature cannot be confirmed without uprooting part of the plant, and since this species is so rare, that was not attempted. Parts of two mature inflorescences were collected from which I removed and sowed the ripe caryopsis (seeds) in November 2015. One seed germinated in April 2016, five months after sowing, and a further four seeds germinated in July 2016, eight months after sowing. All five young plants are very slow growing above ground, and at the time of writing (2-5 months after germination) are 2cm tall with 6 small blueish leaves on the largest five-month-old plant! Below ground is a different story – root development is extensive

and the longest roots are now 12cm long. Presumably this is an adaption by the species to finding moisture deep in crevices in the limestone.

These plants will be grown on and we hope to return some of their progeny in the future, probably by broadcasting seed into likely places.

The morphologically similar Poa lindsayi *in the Nevis Valley, Otago.* P. spania *is very similar in its in-situ appearance but does not form such a tight clump and the inflorescence is more open and delicate. The two can only be reliably distinguished by the larger anthers and pubescent outer surface of the ligule of* P. spania*, both of which require magnification to view. (Photo: Mike Thorsen)*

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Asplenium oblongifolium in the southern South Island

Leon Perrie (leon.perrie@tepapa.govt.nz)
& *Pat Brownsey*
Museum of New Zealand Te Papa Tongarewa, PO Box 467, Wellington 6140

If you had asked us a few years ago what the southern limit was for the fern *Asplenium oblongifolium* (huruhuruwhenua, shining spleenwort), we would have said near Christchurch. However, in assessing herbarium specimens in preparation for the electronic Flora of New Zealand (eFloraNZ), we have learnt that *A. oblongifolium* extends to Otago and Southland.

In Te Papa's WELT herbarium is a specimen collected in 2001 from Moturata Island near the Taieri River mouth (WELT P027971). There are also early twentieth century specimens from "Purakanui [sic] Cliffs Otago" (presumably either Pūrākaunui near Dunedin or Purakaunui in the Catlins, which have both been previously spelt Purakanui; WELT P007255) and the (frustratingly imprecise) "southeast Otago" (WELT P007289). In Auckland Museum's AK herbarium is a 1955 collection from "Bluff" (AK 181427 and 181428). More details of the specimens can be found through the institutions' respective websites: collections.tepapa.govt.nz and www.aucklandmuseum.com/collections-research/collections/search.

These specimens had been misidentified as *Asplenium obtusatum*. The best way to distinguish *A. oblongifolium* from *A. obtusatum* is by the scales on the rachis and stipe. A good place to make the comparison is near the junction of the rachis and stipe. The difference is shown in Figure 1. The scales of *A. oblongifolium* are so narrow that they appear hair-like, whereas those of *A. obtusatum* are much broader. This is an easy and robust character to use, clearly visible with a hand-lens or even the unaided eye, as long as you look for a frond that has not lost its scales through aging.

Figure 1. Scales on the underside (abaxial surface) of the rachis-stipe junction of Asplenium obtusatum *(left) and* A. oblongifolium *(right). Scale bar = 2 mm.*

The species epithet of *Asplenium obtusatum* might make you think it differed from *A. oblongifolium* in the shape of the apices of the frond segments (pinnae). However, while *A. oblongifolium* usually has pinnae with pointed (acute) apices, they can be rounded (obtuse) although only rarely so, and *A. obtusatum* can have rounded or pointed pinnae apices. This means that the shape of the pinnae apices cannot alone provide a definitive identification. A character that may have some utility, is that in big plants of *A. obtusatum*, the pinnae usually decrease markedly in size towards the frond's apex, to give a comparatively small terminal pinna (the one at the very apex of the frond) – see Figure 2. In contrast, the terminal pinna in fronds of *A. oblongifolium* usually remains more similarly sized to the lateral pinnae. (Small plants of *A. obtusatum* do not really show this marked size decrease.) What this means is that plants that have pointed pinnae and a large terminal pinna are good candidates for *A. oblongifolium*, and it is worth verifying this by a close inspection of the scales on the rachis and stipe.

Figure 2. In large plants of Asplenium obtusatum *(left), the pinnae usually decrease markedly in size towards the frond's apex, meaning the terminal pinna is comparatively small. In* A. oblongifolium *(right), the size of the terminal pinna is usually more similar to the lateral pinnae. Photo of* A. obtusatum *© John Barkla CC BY-NC.*

Elsewhere, *A. oblongifolium* ranges from the coast to far inland but its extent in Otago and Southland is unclear. *Asplenium obtusatum* is restricted to sites with a strong coastal influence.

Asplenium obtusatum is common around the coasts of Otago and Southland. However, in these regions, *A. oblongifolium* is seemingly very uncommon, and so much so that it would probably qualify as Regionally Threatened (if the national conservation assessments were to be applied at a regional level). This makes it worth looking for, and we certainly encourage botanists in the area to search for it. Uploading observations to the citizen science website NatureWatchNZ would be very useful. John Steel has already started – see www.naturewatch.org.nz/observations/1254868. Also, while we have checked for specimens in AK, WELT, and Landcare Research's CHR herbarium, someone might usefully review the specimens in Otago University's OTA herbarium; we are unlikely to have the opportunity to do so in the near future. *Asplenium oblongifolium* may be lurking among the *A. obtusatum* specimens, or maybe someone has already documented the presence of *A. oblongifolium* in Otago and Southland, and we were simply unaware of this.

We hope to publish the eFloraNZ chapter for Aspleniaceae in the next year or two. To access the eFloraNZ chapters that have already been published, see www.nzflora.info/publications.html.

If you use facebook, and would like to receive news about New Zealand's ferns, see the group New Zealand ferns: www.facebook.com/nzferns.

Acknowledgements
We thank John Barkla and John Steel for assisting our evolving knowledge of *Asplenium oblongifolium* in the southern South Island.

N.B.

John Steel

The Otago Herbarium specimens have been checked and all been correctly identified as *A. oblongifolium* (17 specimens) or *A. obtusatum* (28 specimens). The hairs/scales criterion applies in all of them whichever is appropriate. There are only two South Island specimens of *A. oblongifolium* in the collection and they are from Kaikoura.

Now we have a sound character to apply, it would be useful to keep a lookout for *A. oblongifolium* when out on our trips as it appears on a number of species lists, but without collections to back them up. OTA would be happy to receive any specimens to enable its range to be confirmed. Remember when collecting to take a complete frond from the base of the stipe, not just a piece of the lamina, and make a precise record of its locality and habitat. And for those of you who like names (* = most common) -

Asplenium oblongifolium
Synonyms: *Asplenium d'urvillei, Asplenium lucidum, Asplenium lucidum* var. *paucifolium, Asplenium obtusatum* var. *integrifolium, Asplenium obtusatum* var. *lucidum, Tarachia lucida.*
English: glossy spleenwort, huruhuruwhenua, shining spleenwort*, shining-spleenwort, uru-uru-fenua.
Māori: huruhuruwhenua, pānako, paranako, parenako, paretao, Urūru whenua, urūruwhenua.

Asplenium obtusatum
Synonyms: *Asplenium apice-dentatum, Asplenium decurrens, Asplenium lucidum var. obliquum, Asplenium marinum* var. *obtusata, Asplenium obliquum, Asplenium obtusatum* subsp. *obtusatum, Asplenium obtusatum* var. *obliquum, Asplenium sarmentosum.*
English: blunt leafed spleenwort, coastal asplenium, coastal spleenwort, lime-spleenwort, parako, parenako, sea spleenwort, sea-spleenwort, shore spleenwort*, shore-spleenwort.
Māori: pānako, paranako, parenako, paretao, paretau, penako, tuturanga.

Dunedin a Night Sky City

Mike Broughton

Dunedin Dark Skies Group

Astronomy has undergone a renaissance in Dunedin in recent times. Not only do we have enviable dark skies on our doorstep, our city is close to the auroral oval where the Aurora Australis (Southern Lights) may be witnessed. (The phenomena has been greatly popularised by Dr. Ian Griffin, the director of the Otago Museum, and as a result, astrophotography in the area is booming.)

UNESCO considers access to the stars is a fundamental human right. Sadly, 80% of the world's population experiences light pollution, and a third are totally denied any view of the night sky. Aside from the well-documented negative impacts upon health, this denial also alienates people from connecting with their environment.

LED upgrade

Over the next two years, the DCC will "upgrade" its municipal streetlights from high pressure sodium (HPS) to light emitting diode (LED) streetlights. According to the DCC, this will save energy and operational / maintenance costs.

There is also the potential to bring more visitors to the region, boost the economy, provide more jobs, and strengthen our community, if we invest in the right kind of technology.

Night Sky City

Dunedin has a unique opportunity to become New Zealand's first certified Night Sky City.
The International Dark Skies Association (IDA) have criteria for protecting the night sky. The aim is to establish best lighting practices to reduce energy wastage and light pollution - the eerie halo in the sky from lights that are too bright, too numerous, unshielded and badly placed, so visibility of the stars is possible.

LEDs are they the panacea for our lighting needs?

Most LED street lights in use today (3000 - 4100K and more), are unsuitable for illuminating our city safely and sustainably. Despite what the lighting industry claims, they significantly worsen light pollution, degrade the environment and harm health due to the blue wavelengths of light they emit.

Should Botanists, Zoologists and Ecologists be concerned?

Many respected ecologists believe white LEDs will be disastrous. Indisputable evidence shows

mammals, invertebrates, fish, amphibians, bats and birds, are being adversely affected. Native crepuscular and nocturnal wildlife could be especially vulnerable. Considering Dunedin is known as the wildlife capital of New Zealand, this is particularly worrisome.

To date, there has been very little if any research conducted on how artificial light at night (ALAN) may affect NZ's fauna and flora. The effect of changing from yellow light (our existing high-pressure sodium street lights) to broad spectrum white light in 3000 – 4100K LEDs, is unknown, but what we do know is cause for concern.

This is not just a problem for the urban environment. Light from towns and cities travels hundreds of kilometres, enough to affect ecosystems from afar.

Blue light disruption of the circadian rhythm – our "biological clock"

White light by definition contains blue light. Blue light suppresses, the "darkness hormone" melatonin, which we depend upon for our circadian rhythm. For humans, the short term consequences include sleep deprivation, reduced day time performance, increased risk of accidents, and also weight gain. Evidence shows long-term melatonin suppression and circadian disruption may also lead to cancer, diabetes and depression.

DCC position

These concerns have been made known to the DCC. To their credit, the council established a Dark Skies Advisory Panel to investigate the matter further and to provide information and guidance about the best options. The group is chaired by Dr. Ian Griffin, and includes Dr. Alex Tups, a biologist and senior lecturer from the Physiology Department of the Otago University, who researches the negative impact of blue light upon melatonin.

At a recent environmental sustainability meeting, Mayor Dave Cull responded to the question, "Was he excited by Dunedin becoming a Night Sky city and would this be good for the environment?" He enthusiastically endorsed the idea that Dunedin becomes a Night Sky City, and acknowledged the colour of the LEDs were an important consideration.

Although this is encouraging, the public need to know that councillors are not obliged to follow the panel's recommendations. (The panel have suggested LEDs should be as low in colour temperature as possible to minimise disruptive blue light.)

The DCC has a moral and ethical responsibility to light our city safely. This involves prioritising the long-term health of residents and the environment, over saving energy and reducing maintenance / operational costs.

Blue light disruption of the circadian rhythm – our "biological clock"

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Environmentally safe, healthy, night sky friendly LEDs

There are LEDs that emit either no blue wavelengths at all, or very little, in the form of narrow-band amber (NBA) and phosphor-coated amber (PCA). The Dunedin Dark Skies Group, is circulating a petition requesting the council adopt PCA LEDs, with a colour temperature of 2,200K or less.

These LEDs have comparable energy efficiency to white 3000K LEDs, with the same technological adaptive features, long life-span and low maintenance / operational costs. They are also are similar in colour to our existing orange street lights, and unlike harsh and glary white LEDs, are soft and gentle on the eyes.

If PCA LEDs are adopted by Dunedin, we can gain Night Sky City status - a win win for residents, wildlife, our night sky, tourism, and the economy.

Conclusions

White LEDs are heavily promoted by the lighting industry as a "smart" solution. Unfortunately, conservation and the wider long-term costs to health and ecosystems have been ignored, and agencies like the NZTA and Auckland Transport, are not addressing or even considering the impact of blue light at night.

In 2016, the American Health Association (AMA) 2016 published a white paper "Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting." Conversions to improper LED technology can have adverse consequences. Physicians at the Annual Meeting of the American Medical Association (AMA), adopted guidance for communities to minimise potential harmful human and environmental effects of blue light from white LEDs.

We are at a crucial tipping point and until the lighting industry fixes the problem, and agencies like the NZTA and Auckland Transport improve their guidelines and recommendations, it's up to concerned individuals and environmentalists to lobby our decision makers for safer lighting

Meeting and Trip Reports

Botanical Society of Otago Hereweka/Harbour Cone Bioblitz

David Lyttle

The Botanical Society of Otago organised a Bioblitz for the Hereweka /Harbour Cone Block a 328 hectare block of land that lies at the heart of the Otago Peninsula. It was purchased by the Dunedin City Council in 2008 and a Management Plan was prepared in 2012. Most of the land is leased for sheep grazing but two significant areas have been retired from pastoral use so native forest can regenerate. Planting programmes have also been initiated by the community.

The Bioblitz was based at the Pukehiki Hall and was be run over two days, Saturday 23rd and Sunday 24th April. It was modelled on the very successful Bioblitz that took place at the Dunedin Botanic Gardens on the 12th July 2015. A Bioblitz is a citizen science initiative where a series of natural history observations made by the participants over the period of the event is recorded and uploaded to the New Zealand Nature Watch Website. The aim of the event was to educate the public about natural values and biodiversity present on the Otago Peninsula by involving people in the process of making scientific observations and recording data.

An extensive list of vascular plants was compiled for the Hereweka/Harbour Cone Block to support submissions to the DCC when its purchase was being considered. Additional plant observations were made on the BSO field trip to Peggys Hill in August 2015. The non-vascular flora ie. mosses, liverworts and lichens was largely unknown prior to the Bioblitz as was the fungal flora and invertebrate fauna. During the event, 140 observations representing 107

species were recorded over the course of two days and added to the existing Otago Peninsula Biodiversity Project. This already contains numerous records of plant, insect, mammal, bird and other life forms found on the Otago Peninsula and provides a permanent, and publically accessible record of the Peninsula's biodiversity. The Bioblitz records may be accessed by entering the location Otago Peninsula into the Nature Watch search function and applying the date (23rd-24th April 2016) and taxon filters (plant, fungus, insect, bird). There is provision for obscuring the locations of rare or threatened species in the submission protocols.

The event was structured by sending field parties lead by people with appropriate specialist knowledge to different sites on the block to record fungi, lichens, plants and invertebrates.

Fungal Foray Smiths Creek Leader David Orlovich A search for saprophytic and mycorrhizal fungi was carried out in small stands of kanuka along the creek and further up the hill. A number of collections were made at this site and photographed. Several mycorrhizal species associated with *Kunzea robusta* were collected from Smiths Creek despite the degraded nature of the stands. Additional fungi were photographed by other observers over the two days of the Bioblitz. Overall most of the fungi observed were common saprophytic species.

Lichen Walk Leader Allison Knight The ridge crest and bush edge parallel to Highcliff Road starting from the track up to Harbour Cone were explored.

Allison reports: We identified 75 lichen taxa after just 4 hours of collecting from 6 localised sites. The bank beside the road was so productive we spent over an hour there. The rocks on the small area of the slopes of Harbour Cone that we examined were covered in lichens. Lichens were everywhere, growing on soil (terricolous), on rocks (saxiolous), on bark (corticolous), on wood (lignicolous) and even on other lichens (lichenicolous). Fungi that grow specifically on lichens are also included in the lichen flora and we found a *Cladonia* covered in the black fruit (apothecia) of a lichenicolous fungus. The most abundant and widespread lichen was the foliose *Parmotrema perlatum*, which grew on rock and/or wood at 5 sites. Eleven of the species identified are classified as Data Deficient, which means that not enough is known about them to give them a meaningful Conservation Threat Status, so this was a useful addition to conservation knowledge. All in all the Hereweka/Harbour Cone area is very rich in lichens and we have barely scratched the surface of the extensive lichen biodiversity harboured there.

Native Plants of Harbour Cone Leader John Barkla The different plant communities on Harbour Cone were investigated.

Peggys Hill Native Forest Remnant Leaders Moira Parker/ Gretchen Brownstein/John Steel This forest remnant, dominated by broadleaf, is rich in epiphytic ferns and orchids and contains several relict podocarps.

Native plants and Ferns, Stewarts Creek Leaders David Lyttle/John Steel This site is the richest site for ferns on the Otago Peninsula. Three species of tree fern (*Cyathea dealbata*, *Cyathea smithii* and *Dicksonia squarrosa*) and *Pneumatopteris pennigera* which is rare locally are found there.

Camp Road Leader Greg Nelson This site contains a melange of native and exotic species on the site of the Old Larnach Farm. It is also a good locality for ferns. There is also a rampant infestation of the weedy, introduced lycopod, *Selaginella kraussiana* growing under the exotic trees present at the site.

Kowhai Forest Scramble, Leader John Barkla This site at Stewarts Creek below Harbour Cone

is a fragment of remnant native forest growing on a steep dry, slope. It is dominated by kowhai (*Sophora microphylla*) and ribbonwood (*Plagianthus regius*). It is representative of dry, East Otago forest that was once more common in the area.

John Steel has compiled plant lists for Harbour Cone, Peggys Hill, Stewarts Creek and the Kowhai forest site but as space is limited and they do not differ substantially from previous lists they will not be published in this newsletter. John is happy to make them available on request. He may be contacted by email john.steel@botany.otago.ac.nz

Insects and other Invertebrates. Brian Patrick and team conducted daytime sweeping, hand collecting and beating searching for insects. A night time light trapping session was conducted on Highcliff Road.

Brian reports: The list of insects and their ecology represents some of the characteristic species that make up the natural ecology of Hereweka, Otago Peninsula. Although the sampling was done late in the summer season, the diversity of species and families of insect is impressive with eight Orders of insect detected (fly, beetle, lacewing, moth etc). A full season of sampling will of course find many more species and a few more insect Orders too, but this is a solid start in collating what will be a rich biodiversity from the many natural communities present on Hereweka.

Some significant finds included the ghost moth *Cladoxycanus minos*, one of New Zealand's 27 endemic moths in this primitive moth group. New Zealand together with Australia have the bulk of the world's species in this ancestral group. This species is a specialist autumn-emerging species with its larvae feeding in moss wetlands. Other moth species found in this brief survey are typical of forests where their larvae feed on the dominant trees such as mahoe, lacebark, *Coprosma* species and the nurturing covering of the liane, *Muehlenbeckia australis*, the last-named being the most important nationwide host plant of New Zealand's moths.

Light trapping produced a long list of species, mostly indigenous, that frequent the forests and shrublands where their larvae are specialist feeders on various herbs, shrubs, trees and lianes. I recommend holding further insect surveys at different times of year to add to this solid list. Springtime and summer are obvious times to hold such community surveys.

While sorting the specimens from light trapping session near Pukehihi, I found an additional lacewing species: it is the endemic lacewing *Protobiella zelandica* (Berothidae). The single specimen captured during the session is our only species from this family of lacewings. This is the most exciting specimen collected! While widespread in NZ, in his review of the family in 1992, Keith Wise recorded only three South Island specimens – one of these from Waitati collected in 1916. So its occurrence here is of note. It is a predator by larval and adult stage. I would need to examine my lacewing collection in the Otago Museum to see if I collected this species in the Dunedin area while I lived there from 1972-2006.

Claas Damken participated in the insect collecting activities and contributed 11 observations which included a number of species of true bugs, a group in which he specialises, to the Otago Peninsula Biodiversity Project.

In addition to the field excursion a number of talks and workshops were held in Pukehiki Hall during the Bioblitz. Brian Patrick presented a talk on New Zealand butterflies. As Brian is New Zealand's foremost expert on butterflies and moths and has travelled widely in New Zealand and the Pacific studying and photographing them we were treated to a marvellous illustrated lecture on this important group. Brian has managed to engender this interest in his son Hamish and they have jointly

authored "Butterflies of the South Pacific and "Moths & butterflies of New Zealand".

John Barkla gave a talk entitled **"**Coming to grips with your local special plants – resources and tools to make it easier and fun**".** John gave an excellent exposition that covered traditional methods of identification like local books and guides, before moving on to web-based resources; NatureWatch, NZPCN, and Landcare Research on-line Lucid keys. Allison Knight presented a workshop on lichen photography and adding lichen records to the new Lichens of New Zealand project on Nature Watch.

Static displays at the Hall included Plants native to the Otago Peninsula (BSO), Weeds on the Otago Peninsula (STOP), The Possum eradication programme on the Otago Peninsula (Otago Peninsula Biodiversity Group) and an Historical Display (Pukehiki Hall Committee).

I would like to thank the following organisations and people who supported us in many ways; Hereweka Harbour Cone Trustees, Pukehiki Hall Committee, Botany Department, University of Otago, Brendon Cross of Roselle Farm, Norcombe Barker of Larnach Castle, Brian Patrick and his support crew, Claas Damken, entomologist and of course the Committee and members of BSO whose enthusiasm and hard work ensured the event was a success.

Fire in the Desert: plant community responses in the Mojave and Great Basin, a talk by Richard Gill, 15th June 2016

Esther Dale

Associate Professor Richard Gill, visiting researcher from BYU in Utah, gave us a fascinating introduction to three American deserts he works in: The Colorado Plateau, Mojave Desert and Great Basin Desert. He gave us an excellent virtual tour of each with stunning visuals which included birds-eye drone footage and time-lapse of a desert sunrise. He also outlined differences in climate, soils, vegetation and human activity in each desert. This gave us a sense of the processes structuring these ecosystems and current threats they are facing.

One highlight of Richard's talk was hearing about Joshua trees (*Yucca brevifolia*, Asparagaceae). The fact that they mast, are both pollinated and parasitised by yucca moths and were dispersed by extinct ground sloths is pretty cool.

Richard's talk concluded with an outstanding time-lapse of the *Aurora Australis* and the Milky Way he shot near out near Brighton during his time in New Zealand. It's safe to say the entire audience were left with an appreciation for these three deserts and their ecology.

Field Trip to Heyward Point Scenic Reserve, 18th June 2016

Lydia Turley

The field trip to Heyward Point on June 18 had a good turnout, with 13 attendees, several of them new to the society.

The track climbs steeply up a hill from Aramoana road, then follows the top of the cliff above Spit Beach toward Heyward Point.

At the bottom of the hill grew windswept *Coprosma crassifolia*. These bushes sported lots of the green mistletoe *Ileostylus micranthus* . *I. micranthus* was easy to see, since its large green leaves look very different to the *Coprosma*. Some of the *Ileostylus* plants had been heavily browsed by possums. Possum browse is a serious threat to our native mistletoes.

Once we started looking closely, we discovered that the dwarf mistletoe *Korthalsella lindsayi*

was also growing in many of the bushes. This mistletoe tends to be just a few centimetres tall and is leafless, with flattened photosynthetic stems. Because of its size, this mistletoe is easily missed. Since it is dispersed predominantly by explosive fruit, seedlings tend to grow near the parent and trees parasitized by *Korthalsella* tend to host many plants. This means that once one plant is spotted, many more tend to follow. The leafless lawyer *Rubus squarrosa* was also growing all through some of the *Coprosma*.

Korthalsella lindsayi *(Photo: Bridget Thomas)*

After a decent hike up the hill, we got a lovely view over the Aramoana Ecological Area and harbour and were rewarded by the view of the sea from the top of the cliffs.

We did a circuit around the outside of the reserve. Much of the reserve had been planted, and the remnants of this could be seen in some unnaturally straight lines of plants, and mutters from the people who know which plants wouldn't naturally be growing in the areas and care about eco-sourcing.

Pseudowintera colorata, *Cordyline australis*, *Podocarpus totara* and *Sophora* were common, while the climbing daisy *Brachyglottis sciadophila* was a botanical highlight. A lovely, thick trunked *Griselinia littoralis* sported whole heaps of epiphytes, including *Pyrrosia eleagnifolia*, *Microsorum pustulatum*, *Asplenium flaccidum* and an *Earina*.

The importance of scientific names was illustrated by the goosefoots. Esther found something which was identified as a *Chenopodium*, commonly known as a goosefoot. Later on, *Pennantia corymbosa* was also described as goosefoot, causing confusion for certain members of the group who tried to equate the two. Moral of the story? Yeah, it looks like there actually is a point in using scientific names. Otherwise you'll get silly geese like me thinking that trees and herbs are all the same thing.

Windswept Myrsine divaricata *festooned with the golden eye lichen* Teloschistes chrysophthalmus *and greyish-green* Ramalina sp. at Heyward Point *(Photo: Esther Dale).*

Heyward Point: Wind-sculpted shrubs overlook a view of Taiaroa Head and Spit Beach. (Photo: Kate Caldwell)

Our Living World', 10th July 2016

Kate Caldwell

'Our Living World', was an all-ages event held at the Dunedin Botanic Garden as part of the New Zealand International Science festival. The Information Centre was abuzz with representatives from the University of Otago's Botany and Zoology departments, Birds NZ, the Department of Conservation, Dunedin Public Libraries, Landcare Research and Orokonui. There were stalls, activities, and guided walks for visitors to enjoy.

Your Botanical Society, not to miss out on an opportunity to share their enthusiasm for all things planty, had a table set up with moss and lichen guides for sale, microscopes, and a nicely curated display of lichens perfect for wide-eyed beginners to learn about the main lichen groups and marvel at their amazing shapes and colours.

John Barkla, wearing his DOC hat, guided people on a 'mysterious mistletoes' tour, John Steel and Lydia had made 'A Botanical Quest' worksheet to encourage visitors to look closely at some of the plants in the lower gardens, David guided a weeds walk, and Allison and I went lichen hunting in the rock garden.

We found two new lichens to add to the list of species known to be in the Botanic Garden, bringing the total to 102! On one of the lovely lichen-covered rocks that came originally from Mt Cargill we found *Diploschistes scruposus*. On a rock wall behind the 'Tannock seat' above the rock garden, we spotted *Blennothallia crispa* – a rare, data-deficient lichen previously known from only one site in New Zealand: a rock wall in the Wellington Botanic Garden!

Liking the lichens (Photo: Allison Knight).

Weedy Dunedin

David Lyttle

The Weedy Dunedin field trip was held on the 10th July in the Dunedin Botanic Gardens as part of the "Our Living World" adjunct to the New Zealand International Science Festival.

A weed can be defined simply as an unwanted plant.

The establishment of pastoral farming by the European settlers and removal of the original vegetation resulted in the introduction of many plants foreign to New Zealand. Indigenous ecosystems were largely destroyed and replaced by pasture, crops and exotic forest. The disruption to the natural ecosystems enabled many opportunistic introduced species to gain a foothold and become weeds. As well as causing significant economic losses, weeds have had a devastating impact on native biodiversity often out-competing native plants in sensitive natural areas leading to the long term degradation of these areas.

Dunedin Botanic Gardens has been established for over 150 years. During that time, many plants that now cause problems have escaped from cultivation and have become naturalised. Many were originally marketed by the nursery trade as desirable horticultural subjects. For the nursery trade to be profitable it needs a large customer base the majority of whom are not skilled gardeners. Garden Centres tend to offer plants that are showy, easily propagated and thrive with very little care, attributes that have enabled many popular ornamental plants to become rampant weeds. It is easy to see how cultivated plants can spread from gardens to adjacent waste ground and flourish in places that are difficult to manage; ie streamsides, steep banks, degraded forest, roadsides, plantations etc. Weed seeds can be spread by birds, wind, transport by domestic animals and machinery. Plants are commonly spread vegetatively by the careless disposal of garden waste. About 66% of our problem weeds were introduced as ornamental plants.

During our walk through the Dunedin Botanic Gardens we looked at plants presently in cultivation, cultivated plants that have naturalised and become weeds and discussed the factors that allow plants to escape from cultivation and become weeds. We visited a number of different sites and considered the plants growing there with this in mind. Examples of plants that are, or have the potential to become weeds were found at the following sites;

Pond: Bear's breeches (*Acanthus mollis*), Lesser celandine (*Ficaria verna* subsp. *ficariiformis*), Foxglove (*Digitalis pupurea*)

Lindsays Creek Bridge: Mexican daisy (*Erigeron karvinskianus*), Agapanthus (*Agapanthus praecox*), Tutsan (*Hypericum androsaemum*), Ivy (*Hedera helix*), Periwinkle (*Vinca major*)

Rock Garden: Heather (*Calluna vulgaris*), Cotoneaster (*Cotoneaster* 2 spp.) Canary Is broom (*Genista canariensis*), Giant bugloss (*Echium pininana*) also Pride of Madeira (*Echium candicans*), Barberry (*Berberis* sp.)

Arboretum: Chilean rhubarb (*Gunnera tinctoria*), Montbretia (*Crocosmia* x *crocosmiiflora*), Indian strawberry (*Duchesnea indica*), Male fern (*Dryopteris filix-mas*), *Nemesia floribunda*

Bush Track: Stinking Iris (*Iris foetidissima*), Aluminium plant (*Lamium galeobdolon* 'Variegatum') Jasmine, (*Jasminum polyanthum*), Wattle (*Acacia* sp), Pontic rhododendron (*Rhododendron ponticum*), Banana passionfruit (*Passiflora tripartita*)

Lookout: Scotch broom (*Cytisus scoparius*), Blackberry (*Rubus fruticosus*), Sycamore (*Acer pseudoplatanus*)

Dealing with unwanted plants

The National Pest Plant Accord is a co-operative agreement between the Nursery and Garden Industry Association of New Zealand, regional councils and government departments with biosecurity responsibilities. All plants on the NPPA list are unwanted organisms under the Biosecurity Act 1993. These plants cannot be sold, propagated or distributed in New Zealand.

The following are a selection of species that are included in the NPPA list and are present in Dunedin City. Some are present in the DBG.

Aluminium plant ‘Variegatum’	*Lamium galeobdolon*
Banana passionfruit	*Passiflora tripartita*
Bomarea	*Bomarea multiflora*
Chilean flame creeper	*Tropaeolum speciosum*
Chilean rhubarb	*Gunnera tinctoria*
Darwin’s barberry	*Berberis darwinii*
Heather	*Calluna vulgaris*
Khasia berry	*Cotoneaster simonsii*
Old man’s beard	*Clematis vitalba*
Mexican daisy	*Erigeron karvinskianus*
Pampas grass	*Cortaderia selloana*
Purple pampas grass	*Cortaderia jubata*
Pontic rhododendron	*Rhododendron ponticum*
Selaginella	*Selaginella kraussiana*
Tasmanian ngaio	*Myoporum insulare*
Tutsan	*Hypericum androsaemum*
Wandering Jew	*Tradescantia fluminensis*
Yellow flag iris	*Iris pseudacorus*

Dealing with the existing infestations of weeds on this list let alone the species that have not yet made the list and are knocking at the door is a formidable task. Unfortunately garden centres still market a lot of rubbish plants that have the potential to become weedy. To raise awareness of the threat of environmental weeds DOC ran a competition to coincide with Conservation Week 2016 (10–18 September 2016). Thirteen major environmental weeds were identified and people were invited to record observations of these species on Nature Watch. (See http://naturewatch.org.nz/projects/the-dirty-dozen) The following illustration is a stark example of a situation that exists in countless sites throughout New Zealand.

Aluminium plant *Lamium galeobdolon* ‘Variegatum’ growing on road reserve at the top of the Paradise Track, Otago Peninsula. This plant is frequently used in domestic gardens as a ground cover as it tolerates shady, damp sites. It becomes a problematic weed when it spreads into native bush as it is deep-rooting, difficult to physically remove, and resistant to herbicides. It can only reproduce vegetatively so this infestation most likely originated from dumped garden rubbish. To retain healthy indigenous ecosystems for the future, especially around cities, it is important for gardeners not to add to the existing problems by careful choice of ornamental plants and proper disposal of garden waste.

Field Trip to Outram Glen, 23rd July 2016: A Botanical Ramble

Ian Geary

The early morning started with a rain shower, which may have dampened member attendance on what proved to be an enjoyable rain-free botanical ramble. David Lyttle's pace was suited to the uncovering and identification of every plant and fungal species new to our eyes for this trip. This thorough botanising, I think is great for refreshing and expanding knowledge. It was a great test recalling common and scientific names I hadn't thought about for years.

Nearby a grey warbler was calling and our party soon grew to include John Steel and an in tow fantail. As our familiarity with common species improved we increased our pace. Despite this, exciting finds continued, including some very cool fungi, such as anything with a purple colouration, earthstars and brackets of *Trametes*. I particularly enjoyed seeing and tasting my first native *Chenopodium*, yet regret not having a wee nibble from my first native *Stellaria* (*parviflora*), found growing near its exotic chickweed friends, *Stellaria media* and *Cerastium fontanum*.

During lunch, some of us enjoyed the bright sun despite the rapidly-extending shadow issue. I was excited to find several hyridellid shells (freshwater mussel) on the river bank, after having previously seen many more fossil hyridellids than modern ones. The return walk included discussion about the splitting of *Kunzea* into numerous species and how opinions differ among experts on how precisely you should identify taxa on NatureWatch, for example, whether it is ok to identify poroporo to *Solanum aviculare* or *S. laciniatum* based on its known geographical distribution, even when important floristic characters may not be present.

All in all this was a great trip and I feel privileged to have been there to celebrate actually reaching this lunch spot this time. Many thanks to David and John for an enjoyable and educational trip.

A small fruiting body of the earthstar fungus Geastrum saccatum *(Photo: Ian Geary)*

lunch spot at Outram Glen (Photo: John Steel)

A new species and a new South Island record for Dunedin!

John Steel

One never knows what will show up on the field trips and the July trip to Outram Glen was no exception turning up a couple of surprises. Along the trackside there were patches of a light green moss that took Jill Hamel's fancy. There are plenty to choose from, but Jill was taken enough by this one to ask what it was. At first I thought it was a Bryum, but a closer look troubled me so I collected some for later identification. After much searching, I ended up with *Chenia leptophylla*, but I ruled it out as it

only occurs in the North Island and even there not very often. However, I couldn't go past this so I sent some to the expert on the species, Dr. Jessica Beever in Auckland who had kindly agreed to check it out and she subsequently confirmed the find.

The following is a summary of her comments (J.Beever, pers. comm.). All known specimens are from anthropogenically disturbed sites where it is a primary coloniser associated with a number of moss species and the adventive liverwort, *Lunularia cruciata*. The renowned botanist, Donald Petrie made – but did not name – the earliest known collection in 1918, in Ngaruawahia and since then it has been collected by other searchers from a number of sites throughout the North Island and offshore islands. Sporophytes are unknown in New Zealand and very rare elsewhere, but the leaves are caducous and have been found with rhizoids growing from either end of the costa. All this suggests that *Chenia leptophylla* is adventive.

Outram Glen is well away from human habitation and only really used by walkers and trampers, and fishermen and hunters accessing the further reaches of the gorge. How it arrived here is not known. The aforementioned are likely candidates though where they acquired it would be another story. It is widespread throughout north and southern hemispheres, but I wouldn't have thought Outram Glen to be on the international traveller's bucket-list itinerary: maybe it has arrived on some wandering bird's muddy feet (making it native – aaaah!) or a local, international traveller's clothes (making it an alien invader – grrrrr!).

The specimens at Outram grow on the side of the walking track underneath the bush canopy, but not extending into the bush. Track maintenance has resulted in substantial areas of the vertical verge being cleared of larger vegetation and the consequent bare areas being colonised by bryophytes and lichens. Here too, I

Chenia leptophylla

found *Chenia* alongside other mosses and liverworts, including the adventive, *Lunularia cruciata*, common along the track and banks.

Because of its small size it is quite possible that this species has gone unnoticed and is present elsewhere so I would be pleased to receive collections or records from new areas. Whether or not it affects other species is not known. It shouldn't be too difficult to spot with its spreading leaves, conspicuous vein and apiculus with a brownish cell at the tip.

Chenia leptophylla *phyllid apex*

The second find was a reward for perseverance. David Orlovich works on the fungal genus, *Cortinarius*, and has been urging us to look out for purple fungi that may be of interest to him, but to date without luck. A little further along the track from the *Chenia*, under some *Kunzea robusta* which is mycorrhizal, I found two such purple fungi. A few moments later David Lyttle doubled the collection. These were duly presented to David Orlovich who has now decreed them to be members of the new species of *Cortinarius* pictured.

All in all a good field-day's work: who knows what will turn up on the next trip if our eyes are kept open!

Cortinarius *new sp. (Photo: David Orlovich)*

"Trust no authority; pay no heed to the books, but go to the plants themselves."

(advice given to Leonard Cockayne by "the late Mr. R. Brown,
the ardent and successful investigator of New Zealand mosses").

Waianakarua Field Trip 3rd. September – nature's resilience in action.

John Steel

The threat of snow on the tops and warnings of a steep and slippery terrain failed to deter sixteen keen souls from venturing on to the Waianakarua Track, one of North Otago's less frequented attractions, as the stormy weather of the previous evening cleared to give us a beautiful day. Malcolm Douglas, whose family have lived nearby for a hundred years (and who hosted our trip to their wonderful, private arboretum this time last year), provided some insight into the area's recent history. The Waianakarua River Middle Branch has carved a steep sided gorge through the hills and was originally forested only to be repeatedly burned to make way for farming and forestry. The fires raced up the dry hillsides which were then taken over by exotic pasture grasses and ultimately gorse as farming declined and forestry took over. The ridges suffered most, but pockets of native broadleaves and podocarps survived in the gullies. Ralph Allen's 1976 report on the area does not make for encouraging reading (Allen 1978) and Ward in 1985 similarly reported the continued logging and burning, adding that, "browsing by feral sheep and deer over several decades has precluded regeneration in much of the reserve" (Ward & Munro 1989). Since then fencing and pest control have allowed for a remarkable change and Malcolm continues to be amazed at the amount and speed of regeneration, especially of *Pseudopanax colensoi*.

The track starts from Mount Misery Road at about 400 m in a small area of exotic, weedy species which soon disappear as the track enters young *Kunzea robusta* forest with a few young natives beginning to show in the understorey. Allison was soon in her element as lichens appeared, including some impressive patches of *Cladonia aggregata* and other species. The track quickly begins to dip along the ridge towards the gorge and the *Kunzea* begins to thin out with older specimens becoming more obvious and the native broadleaves and ferns increasing in size and number with *Blechnum procerum* giving way to *Blechnum discolor* and *Coprosma linariifolia* becoming particularly noticeable. As the sides of the gorge steepen the broadleaves take over and a view across the gorge dramatically shows the pattern of *Kunzea*-dominated ridges alternating with the broadleaves, and maybe the odd *Podocarpus laetus* (thin-barked totara) and *Prumnopitys taxifolia* (matai), in the gullies between, evidence of past fire regimes. Scats and damage are frequent evidence that deer are still active here and John Barkla's discovery of an unhappy-looking *Tupeia antarctica*, a favourite of deer and possum, surviving on *Coprosma linariifolia* may hint that nature still has some way to go. Seedlings of matai make their appearance as does a small group of the, at risk and naturally uncommon, mountain daisy, *Celmisia hookeri*, the latter of which I would not have expected to find under thick, forest canopy as here, but which Malcolm says used to be found on rocky outcrops elsewhere in the gorge.

Celmisia hookeri *(Photo: John Steel)*

Lunch was at a perfect spot by the river below a narrow terrace where David had found a stand of mature matai and John crossed the river to make the finds of the day, *Melicytus flexuosus* and *Coprosma wallii*. Whereas the resilient natives have reclaimed the sides of the gorge, the river edge is dominated by a diverse range of the usual ruderal exotics to be found in such constantly disturbed areas. Will nature also root them out in time? How long will they have to be here before they become native? What were river edges like before they arrived? Either the pleasantness of the moment or the thought of the climb out made for a rather long lunch break, but eventually the effort was made. The steepness of the climb meant much of ground level was now at eye level and the small world of the bryophytes and ground lichens could not be avoided - and it wasn't too long before Allison found her quest for the lichen, *Dibaeis absoluta*, further enhanced. It is only a 300 m climb out and I am sure it was much steeper going up than coming down, but the rewards were well worth it.

In thirty years the gorge has gone from devastation to well on its way to complete recovery, a good example of nature's resilience – just leave it alone and let it to do the job – and don't wait another years before coming back or you won't recognise the place! Malcolm has highlighted another couple of places in the vicinity so maybe next year there can be another trip to this very interesting area.

The group: Allison Knight, Chris Hinton, Chris Walker, David Lyttle, Duncan Nicol, John Barkla, John Steel, Lesley Smith, Lydia Turley, Marilyn Barkla, Mi Tang, Miki Nomura, Nusyana Champ Pi, Robyn Bridges, Rosemary Clucas and Zhuo Wu.

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For a copy of the species list for Waianakarua Track, contact John Steel john.steel@otago.ac.nz.

Waianakarua field trip participants (Photo: John Steel)

15th Annual Geoff Baylis Lecture, 14th September 2016: Life on Zealandia

Peter Johnson

A geological haerenga, with Dr Nick Mortimer, Dunedin GNS geologist and petrologist.

Nick Mortimer is co-author with Hamish Campbell of Zealandia Our Continent Revealed (2014) which explores the geological origins and history of the New Zealand continental land mass. This recognition of Zealandia as a 94% submerged continent in the SW Pacific Ocean provides a new context for many aspects of natural science.

As part of the initial abstract for his lecture, Nick Mortimer was announced as taking his audience on a 100 million year geological haerenga (a journey) from the South Pole, to where Zealandia is today, with its distinct cargo of plants and animals.

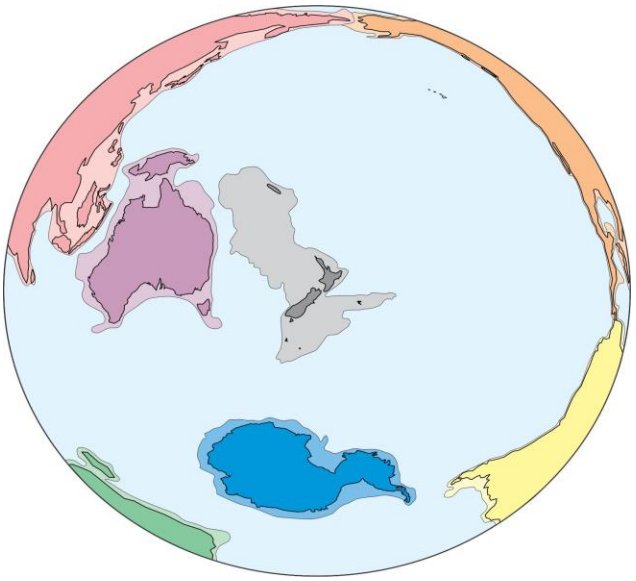
What a great journey it has been, not only across the surface of the globe, but as a journey of discovery. And what a great audience, a full lecture theatre, came to hear the story.

When Nick questioned why he was explaining geology to a gathering of Otago botanists, he need not have been concerned, for the late Botany Professor Geoff Baylis (1913-2003) held the view that Otago University is the best place to study plant ecology because of the diversity, at the back door of Dunedin, of geology, soils, landforms, and climates, and furthermore you don't study one without the others.

Nick said he would include, at the end of his talk, his three favourite fossil plant sites. But for a start he emphasised the importance of several growing lines of evidence for recognising Zealandia, that much of this evidence, and confidence in it, has arisen over the last 20 years, and that many researchers have been involved.

When Kupe reached New Zealand, he found islands. When Tasman and Cook came this way they went home without realising they had found a continent. For geologists the margins of continents are not simply coastlines, but rather the margins of continental shelves, a definition that is independent of sea level changes. The distinction between areas of continent and deep ocean can now be mapped offshore using satellite microgravity measurements.

So the image which Nick calls a 'New World Map' portrays seven geological continents: Africa, Eurasia, North America, South America, Antarctica, Australia, and Zealandia.



Delimitation of continents is based also on where continental crust (especially granite, mostly ancient, relatively buoyant) meets oceanic crust (more dense, mostly younger basalt that spreads from mid-ocean ridges). To test whether the offshore shelves are truly continental the geologist goes to sea, armed as usual with hammer, boots, and hand lens, in ships that plot a zigzag course, seeking seamounts with elevated hard rocks that can be sampled by dredging. A heavy tooth-edged bucket is dropped astern. It takes an hour to

reach the bottom, another hour down there, and another to be retrieved. The action happens 24/7, which must then dictate sleep- and study-times for the geologists and seismologists.

The illustrated lecture treated the audience to a video (sped-up, which is what geologists always have to do with the time scale) showing the dredge masters securing, and emptying the bucket contents on the deck. Then, like vultures, the geologists descend on the pile. This is where the hammers come into play – sledge hammers – and the boots (steel-capped, Nick told me later, H&S coming into play there). What story will the rocks tell?

Continental crust offshore of New Zealand is confirmed by a diversity of rocks (not just oceanic basalt). So dredging, and also drillcore samples, show granite, diorite, gabbro, greywacke, and schist away off to the south, east, and northwest. The continental credentials of Zealandia are supported further by its crust being relatively thick, and by having high elevation (even if this is undersea, where the elevation is still markedly above that of oceanic crust).

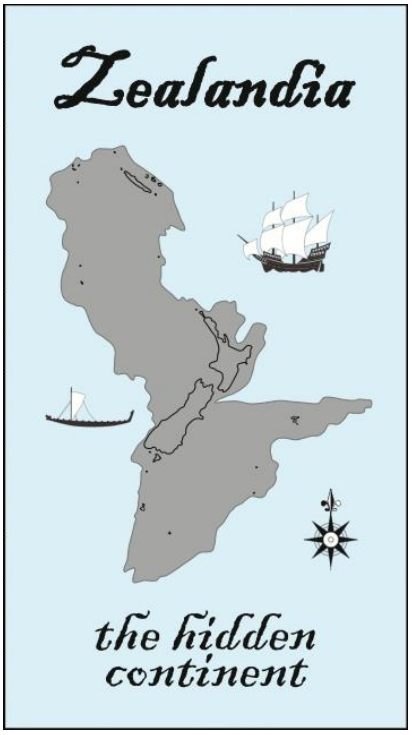
Zealandia has taken a long journey, from its Gondwana origins, involving much rising and falling, wetting and drying, stretching and buckling, warming and freezing: all of which has caused its biota to change through time.

When showing photos of his favourite plant fossil sites, Nick ran a short quiz, which did generate the right answers from the audience: Productus Creek near the Takitimus, Botanical Hill near Nelson City, and Orepuki on the Southland coast, sites that respectively display Glossopteris (ancient seed-fern), Jurassic podocarp forest, and carbonaceous mudstone full of grass pollen.

So much for land plants. But has Zealandia always had some land above sea level? This big question arises from the Oligocene, 34–23 Ma (million years ago). The widespread sedimentary rocks from that time are all limestones, without a silt or sand component that would be expected from erosion of nearby land masses. So it might be the case that Zealandia's earlier biotic baggage was wiped out at that time.

At the end of Nick's lecture, I recalled that Geoff Baylis, in the course of his field studies and explorations, had once stood on each of New Zealand's cardinal geographical Capes (North, East, West, and South Capes). He will be one of the few people (or the only person?) who have done this, and in doing so he was actually standing, at the first three Capes, fairly close to the edges of Zealandia. (Take a look at Nick's "hidden continent" Zealandia map*).

Nick had a retrospective thought too: he had meant to say (perhaps in the context of Conservation Week) that in terms of the current New Zealand native fauna and flora, we have a responsibility to study and look after not just the biota of a country, but the biota of an entire continent!



* Nick Mortimer's Zealandia map, with waka and sailing ship, has been made into a fridge magnet; perhaps this has some significance in taking the continent back towards the South Pole?

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