



# TRILEPIDEA

Newsletter of the New Zealand Plant Conservation Network

No. 151

June 2016

Deadline for next issue:  
Friday 15 July 2016

## SUBMIT AN ARTICLE TO THE NEWSLETTER

Contributions are welcome to the newsletter at any time. The closing date for articles for each issue is approximately the 15th of each month.

Articles may be edited and used in the newsletter and/or on the website news page.

The Network will publish almost any article about plants and plant conservation with a particular focus on the plant life of New Zealand and Oceania.

Please send news items or event information to [events@nzpcn.org.nz](mailto:events@nzpcn.org.nz)

### Postal address:

P.O. Box 16102,  
Wellington 6242,  
NEW ZEALAND

## PLANT OF THE MONTH, p. 2



*Lobelia physaloides*.  
Photo: Gillian Crowcroft.

## New Zealand Indigenous Flora Seed Bank (NZIFSB)— Cryopreservation paving the way for desiccation sensitive seeds

Jessica Schnell ([j.l.schnell@massey.ac.nz](mailto:j.l.schnell@massey.ac.nz)), Daniel Ballesteros ([D.Ballesteros@kew.org](mailto:D.Ballesteros@kew.org))  
and Craig McGill ([c.r.mcgill@massey.ac.nz](mailto:c.r.mcgill@massey.ac.nz))

### Desiccation sensitive seeds in New Zealand

Long-term preservation of seeds under the standard conditions of seed banks (i.e., dried to equilibrium in a controlled environment of 5–20°C and 10–25% relative humidity, and stored at a temperature of  $-18\pm 3$  °C and  $15\pm 3$  % relative humidity) is feasible only for orthodox (desiccation-tolerant) seeds (FAO, 2014). However, a large number of species cannot be preserved under these conditions, such is the case for species producing desiccation sensitive (recalcitrant) seeds. About 20–25% of the seed plants of the world produce non-orthodox seeds. But, since the proportion of recalcitrant seeds is habitat dependent, recalcitrance acquires greater importance in particular habitats, such as tropical evergreen rain forests. It has been hypothesized that ca. 47% of the indigenous flora here may produce recalcitrant seeds (Tweddle et al., 2003; Daws et al., 2006).

The proportion of desiccation-sensitive seed within the New Zealand flora is unknown but a number of species have already been identified as having desiccation-sensitive seed. The list includes nikau (*Rhopalostylus sapida*), kahikatea (*Dacrycarpus dacrydioides*), tawa (*Beilschmiedia tawa*), broadleaf (*Griselinia littoralis*), totara (*Podocarpus totara*), rimu (*Dacrydium cupressinum*), karaka (*Corynocarpus laevigatus*), supplejack (*Ripogonum scandens*), tree fuchsia (*Fuchsia excorticata*), wineberry (*Aristotelia serrata*) and lacebark (*Hoheria populnea*). Desiccation-sensitive seeds cannot be dried to low moisture content because they lose viability quickly when dried below  $0.3$  g  $\text{H}_2\text{O g}^{-1}$  dry mass (FAO, 2014; Pammenter et al., 1991). Hence, the problem with these species is that they cannot be stored long term in the  $-20^\circ\text{C}$  freezer of the seedbank because seeds stored at the seedbank need to be able to survive desiccation to low moisture content (below  $0.1$  g  $\text{H}_2\text{O g}^{-1}$  dry mass) in order to avoid ice formation when banked at such temperature.

### Cryopreservation of recalcitrant seeds

Cryopreservation (the process of using sub-zero temperatures to preserve living cells and tissues) offers a potential long-term storage solution for these species (Walters et al., 2013; FAO, 2014; Pritchard et al., 2014). During cryopreservation, tissues, sometimes protected with cryopreservants, are cooled



*Quercus robur* embryonic axes in culture medium showing root and shoot growth. Photo: Daniel Ballesteros.

## PLANT OF THE MONTH – *LOBELIA PHYSALOIDES*



*Lobelia physaloides*. Photo: Gillian Crowcroft.

with many small teeth along margin, reminiscent of a hydrangea, hence the common name, New Zealand hydrangea.

As a palatable herb, this species has virtually vanished from most of its former mainland habitat. It remains abundant on islands free of browsing animals (Three Kings and Poor Knights). If animal browse can be controlled, this species can make a spectacular recovery.

You can find out more about *Lobelia physaloides* in the Network website factsheet at: [http://www.nzpcn.org.nz/flora\\_details.aspx?ID=156](http://www.nzpcn.org.nz/flora_details.aspx?ID=156)

Plant of the month for June is koru, *Lobelia physaloides* (syn. *Colensoa physaloides*), an endemic perennial herb inhabiting coastal and lowland forest of the northern North Island. Often along stream sides or in damp sites in part-shade, it was formerly common in these types of habitats within more northerly kauri forests.

Clusters of long tubular purple flowers on purple fuzzy stalks appear in early spring through to summer. Flowers are followed by blue, white with blue streaks, or white fruit.

The leaves are large, soft, and bright green

very fast to very low temperatures ( $-160$  to  $-196^{\circ}\text{C}$ ), hence avoiding or minimizing the formation of ice, which can be lethal. However, only a small number of species have well established and successful cryopreservation protocols. This is partly because desiccation sensitivity and responses to cryopreservation procedures are variable, and often need to be ascertained per species as well as genotype (Walters et al., 2013; FAO, 2014).

The Comparative Seed Biology group (CSB) of the Department of Comparative Plant and Fungal Biology at Kew has a long history of cryobiology research. Additionally, it is currently testing whether there are any molecular solutions for the *ex-situ* storage of recalcitrant seeds. The research group is based at The Wellcome Trust Millennium Building, Wakehurst Place, United Kingdom, home of the Millennium Seed Bank.

Jess Schnell, advised by Dr Daniel Ballesteros and Prof. Hugh Pritchard, will be working with the CSB for the next three months to carry out experiments into cryopreservation of embryonic axes of kohekohe seeds as part of her Master of Science (Agricultural Science) thesis. She will be following the protocols set out in Park (2013) as well as some innovations including flash drying, amelioration of oxidation during excision and cryopreservation, or vacuum infiltration vitrification (Wesley-Smith et al., 2001; Nadarajan and Pritchard, 2014; Pritchard et al., 2014). Thermal analysis using differential scanning calorimetry will be used to investigate



Embryonic axes of a kohekohe (*Dysoxylum spectabile*) seed. Photo: Jessica Schnell and Manawatu Microscopy and Imaging Centre.

water properties and ice formation during cryopreservation. This research will build capability for the conservation of desiccation-sensitive seed in the New Zealand indigenous flora. The kohekohe work undertaken has already determined that embryos can be extracted, partially dried and retrieved from liquid nitrogen. However, post liquid nitrogen survival has been low and regeneration of shoot tissues from the embryonic axes has not been possible. The kohekohe work will focus on determining the reasons for the failure of shoot growth, while improving survival rates.

## References

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- Nadarajan, J, Pritchard, HW, 2014. Biophysical characteristics of successful oilseed embryo cryoprotection and cryopreservation using vacuum infiltration vitrification: an innovation in plant cell preservation. *PLoS One* 9, e96169. <http://dx.doi.org/10.1371/journal.pone.0096169>.
- Pammenter, NW, Vertucci, CW, Berjak, P, 1991. Homeohydrous (recalcitrant) seeds: dehydration, the state of water and viability characteristics in *Landolphia kirkii*. *Plant Physiology* 96: 1093–1098.
- Park, MJ, 2013. Seed storage behaviour of New Zealand's threatened vascular plants. Unpublished Doctor of Philosophy thesis, Massey University Library. 181p.
- Pritchard, HW, Moat, JF, Ferraz, JBS, Marks, TR, Camargo, JLC, Nadarajan J, Ferraz IDK, 2014. Innovative approaches to the preservation of forest trees. *Forest Ecology and Management* 333, 88–98.
- Tweddle, JC, Dickie, JB, Baskin, CC, Baskin, JM, 2003. Ecological aspects of seed desiccation sensitivity. *Journal of Ecology* 91, 294–304.
- Walters, C, Berjak, P, Pammenter, N, Kennedy, K, Raven, P, 2013. Preservation of recalcitrant seeds. *Science* 339, 915.
- Wesley-Smith, J, Pammenter, NW, Berjak, P, Walters, C, 2001. The effects of two drying rates on the desiccation tolerance of embryonic axes of recalcitrant jackfruit (*Artocarpus heterophyllus* Lamk.) seeds. *Annals of Botany* 88: 653–664.

## Queen Elizabeth II National Trust Brian Molloy Doctoral Research Scholarship

Applications are invited for the Queen Elizabeth II National Trust Brian Molloy Doctoral Research Scholarship. The scholarship is funded by the QEII National Trust to support a full-time supervised doctoral research degree, and provides funding for up to 3 years at up to \$50,000 per year. The scholarship was established to promote and advance ecological science and conservation in New Zealand, and to recognise Dr Brian Molloy's contribution to QEII National Trust.

QEII National Trust is an independent statutory organisation and a registered charity. It was set up in 1977 to help private landowners in New Zealand protect special natural and cultural features on their land forever with open space covenants. QEII National Trust partners with landowners to achieve this objective—throughout the country, landowners are voluntarily protecting over 180,000 ha of their land with covenants.

### Research proposals

Research proposals will demonstrate:

- how the studies funded by this scholarship support the vision and objectives of the National Trust;
- how the research will lead to a greater understanding of the core values of Open Space covenants and their management for:
  - the benefit of the National Trust and its covenantors in particular,
  - New Zealand conservation in general.

Alignment between a candidate's research interests and those of QEII National Trust will be a key consideration in determining the successful candidate. Scholarship regulations and an application form are available on QEII National Trust's website: [www.openspace.org.nz/Site/Publications\\_resources/QEII\\_Brian\\_Molloy\\_scholarship.aspx](http://www.openspace.org.nz/Site/Publications_resources/QEII_Brian_Molloy_scholarship.aspx).

For any enquiries, please contact Bettylyn Mantell ([bmantell@openspace.org.nz](mailto:bmantell@openspace.org.nz)) or phone QEII National Trust, 04 472 6626.

**The deadline for applications in this round is 5.00 p.m., 3 August 2016.**



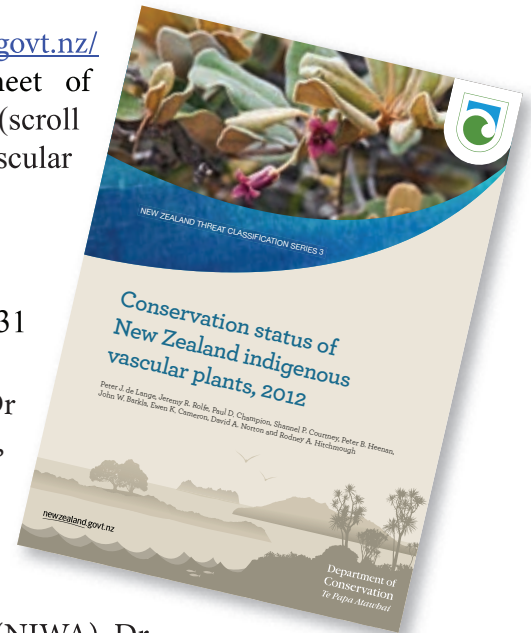
## Submissions called for 2016 assessment of the conservation status of indigenous vascular plants

Notice is hereby given that the conservation status of indigenous vascular plants will be reassessed at the Landcare Research/Manaaki Whenua Campus, Lincoln, Canterbury, in August 2016. The 2016 assessment will replace the 2012 indigenous vascular plant conservation status report (de Lange et al. 2013).

For a PDF (792 Kb) of the 2012 assessments go to [www.doc.govt.nz/Documents/science-and-technical/nztcs3entire.pdf](http://www.doc.govt.nz/Documents/science-and-technical/nztcs3entire.pdf); a spreadsheet of the data can be downloaded at [Supplemental data \(XLSX, 410K\)](#) (scroll down to 3. Conservation status of New Zealand indigenous vascular plants, 2012).

Submissions are welcomed that provide information to assist the panel in making its assessments. Information on how to make a submission is available on the [DOC website](#). Submissions close 31 July 2016.

As three of the past threat listing panel (Prof. David Norton, Dr Peter Heenan and Mr Ewen Cameron) have elected to stand down, a new panel has been proposed and approved by the Department of Conservation. The new panel comprises Dr Peter J. de Lange (Chair, Department of Conservation), Dr Leon Perrie (Museum of New Zealand Te Papa Tongarewa), Ms Sarah Beadel (President, New Zealand Plant Conservation Network), Mr Paul Champion (NIWA), Dr Ilse Breitwieser (Landcare Research Ltd), Dr Ines Schönberger (Landcare Research Ltd), Ms Kerry Ford (Landcare Research Ltd), Mr Shannel Courtney (Department of Conservation), Mr John Barkla (Department of Conservation) and Mr Jeremy Rolfe (Facilitator, Department of Conservation).



## Erratum

In *Trilepidea* 149, there was an article about coastal peppergrass in which the scientific name we given as *Lepidium banksia*. Coincidentally, the Plant of the Month in *Trilepidea* 150 was coastal peppergrass with the correct specific epithet, i.e., *Lepidium banksii*. The *Trilepidea* 149 PDF has been corrected so those who keep hard copy of the newsletter may care to download the corrected version (go to [www.nzpcn.org.nz](http://www.nzpcn.org.nz), place your cursor over 'Publications', scroll down to 'Newsletters', click on that and then on *Trilepidea* 149). We apologise for any confusion the original error may have caused.

## Newsletter copy

As members will surely have noticed, this is a very 'thin' issue of *Trilepidea*. The newsletter welcomes contributions on any aspects of indigenous plants. Surely there are worthwhile stories from the many field trips that happen all over the country. What did you find that you did not expect to find; what did you not find that you expected to find? The Network is only too happy to help novice authors so don't feel that what you submit has to be polished prose. Send your contributions now to [info@nzpcn.org.nz](mailto:info@nzpcn.org.nz).

## UPCOMING EVENTS

If you have important events or news that you would like publicised via this newsletter please email the Network ([events@nzpcn.org.nz](mailto:events@nzpcn.org.nz)):

### 11th Australasian Plant Conservation Conference (APCC11)

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**Dates:** 14–18 November 2016. Venue: [Royal Botanic Gardens Victoria](#), Melbourne. Jointly presented by [La Trobe University](#) and the [Australian Network for Plant Conservation](#) (ANPC)

Early Bird Registrations and the call for Abstracts are now open; the latter closes on Friday 8 July.

The organising committee formally invites NZPCN members to attend the APCC11 conference and submit an abstract for a presentation on one of the six following conference themes:

- Assisted colonisation as a practical tool for climate change mitigation.
- Conservation for people and nature: how do we maximise the benefits for both?
- Rethinking landscape restoration: seed production, provenance, conservation planning.
- Holistic conservation: the role of mutualisms in ensuring functional ecosystem recovery (eg. pollinators, soils).
- Rescuing small populations from extinction.
- New challenges, emerging ideas.

Following the conference, many conference papers will be published in two issues of [Australasian Plant Conservation](#).

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**To register:** [conference website](#) and download the Abstract Submission Form, and for more information on the conference themes, invited speakers, field trips and workshop.

### Auckland Botanical Society

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**Meeting:** Wednesday 6 July at 7.30 pm for a talk by Brenda Osborne and Jonathan Boow titled 'Ecosystems guide'. **Venue:** Unitec Room 115-2017.

**Contact:** Maureen Young, email: [youngmaureen@xtra.co.nz](mailto:youngmaureen@xtra.co.nz).

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**Field trip:** Saturday 16 July to Oratia. Leader: Geoff Davidson.

**Contact:** Maureen Young, email: [youngmaureen@xtra.co.nz](mailto:youngmaureen@xtra.co.nz).

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### Kaipatiki Activities

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**Field day:** Saturday 2 July 10.00 a.m. to 1.00 p.m. at Unsworth Reserve, Barbados Drive, Unsworth Heights, North Shore, Auckland. **Meet:** at Barbados Drive entrance for this community planting and place-making event hosted by A Rocha and Kaipatiki Project. Bring a spade if you have one. Guided bush walks and free lunch provided by Albany Newcomers Network.

**Info:** [www.kaipatiki.org.nz](http://www.kaipatiki.org.nz).

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**Field Day:** Saturday 9 July, 9.30 a.m. to 12.30 p.m. for the Engine Bay Community Plant Nursery Open Day and Planting at Bomb Point Drive, Hobsonville Point (past Hobsonville Point Primary), Upper Harbour, Auckland. Bring a spade if you have one and return mature plants to the ground around the nursery next to the coastal pathway. Free BBQ for all planters thanks to Harcourts Cooper & Co, Beach Haven.

**Info:** [www.kaipatiki.org.nz](http://www.kaipatiki.org.nz).

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**Photography Course:** 10.00 a.m. to 3.00 p.m. Saturday 9 July to Sunday 10 July a Kaipatiki Project, 17 Lauderdale Road, Birkdale, North Shore, Auckland. **Tutor:** Edin Whitehead ([www.edinz.com](http://www.edinz.com)). **Cost:** \$100 per person for the weekend.

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**Info:** [www.kaipatiki.org.nz/courses](http://www.kaipatiki.org.nz/courses).

## Waikato Botanical Society

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**Field trip:** Saturday 9 July at 10.00 a.m. to Whewells Bush Scientific Reserve, Matangi (back-up 10 July). **Grade:** easy.

**Organiser:** Kerry Jones,  
ph: 027 747 0733,  
email: [km8j1s@gmail.com](mailto:km8j1s@gmail.com).

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## Rotorua Botanical Society

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**Field trip:** Saturday 2 July to the Waikato River margins and Wairakei (Huka Falls area). **Meet:** the car park Rotorua at 8.30 a.m.  
**Grade:** easy.

**Leader:** Chris Bycroft,  
ph: 07 345 3840, email:  
[chris.bycroft@wildlands.co.nz](mailto:chris.bycroft@wildlands.co.nz)  
(email preferred).

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**Field trip:** Sunday 7 August—Arahiwi Scenic Reserve, Mamaku.  
**Meet:** the car park Rotorua at 8.30 a.m. or Mamaku Village Dairy (opp Timber mill) 55 Mamaku St at 9.00 a.m. **Grade:** easy, bring your gumboots.

**Leader:** Paul Cashmore,  
ph: 07 349 7432 (wk) or  
027 650 7264,  
email: [pcashmore@doc.govt.nz](mailto:pcashmore@doc.govt.nz).

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## Whanganui Museum Botanical Group

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**Meeting:** Tuesday 5 July at 7.30 p.m. for a talk by Peter Frost on the ecology and human uses of mopane worms.

**Venue:** Museum's Davis Lecture Theatre.

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## Wellington Botanical Society

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**Field trip:** Saturday 2 July to Orongorongo Track. **Meet:** 10.00 a.m. at Rimutaka Forest Park's Catchpool car park, c. 15 mins along Coast Road, south of Wainuiomata. If you require a lift from Woburn Station, ring Ian and/or Jill the night before, and we will arrange a pickup. No phone calls, no pickup!

**Co-leaders:** Ian and Jill Goodwin,  
ph: 04 475 7248.

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**Meeting:** Monday 18 July at 7.30 p.m. for a talk by Debra Wotton, Director and Principal Ecologist at Moa's Ark Research, titled 'Seeds versus safe sites: What limits recruitment of *Muehlenbeckia astonii*'?

**Venue:** Victoria University Lecture Theatre M101, ground floor Murphy Building, west side of Kelburn Parade; enter building off Kelburn Parade about 20 m below pedestrian overbridge.

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**Field trip:** Saturday 23 July for the Te Marua Bush workbee, **Meet:** by car: at Te Marua Bush at 9.30 a.m. (250 m north of Upper Hutt's Te Marua Store and then left, off SH2 for 50m, along the road to Te Marua Lakes, Kaitoke Regional Park). by train: catch 8.05 a.m. Hutt line train from Wellington—phone leaders to arrange to be met at Upper Hutt Station.

**Co-leaders:** Glennis Sheppard, ph: 04 526 7450; Sue Millar, ph: 04 526 7440.

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## Nelson Botanical Society

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**Field trip:** Sunday 19 June to the Pelorus area. **Meet:** at the Church steps at 9.00 a.m. All participants must register by Friday 17 June in case of cancellation.

**Leader:** Penny Palmer,  
ph: 03 539 1329;  
email: [stevepenny@xtra.co.nz](mailto:stevepenny@xtra.co.nz)

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**Meeting:** Monday 20 June at 7.30 p.m. for a talk by Leon Perrie titled 'Camping in Guadalcanal's jungle and other tales of Pacific fern exploration'.

**Venue:** Jaycee Rooms Founders Park.

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<b>Field trip:</b> Sunday 17 July to Adele Island, Abel Tasman National Park. <b>Meet:</b> Church steps at 9.00 a.m.	<b>Leader:</b> Helen Lindsay, ph: 03 528 4020, email: <a href="mailto:lindsay.helen@xtra.co.nz">lindsay.helen@xtra.co.nz</a> .
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<b>Meeting:</b> Monday, 18 July at 7.30 p.m. for a talk by Shannel Courtney's titled 'Coastal peppergrass—a plant on the edge'.	<b>Venue:</b> Jaycee Rooms, Founders Park, Nelson.
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### Canterbury Botanical Society

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<b>Meeting:</b> Monday 4 July at 7.30 p.m. for a talk by Carol Jenson and Bob Webster titled 'Patagonia'. <b>Venue:</b> Upper Riccarton Library, 71 Main South Road.	<b>Contact:</b> Alice Shanks, ph: 03 337 1256, email: <a href="mailto:alice@caverock.net.nz">alice@caverock.net.nz</a> .
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<b>Field trip:</b> Saturday 9 July to Riccarton Bush and Addington Bush.	<b>Contact:</b> Alice Shanks, ph: 03 337 1256, email: <a href="mailto:alice@caverock.net.nz">alice@caverock.net.nz</a> .
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<b>Meeting:</b> Monday 1 August at 7.30 p.m. for a talk by Marine Aubert titled 'The impact of forest fragmentation on bird/plant mutualisms'. <b>Venue:</b> Upper Riccarton Library, 71 Main South Road.	<b>Contact:</b> Alice Shanks, ph: 03 337 1256, email: <a href="mailto:alice@caverock.net.nz">alice@caverock.net.nz</a> .
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<b>Field trip:</b> Saturday 6 August to Bowenvale and Dry Bush.	<b>Contact:</b> Alice Shanks, ph: 03 337 1256, email: <a href="mailto:alice@caverock.net.nz">alice@caverock.net.nz</a> .
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### Otago Botanical Society

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<b>Meeting:</b> Wednesday 13 July at 5.20 p.m. for a talk by Dr Justin Maxwell, Department of Anthropology and Archaeology, University of Otago, titled 'The Moriori: an example of precontact innovation in plant management'.	<b>Venue:</b> Zoology Benham Building, 346 Great King Street, behind the Zoology car park by the Captain Cook Hotel. Use the main entrance of the Benham Building to get in and go to the Benham Seminar Room, Rm. 215, 2nd floor.
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<b>Field trip:</b> Saturday 23 July to Trip Outram Glen. <b>Meet:</b> 9.00 a.m. at the Botany Department car park.	<b>Contact:</b> David Lyttle, ph: 03 454 5470, email: <a href="mailto:djlyttle@ihug.co.nz">djlyttle@ihug.co.nz</a> .
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<b>Field trip:</b> Saturday 6 August to Lower Taieri Gorge. <b>Meet:</b> 9.00 a.m. at the Botany Department car park.	<b>Contact:</b> John Barkla, ph: 03 476 3686, email: <a href="mailto:jbarkla@doc.govt.nz">jbarkla@doc.govt.nz</a> .
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