



TRILEPIDEA

Newsletter of the New Zealand Plant Conservation Network

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Deadline for next issue:
Friday 15 December 2017

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

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NEW ZEALAND

PLANT OF THE MONTH, p. 2



Asplenium lepidotum. Photo: Leon Perrie © Museum of New Zealand Te Papa Tongarewa.

President's report the New Zealand Plant Conservation Network 14th Annual General Meeting, Wednesday 15 November 2017, Regent Theatre, 23 Weld Street, Hokitika

Kia ora koutou katoa, welcome to the 14th AGM of the New Zealand Plant Conservation Network.

Thank you for coming to the AGM. It has been another busy year for the Network and I want to begin by thanking and acknowledging the ongoing support of all Network members along with the contributions and dedication of our Council members and co-opted members. The Network is in a very healthy state with our membership growing by 46 individual new members this year bringing us to a total individual membership of 880.

The Network was established in 2003 to be principally just that – a network. It was stimulated at the time by the release of the Global Strategy for Plant Conservation; Target 16 of which is: *Institutions, networks and partnerships for plant conservation are established or strengthened at national, regional and international levels to achieve the targets of this Strategy*. Networking supports plant conservation activities by providing the means to share experiences, exchange information, encourage professional development and build the collective capacity of the community of people involved in plant conservation.

The Network's core activities support these concerns. The committee reviewed and updated the Network Strategy last year and we identified the core networking services the Network provides such as the website, our newsletter, our biennial conference and the awards. These are the activities we will continue to focus on delivering and improving on moving forward.

Visitation to the website is huge, with over 270,000 sessions over the last year (a 10% increase on the previous year), involving over 153,000 individual users (a 13% increase on the previous year). Most of our website users are from Aotearoa, with the remainder from the United States, Australia, the United Kingdom and France. Jesse Bythell has done a wonderful job as Webmaster. Our website is the flagship of the Network's activities, it is a well-respected and well used online resource, and we want it to be even better. Getting to where we want to be with the back-end of the website, where the nuts and bolts that hold it together are, takes a lot of time and work. Not an easy task when, like us all, Jesse also holds down a full time job. Jesse deserves a lot of thanks for the work she puts in behind the scenes of the website to keep it up and running.

I'd also like to thank Nicky Oliver-Smith as Treasurer and Matt Ward as Secretary for the work they put in behind the scenes. Catherine Beard and Melissa Hutchison deserve thanks for bringing together the NZPCN Awards this year. John Barkla has put his time into refining the Network strategy. Matt Ward, Astrid van Meeuwen-Dijkgraaf, Peter de Lange, and Sarah Richardson have been doing a great job with the Forum. Peter de Lange and Colin Ogle have updated the plant factsheets and images

PLANT OF THE MONTH – *ASPLENIUM LEPIDOTUM*

The plant of the month for November is *Asplenium lepidotum*, one of approximately 25 endemic New Zealand *Asplenium* species. The species is found only in North-West Nelson, and down the West Coast to about Greymouth. It lives in lowland base rich habitats, especially limestone, and is often associated with rock outcrops and bluffs in forested habitats. Across its range the species is sympatric with many other *Asplenium* species, especially *A. polyodon* and *A. flaccidum*. The plant is short rhizomatous and can form large clumps up to 1 metre tall. The leaves are thick and bright shining green with up to 16 pairs of weakly serrated pinnae (leaflets).

This species is most similar in appearance to *Asplenium oblongifolium* and *A. obtusatum*. *Asplenium lepidotum* can be distinguished from these species by the presence of abundant scales on the upper pinnae surface, most obvious on new unfurling fronds, as these scales can be lost on more mature leaves. It may also hybridise with other *Asplenium* species.



Asplenium lepidotum. Photo: Leon Perrie © Museum of New Zealand Te Papa Tongarewa.

The species is endemic to New Zealand, and does not have a current threat ranking, as it has only been named recently, but is likely to be naturally uncommon due to the scarcity of its habitat, but the relative abundance of the species within this habitat type. It doesn't appear to be very palatable to exotic browsers, and the main threats are likely to be land clearance and competition with exotic weed species such as Mexican daisy. It is not commonly grown in cultivation, and should not be removed from the wild.

The generic name *Asplenium* comes from the Greek word a- 'without' and splene 'spleen', referring to a northern hemisphere species, the black spleenwort (*Asplenium adiantum-nigrum*), which was once believed to be a cure for diseases of the spleen. The species epithet '*lepidotum*' comes from the Latin word '*lepidotus*' meaning covered with small scales, referring to the pinnae of the species.

You can view the NZPCN website factsheet for *Asplenium lepidotum* at: http://www.nzpcn.org.nz/flora_details.aspx?!D=7718

on the website on a regular basis and we now have Wildland Consultants staff volunteering to update news items on the homepage. Thank you to Eric Scott, Jeremy Rolfe and Rowan Hindmarsh-Walls for their monthly work on the Network newsletter.

Particularly, I'd like to thank Alex Fergus, who has been the chief organiser of this year's conference. Alex put in a lot of work to bring the conference together, while also holding down a full time job. Nearly 100 Network members gathered to enjoy a host of good speakers, several well run workshops, interesting field trips and a combined exhibition dedicated to botanical artwork. Thank you to our speakers, workshop facilitators and field trip leaders who helped to create a great conference.

Some interesting developments this year for plant conservation in New Zealand were addressed in the conference programme. Myrtle rust was confirmed as present on Raoul Island in March this year, and on the North Island in May. We have seen a swift response from national, regional and local government agencies, with attempts at containment, an increase in public awareness and an improved interest in the use of ex-situ conservation tools to help protect Myrtaceae species vulnerable to this fungus, particularly in the commitment to seed banking. We have seen the release of a draft Threatened Species Strategy from the Department of Conservation, on which the Network council and many Network members submitted. I'm personally hopeful that the newly elected government will continue to commit and improve upon its obligations to help protect our threatened plants.

I'd like to conclude by thanking the other organisations and businesses that have contributed toward the Network over the year, and directly to our 2017 conference. They are, Coastlands Plant Nursery Ltd, Wildland Consultants, West Coast Treetop Walk and Café, the Otari-Wilton's Bush Trust, the Botanic Gardens of Australia and New Zealand. Along with Network membership, good sponsorship is key to the ongoing development and maintenance of the Network's activities. I look forward to the continued support of the Network by these organisations and others, in our combined efforts to protect and restore the flora of Aotearoa.

Rewi Elliot, President

NZPCN Award winners 2017

As in previous years, this year's Plant Conservation Network awards span the full breadth of activity required to protect New Zealand's native plants. The 2017 award winners are:

Young Plant Conservationist of the Year: Emilly Fan

Plant Nursery Involved in Plant Conservation: Glenbrook Nursery, Te Whangai Trust

School Plant Conservation Project: Rototuna Primary School, Hamilton

Community Group: Friends of the Pukemokemoke Bush Reserve

Local Authority Protecting Native Plant Life: Christchurch City Council

Individual Involved in Plant Conservation: Lindy Kelly

Special Award – Botanical Illustration: Eleanor Burton

Young Plant conservationist of the Year – Emilly Fan

Emilly is currently a Year 13 student at Takapuna Grammar School, Auckland. She is an avid environmentalist and has a particular interest in plant conservation. She has been the leader of the Takapuna Grammar School environmental group since 2015 and has organised numerous native tree plantings on school grounds. A few months ago she organised a successful moth plant removal at the Waitemata Golf Club where there was a large infestation. She has also collaborated with the local Ben & Jerry's store to create a community garden that featured many native plants. She is also a regular Motutapu Restoration Trust volunteer—ferrying over fortnightly to do nursery work, weed busting and tree planting. Emilly is a passionate advocate for plant conservation; spreading awareness at many national forums that she has been selected to attend as a youth delegate, including the Sir Peter Blake Youth Enviroleaders Forum, the Auckland Council Sustainability “Make a Difference” hui and the national Environmental Defence Society conference.

Plant Nursery involved in Plant Conservation: Glenbrook Nursery, Te Whangai Trust

Te Whangai Trust is a social enterprise that provides employment training for long-term unemployed people and at-risk youth at a native plant nursery. The organisation's mission is to ensure disadvantaged people can create opportunities for growth while contributing their skills to the local community and environment.



Founded 10 Years ago, Te Whangai Trust now has training hubs located in Miranda, Glenbrook, Pukekohe and Mt Roskill. These hubs have helped 1200 people increase their numeracy and literacy levels, financial capability, relationships and parenting skills. Over 1300 people have successfully undertaken court-directed community service work through Te Whangai. A pilot project focusing on high-risk offenders revealed 73% of those participating in Te Whangai's planting programme did not re-offend.

Te Whangai has built four nursery hubs that have grown and planted over a million native trees. The NZPCN received a nomination for Te Whangai's Glenbrook team, noting its dedication to conservation and its appreciation of the natural environment. It was noted that "it is a common thing for these guys to give up their free time and often family time to get the job done". They are very dedicated to their tasks—putting in a huge effort to restore and repopulate our forests, waterways, coasts and urban areas.

School involved in plant conservation award: Rototuna Primary School, Hamilton

In 2017, Rototuna Primary continued to work on restoring the section of the Mangaiti Gully that runs through the school grounds. This project sees the children continue to develop their environmental knowledge, and strengthen their relationships with other gully restorers. Mangatiti Restoration Trust continues to motivate, encourage and actively engage in projects with the school. A joint community project with Gerard Kelly from HCC, Rex Bushell and his team, helped teach Team Kakapo to restore a section of Mangatiti Gully behind Sovereign Isle. This saw over 140 children and over 30 adults working together to plant, release and learn. By developing a shared vision amongst local gully restorers, it fosters relationships between the school and community and helps the children to see the importance and relevance of their conservation achievements.

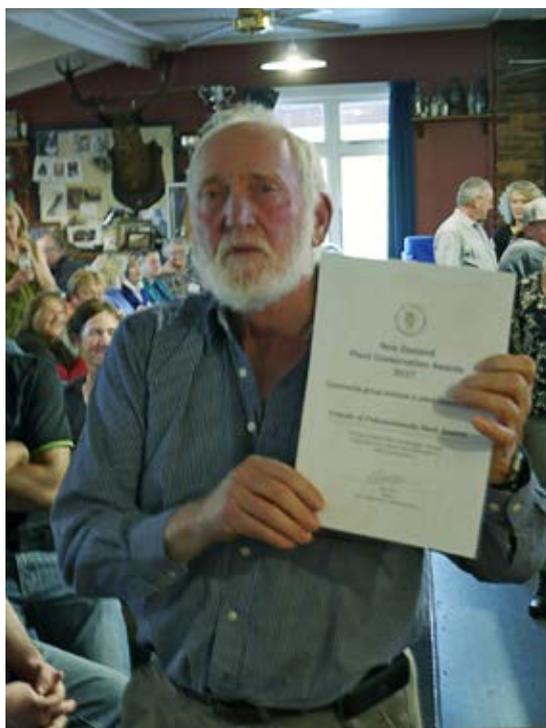
Rototuna Primary School is very fortunate to have a visionary leader who saw a space that could be restored while connecting children with the environment. His dream was to see every child plant a native plant each year. Over the past 5 years, they have achieved that, growing over 1000 plants a year and having nearly 1500 children planting out saplings in our gully or with neighbouring gully

restorers. The children have benefited hugely by our programme, developing confidence in the outdoors, connecting it to all areas of the curriculum, building leadership and now adding their ideas to his existing vision. We thank the Local and Regional council, Enviroschool leaders, Kaumatua and the children for helping to make this dream a reality.

Community Group involved in Plant Conservation: Friends of the Pukemokemoke Bush Reserve

The David Johnstone Pukemokemoke Bush Reserve is located on Whitikahu Rd at Tauhei just 25 km north of Hamilton. It was donated by David Johnstone to be administered by a private trust for recreation and education, and to be available to all. Pukemokemoke means hill standing alone and was very much part of Maori traditional use, as a source of food, for rongoa, and as a stopover on a journey. Pukemokemoke was logged for timber in the 1940s and 1950s and was part of a working farm. At the time it was willed to the nation in 1990 by David Johnstone, it had stock on it, was full of weeds and various predators. The transfer of the property to a charitable trust in 1997 saw the beginning of a process of restoration of this 40 ha remnant of lowland native forest.

One of the first tasks of the new trust was to ensure safe access so a new concrete bridge was installed to give foot and vehicle access into the reserve. The reserve has the Mangatea Stream on its boundary and the removal of weeds along the stream and planting of 2500 native plants was an early achievement as a way of softening this boundary. Major weed species included honeysuckle, privet, gorse and pampas. All have now been successfully brought under control. However, the major infestation of privet was the greatest weed problem, with some 4 ha of solid, impenetrable privet to deal with. Within the last 20 years, all the weed difficulties have been reduced to minor problems and about 10,000 native plants have been introduced into the forest margins and flats to restore the forest to its former beauty and resilience.



The reserve has several kilometres of tracks and one track passes through a lovely stand of mature kauri. With the emerging problem of the root disease *Phytophthora* (kauri die back), the group chose to protect the stand from soil borne, footwear-transmitted infection by erecting a 400 m long raised wooden walkway through the kauri stand. Funds were provided by the Waikato District Council, Waikato Regional Council and the Tindall Foundation; all work was performed by the volunteer effort of the Friends of Pukemokemoke.

The reserve has become a favoured place for early morning runners and for all manner of recreation. Thanks to the dedicated efforts of the group there are now well maintained tracks, a gazebo shelter and picnic shelter. One group of users that they are particularly pleased to host, are the five or more pre-schools who bring their children regularly to the bush as part of their outdoor education. To watch the way in which the children value the experience and are learning about the environment is something that the Trust especially values.

Restoration is an ongoing process and though they have been successful in removing most pests and weeds, the Trust sees the reserve as an ongoing experiment which is both educational and recreational. Many volunteers have contributed to the current success; funds have been supplied by local authorities, and the work goes on as we pass from a reconstruction phase into a maintenance phase. The reward is in the many happy faces of runners, picnickers and children who appreciate what a good piece of native bush can look like.

Local Authority Protecting Native Plant Life: Christchurch City Council with special recognition of Arthur Adcock

Arthur Adcock has been a Christchurch City Council ranger for over four decades, first as a ranger at Spencer Park and latterly at The Groynes Regional Park. Arthur has a remarkable ability to use his role as the Groynes Park ranger to bring about catchment wide restoration and protection. Over the last decade he has knitted together City Council land, Environment Canterbury lease land, and private land owned by The Lady Isaac Trust, Island farm, small-holdings, and land leased to the Scout Association, into a cohesive, reforested corridor along the Otukaikino stream, a rare lowland Canterbury spring-fed stream. The Otukaikino bounds the northern edge of the Christchurch city and is prized for trout fishing. Arthur has been instrumental in successful applications to the Christchurch West Melton Water Zone committee and Fish and Game for funds to boost the Council spending on plants. Arthur has overseen the planting of almost 100,000 eco-sourced trees, shrubs, toe toe and harakeke along the river. He has also installed almost 10 km of walkway that runs along the river through City Council, Environment Canterbury and privately owned land.



Arthur seeks advice. He is strict about eco-sourcing plants. He is guided by the Christchurch City Council landscape architect, Anthony Shadbolt, and ecological reports prepared for the Council. He has managed a rare population of *Mazus novaeseelandiae* subsp. *impolitus* f. *impolitus* (Threatened -Nationally Vulnerable, DOC 2012), and naturally-occurring wetland species *Schoenus apogon*, and *Hypericum pusillum*, *Schoenus maschalinus*, *Carex flavicans*, *Carex maorica*, and *Gratiola sexdentata* (all now rare in the Low Plains Ecological District), which requires mowing to keep the grass from shading out these low-growing wetland species. On private land, Arthur advocated fencing to enable differential grazing to reduce grass competition, i.e., high wires that allow sheep to push under while keeping cattle out.

Arthur has now convened a working group to guide the City Council park staff in the management of the Christchurch drylands. It is a testament to the force that is Arthur that he was able to get Council staff, Ecan staff, Wildlands, Ecan lessees, Lady Isaac Trust, private landowners, QEII Trust, and the Christchurch Airport environment officer together to start on guidelines to manage the City Council's drylands. He has already planted out new bushes of *Olearia adenocarpa*.

Arthur is one of those rare people who can make things happen in a complex organisation and sweep along the people around him. From PD worker to scientist to the mayor, Arthur is fearless as he takes every opportunity to promote and resource the new forest on the edge of Christchurch and the Plains. We cannot imagine that anyone but Arthur would have been able to carry out a project of this scale and ecological integrity. The Canterbury Botanical Society toured the Groynes Park restoration in November 2015 to view the massive area of restored forest and the nationally threatened and uncommon wetland plants in flower.

Individual Involved in Plant Conservation: Lindy Kelly

Lindy was nominated on the strength of her vision for (and work on) the Kelly's Bush restoration project. This project has been going now for 30 years. Kelly's Bush comprises two parts; about 2.5 ha of original native bush dating from pre-European times which contains some rare and unusual flora and fauna, and has been declared an area of special significance by the local council. A further area of approximately 3.5 ha surrounding the bush and in the gully below it was a sea of gorse, old man's beard, blackberry and banana passionfruit vine. Over the 30 years, Lindy and others have worked tirelessly to clear, develop, protect and preserve both areas; putting in trails, steps, bridges and picnic areas so they could share it with the public. When Lindy's husband Joe was killed on the farm 8 years ago Lindy continued to keep the bush project flourishing.

Lindy has also put a lot of effort into engaging with kindergartens, primary, intermediate and high schools, and community groups such as Cubs, Brownies, walking groups and many other organisations to use and be part of the bush project. Raising awareness about New Zealand's natural environment has been paramount in her work. She has written and had published a series of children's books about the bush in English and Maori to share knowledge about its importance and to inspire children to care for their environment. She has also made CDs to accompany the books.

The Kelly's Bush project has helped with extensive conservation education in the region, not only with schools but also through the Conservation Rangers at NMIT. At open days held by Lindy at Kelly's Bush over the last year over 200 people have come each time to walk, appreciate and admire the gem that has been preserved and that continues to be developed by Lindy who is also farming full-time.

With the help of fundraising and local trappers, Lindy has made significant progress on weed and pest control. She propagates and grows many of the native tree species which she then plants in the gully. Each year, she plants around 1000 native trees herself. Lindy's dedication, commitment, hard work and perseverance in protecting, developing and sharing the taonga that is Kelly's Bush makes her a most worthy recipient of the NZPCN Individual Award for 2017.

Special Award for Botanical Illustration: Eleanor Burton

Eleanor has been employed by Wellington City Council in a part-time capacity for the last nine years. During this time, she has been based at Otari-Wilton's Bush, Wellington, where she maintains the native-plant database. In more recent years, she has also spent time at the Wellington Botanic Garden, updating the database there and training colleagues to use the BG Base programme used by both gardens. Eleanor has been a member of the Wellington Botanical Society (WBS) committee for the last 7 years, including 2 years as vice-president. She is currently the Editor of the WBS's bulletin, regularly leads fieldtrips, and volunteers at Te Papa, where she mounts and databases plant specimens for the herbarium.



Eleanor's earliest interests lay in drawing plants. This interest under-pinned her choices of school and university subjects, at the same time recognising that botanical illustration on its own was not a very secure career choice. None of her qualifications or subsequent employments strayed far from

her original objective. At Victoria University, Eleanor took a degree in Botany and afterwards trained in arboriculture. During this time, she continued to draw plants, not only refining the observational and line-drawing skills needed, but acquiring in the process a well-organised set of sketch-books containing beautiful drawings of New Zealand plants. These were executed both in graphite and pen and ink.

In recent years, Eleanor has produced drawings on commission from the French Government for the Flora of New Caledonia by John Dawson, and has produced botanical illustrations for Wellington City Council for interpretation boards, illustrations for the children's programme, and illustrations for the new Discovery Gardens soon to be opened at Wellington Botanic Garden. For the last 10 years, Eleanor has been working on a personal project to illustrate the New Zealand *Celmisia* genus, some members of which are yet to be fully described. In 2012, 25 of these colour-pencil illustrations were exhibited in the foyer of Conservation House, the Department of Conservation's head office, Manners Street, Wellington. This exhibition served to highlight the diversity of *Celmisia*, and the particular facility of a skilled botanical illustrator to bring out the unique character of each species.

As well as continuing to draw for her own reference collection, since 2000 Eleanor has provided botanical pen-and-ink drawings of the highest standard for most issues of Otari-Wilton's Bush Trust's News and Views quarterly newsletter, and has done the same for the Wellington Botanical Society newsletter when requested. In 2012, a collection of her Otari-Wilton's Bush Trust newsletter illustrations was published with short descriptions of each subject. Since 2016, Eleanor has illustrated the cover of the New Zealand Botanical Society Newsletter. For each of these publications, Eleanor has provided freely and willingly of her time and expertise. The accuracy and elegance of her line drawings follow the ancient tradition of the best botanical illustrators.

The Lucid key for *Epacris*

Some time ago, Ron Crowden from Australia asked for assistance with images of *Epacris* spp. A number of readers either supplied him with images or offered to so for which he was very grateful (he got far more than he needed or could use). The key is now complete and available and Ron would like to make good his offer to supply a copy to those who sent or offered images. However, Ron has a small problem in that his computer suffered a fatal crash and he has lost the email addresses of all those who communicated with him. So, if you sent or offered images of *Epacris* to Ron and would like a copy of the key please send an email to Ron at: ron.crowden@bigpond.com and give him your snail mail address.

Lucy Cranwell student grant for botanical research: Call for applications

Applications are invited for the Lucy Cranwell Grant of \$2,500 from the Auckland Botanical Society to assist a student studying for the degree of PhD, MSc, BSc (Hons) or B. Appl. Sci. in any tertiary institution in New Zealand whose thesis project deals with some aspect of New Zealand's flora and vegetation. Priority will be given to projects relevant to the northern half of the North Island.

The research project to be supported will be chosen on the basis of appropriateness to the objects of the Society, namely to encourage the study of botany, and to stimulate public interest in the plant life of New Zealand and its preservation, conservation and cultivation. The grant will be administered by the student's supervisor as a contribution to expenses associated with the project.

Closing date for applications: **5.00 pm Friday 15 December 2017**

A copy of the Application Form and the rules of the award may be downloaded from the Auckland Botanical Society website under: Lucy Cranwell Fund:

<https://sites.google.com/site/aucklandbotanicalsociety/>

Contact for enquiries: Helen Preston-Jones, Auckland Botanical Society, email: helenprestonjones@gmail.com

Cook Islands bryophyte survey

Peter J. de Lange, Department of Natural Sciences, Unitec Institute of Technology, Auckland, New Zealand (pj.delange@xtra.co.nz); Matt von Konrat, Field Museum Herbarium, Field Museum, Chicago, Illinois, U.S.A.; Mereia Tabua, Scientific Officer, University of the South Pacific, Suva, Fiji; Gerald McCormack, Cook Islands Biodiversity and Natural Heritage, Cook Islands Government, Rarotonga; Theo J.P. de Lange, Gillian M. Crowcroft and Finn J.T. de Lange, Natural Resource Assessors, Auckland, New Zealand

Sitting in a deck chair, sipping Piña colada whilst contemplating whether to go for a snorkel in the azure tepid waters of the lagoon (Fig. 1) or attend a local night club is the usual way people spend their time on Rarotonga, the most populated island in the Cook Islands group. However, there are other ways to enjoy the island that are potentially less damaging to the liver and have the added bonus of making one much fitter.



Fig. 1. Muri Lagoon, Rarotonga—the quintessential tourist’s idea of where to spend a day on a South Pacific Island. Photo: Gillian M. Crowcroft.

Fig. 2. The central mountains of Rarotonga on a stormy day as viewed from Motutapu, Ngatangia Harbour, Rarotonga. Photo: Peter J. de Lange.

Rarotonga (21° 13' 44.63" S 159° 46' 30.87" W), at 67.39 km², and reaching an elevation of 653 m a.s.l. is the largest and highest of the 15 major islands making up the Cook Islands group (Fig. 2). The Cook Islands are also part of over 4500 islands of the Polynesia-Micronesia biodiversity hotspot and widely considered as the epicentre of the current global extinction crisis (<http://www.cepf.net/resources/hotspots/Asia-Pacific/Pages/Polynesia-Micronesia.aspx>). The island is an estimated 2.68 million years old (Wood 1967). Currently, it is thought that people (Polynesians) settled the island some 1500 years ago (Keller & Wheeler 1998), though Smith (1904) suggested a more recent settlement date of 875 years before present. The vascular flora of Rarotonga was first documented by Cheeseman (1903) and was updated, along with a comprehensive account of the other islands of the Cook Island group, by Sykes (2016). However, the bryophyte flora of the Cook Islands group (Fig. 3) has received scant attention. The most recent account, that by O’Shea (2008), lists only mosses, accepts 62 taxa for the islands. Virtually nothing has been published about the islands’ hornworts and liverworts, and most of that is incidental mention in papers dealing with other island groups or regions, e.g., Braggins et al. (2014), Renner and de Lange (2011).



Fig. 3. Mato (*Homalium acuminatum*) tree covered in bryophyte growth, Te Kou, Rarotonga. Photo: Matt J. von Konrat.

As so little is known about the bryophyte flora of the Cook Islands, an international team comprising bryologists from the University of the South Pacific, Suva (Fiji), The Field Museum, Chicago (USA), and Department of Natural Sciences, Unitec Institute of Technology, Auckland (NZ), initiated a survey of the islands' bryophytes. Working closely with the Cook Island government, the team completed 10 days of field work on Rarotonga during late September – early October 2017. During the survey, a range of habitats was targeted including coral cay (Fig. 4), coastal and lowland forest, stream catchments (Fig. 5), valley head and cloud forest (Fig. 6) and rock outcrops. Numerous specimens were collected from these habitats, carefully packeted, air dried and shipped to The Field Museum and University of the South Pacific where they will be critically examined, identified and DNA sequenced (if necessary). In addition to these steps, whilst on Rarotonga portions of fresh specimens were mounted on slides, examined by microscope, and their critical features, such as leaf oil bodies (Fig. 7) imaged using a computer-camera-microscope set up. Although labour intensive, this process is critical because the oil bodies of liverworts deteriorate rapidly on drying and are soon lost, yet oil bodies are a key character enabling family, genus and even species recognition. Apart from their taxonomic significance, interestingly, oil bodies also harbour chemical compounds that have biologically active properties, for example, activity against microbes.



Fig. 4. Motu Koromiri, Muri Lagoon, Rarotonga—one of three coral cay / sand cay islands in the Muri Lagoon, Rarotonga. Photo: Peter J. de Lange.

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Fig. 5. Tributary stream to the Avana below Te Atukura, upper Avana Stream, Rarotonga. Photo: Peter J. de Lange.



Fig. 6. Valley head and upper slope forest, below Te Atukura, Rarotonga. Photo: Peter J. de Lange.

The bryophyte flora of Rarotonga is very conspicuous to those who know what to look for (Fig. 8, 9), and it is full of surprises. For example, on the low-lying coral cay islands of Muri Lagoon (Fig. 4), in places where storm surges would frequently wash through the vegetation, the exposed root plates of coconut (*Cocos nucifera*), toa (*Casuarina equisetifolia*) and 'au (*Hibiscus tiliaceus*) often sported patches

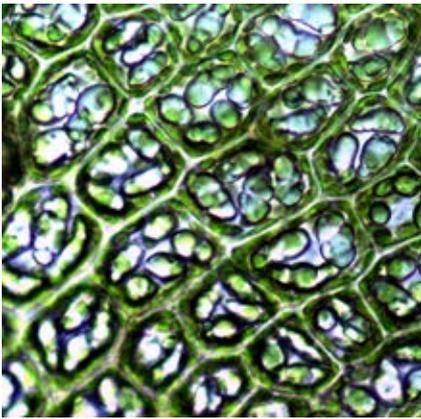


Fig. 7. *Bazzania* oil bodies – an example of oil bodies observed in one of the many liverworts collected from Te Kōu, from which microscope slides and then images were taken to aid future identification. Photo: Matt J. von Konrat.

Fig. 8. A colony of *Plicanthus hirtellus* growing on the trunk of kaiatea (*Weinmannia samoensis*), Rarotonga. *Plicanthus* is a common epiphytic liverwort of Rarotongan cloud forest. Photo: Peter J. de Lange.

Fig. 9. *Schistochila cheesemanii*, a common ground dwelling liverwort of Rarotonga, this species is probably conspecific with the more widespread *S. aligera*. Photo: Peter J. de Lange.

of liverworts in the genus *Frullania* or the family Lejeuneaceae. In coastal forest remnants, particularly on the south and western side of Rarotonga, the trunks of lantern tree (*Hernandia nymphaeifolia*), ‘au, coconut, ano (*Guettarda speciosa*), and nono (*Morina citrifolia*) were covered in greenish patches of *Lejeunea schusterii*. This minute liverwort was originally described from the northern North Island of New Zealand as *Rectolejeunea denudata*. Its discovery on Rarotonga in 2006 provided one of several cryptogamic plant links to New Zealand some 3200 km away in the south-western Pacific (Renner & de Lange 2011). Other linkages across the Pacific include *Plagiochila pacifica*, previously regarded as endemic to Raoul Island in the Kermadec group and *Lejeunea hawaikiana*, which skips across the Pacific from Rarotonga through Raoul Island to the North and Chatham Islands of New Zealand—hence the species epithet (Renner & de Lange 2011).

The cloud forest of Rarotonga, at 150 ha, occupies only a fraction of the island’s 67.39 km² yet it supports the greatest number of endemic vascular plants (12 of the 18 endemics currently accepted for Rarotonga). Access to these fragile forests is not easy, requiring a good head for heights and plenty of blind faith as one typically uses aged fixed ropes and steel pins hammered into the often-vertical rock and clay walls leading up to the razor-back summits of the central Rarotongan mountains. Of course, that is when these are provided; when they are not, one then has to ‘trust’ the spindly roots and trunks of neinei (*Fitchia speciosa*), or more reliable root stocks of mato (*Homalium acuminatum*) and pua (*Fagraea berteriana*). As mountain trails are generally not maintained on the island, track clearance with a machete is often required, adding to the strain of field work (Fig. 10). Bryologically the cloud forest of Rarotonga is well marked; the initial indicators are *Papillaria*, possibly the same species, *P. crocea*, that festoons the upper ‘wet’ forest of Raoul Island, followed by the golden-yellow liverwort *Plicanthus hirtellus* (Fig. 8) and a species of dark brown to red-brown *Mastigophora* (Fig. 11) both of which form ‘balls’ on the trunks of kaiatea (*Weinmannia samoensis*), *Celtis pacifica*, pua and naturalised rose-apple (*Syzygium jambos*). Epiphytes aside, on the ground a sure-fire indicator of cloud forest is *Schistochila cheesemanii* (Fig. 9) a dubious endemic, probably conspecific with the wider ranging *S. aligera*.

Accessing these forests makes for a very long day, particularly as camping high up in the clouds is judged potentially too damaging to this fragile ecosystem. So a bryological survey of Rarotongan cloud forest necessitates early morning starts. Once the cloud forest is reached, strict discipline is then necessary to ensure that the full range of microhabitats is covered before the light fails. Because of this, the survey succeeded in surveying only one cloud forest, that found on Te Kōu, a 588 m tall peak (Fig. 12), whose jagged summits enclose a deep forested basin, complete with small stream draining down into the Avana headwaters. Several hours were spent on Te Kōu working in teams combing the



Fig. 10. Theo de Lange clearing a track through dense kiekie (*Freycinetia arborea*) vineland *Isachne distichophylla* grassland, Te Kou Basin, Te Kou, Rarotonga. Photo: Peter J. de Lange.



Fig. 11. A 'ball' of *Mastigophora* on the trunk of pua (*Fagraea berteriana*). Associated with the liverwort is the lichen *Pseudocyphellaria argyracea* s.l., filmy fern (*Hymenophyllum polyanthos*), hares-foot fern (*Davallia solida*), and glossy tongue fern (*Elaphoglossum savaiiense*). Photo: Matt J. von Konrat.



Fig. 12. Cloud forest, Te Kou Basin, Te Kou, Rarotonga. Photo: Peter J. de Lange.

basin and summit ridge forest, making sure to explore the forest canopy, tree and tree fern trunks, and numerous root caves in the dense kiekie (*Freycinetia arborea*) / *Isachne distichophylla* tangles that often form the ground cover on Te Kou.

As a guide to the time needed to complete this survey, the few hours spent on Te Kou resulted in a near night forest exit and a further 18 hours of specimen sorting, processing, interim labelling and imaging. It was a very tired team indeed that completed the first phase of the island survey and headed back to Fiji, New Zealand and the USA on the 6 October 2017.

Although the study is still in its early days, it looks like the bryophyte flora (hornworts, liverworts and mosses) of Rarotonga may exceed 150 species. The study will also investigate the conservation status of these little plants, their ecological and cultural significance, and the status of those species that have been described as endemic. Already, preliminary findings indicate that Rarotonga has been invaded by a number of 'weedy' moss species, such as feather moss (*Pseudoscleropodium purum*) that was discovered in 2010 growing in a car park in Avarua, the main centre of Rarotonga and capital of the Cook Islands, and *Fissidens bryoides* found in the same area in 2014.

Acknowledgements

We would like to thank Charlene Hoff, Policy and Research Officer, Office of the Prime Minister, Cook Islands Government for assistance with our collection permit.

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Hawke's Bay Botanical Group Formed

Marie Taylor, Hawke's Bay Botanical Group chair, and Mike Lusk, committee member

This time last year a few Hawke's Bay people keen on native plants set up an informal group to organise field trips, talks and workshops. The initial meeting setting up the group attracted 25 people, which was a fabulous start. As a result of the very helpful Wellington Botanical Society's detailed information around running an incorporated society, we decided to forgo that option, and just get together without subscriptions or membership fees.

Unfortunately, most of the field trips in the first few months came to an untimely demise thanks to the uncanny ability of the organisers to synchronise events with heavy rainfall events. Not easy in Hawke's Bay but we did it! But now we've had a trio of successful events under our belts, so are feeling more confident about the future.

The first trip was to Kaweka Lakes on 13 November 2016 where Mike Lusk and Amelia McQueen led 11 people around the ridiculously scenic lakes. Mike Lusk had hoped there would be more orchids along the track but they were having a rest year with only three species in flower. There were plenty of other plants including ferns, lichens and clubmosses so progress was suitably slow. The western lake was relatively low exposing some of the water plants and allowing easy passage along the shore where a variety of specialised plants are present, some of them locally or more generally rare. There is a pleasant grassy camping area between the lakes so we stopped there for lunch and a bit of a look around the immediate area while Alan Lee stretched the definition of botany a bit by catching some of the small brown trout which infest the lake waters. A variety of sedges and rushes mixed with low grasses and some orchids in bud, *Pimelea prostrata* (New Zealand daphne), *Huperzia australiana* (a fir moss) and an unusual fern (*Botrychium australe*) were close by. Sadly there has been a fire in this area and a small but rapidly expanding patch of broom has taken full advantage. We also pulled some wilding pines scattered along the shore.



Kaweka Lakes.

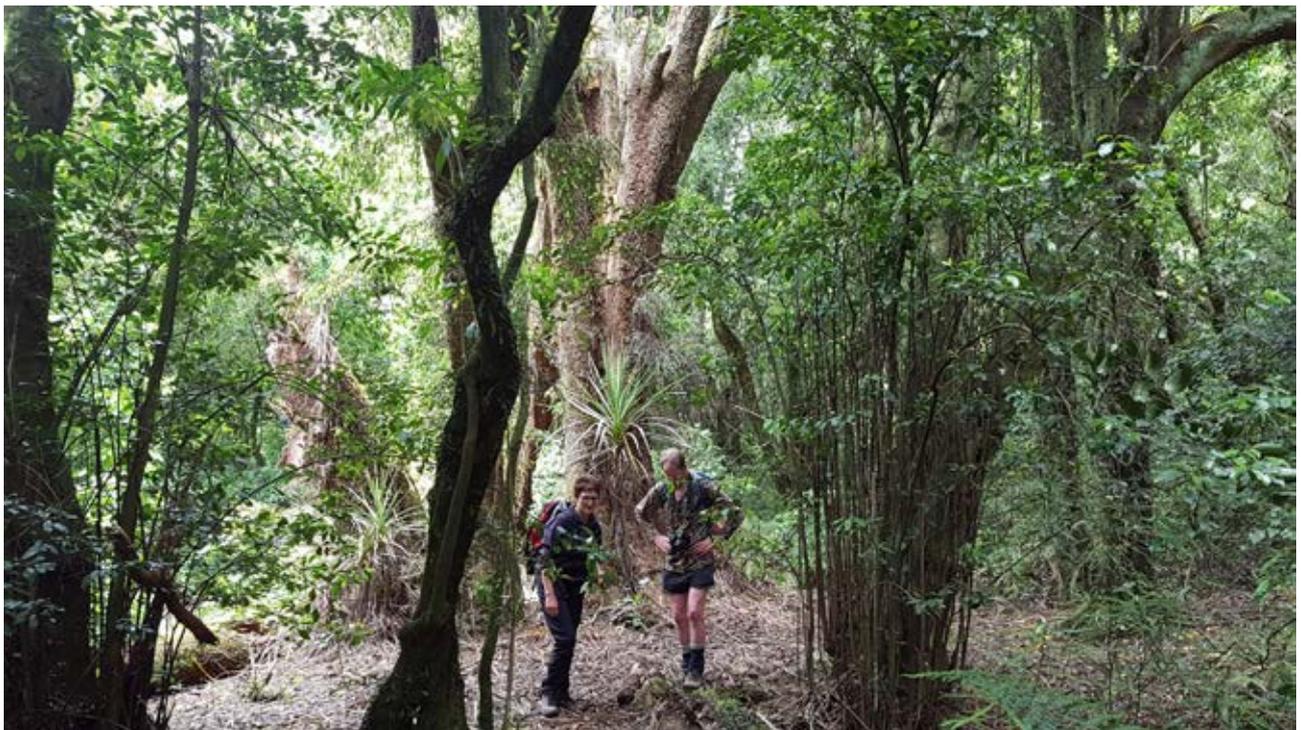
Again, rain threatened but didn't deter our 23 planters at the mid-winter planting on 1 July, 2017, at the Baldwin Open Space Covenant in Central Hawke's Bay. This very special covenant covers 7.7 ha in four blocks and had been recently topped up with deer fencing. (As an aside, deer are near plague proportions in much of Hawke's Bay now, threatening and damaging a great deal of habitat.) This is one of the very few sites where *Pittosporum obcordatum* is found in Hawke's Bay and the trees were still sporting a good crop of seeds. Among other species to be planted were *Teucrium parvifolium*,

of which only one plant was already present, and protected by a dense covering of blackberry, and *Olearia gardnerii*, because the alluvial flats of the site alongside the Mangarouhi Stream are perfect habitat. The *Olearia* was grown from cuttings from the one original plant which has ever been found in Hawke's Bay. The bush is also full of other divaricating species, and it was a real treat to see them.



Lunch at the Baldwin covenant planting day.

November 4, 2017, saw 80 people visit the Lattey and Gallen covenant, Korimako, on the banks of the Esk River near Te Pohue. Eighty people! It was fantastic. Co-owners Jeremy and Kath Simpson welcomed everyone, and we trooped off on a 5 km walk through the oldest covenant in Hawke's Bay. Enormous totara trees, at least 500 years old, are the piece-de-resistance of the covenant, but really the place is a botanical treasure and we were oohhhing and aahhing all day. Eagle-eyed Pete Shaw found *Dactylanthus* almost straight away, which was embarrassing, as some of us have been walking past it for years and not recognising it.



Kay Griffiths and Alan Lee in the Lattey and Gallen open space covenant.

Sean Husheer took the notes and virtually doubled the species list for the bush, with many orchids added as well as one lone nikau which was thriving. We also walked up the banks of the Esk a little way to see one of two small hydro dams on the next door farm.

Our next excursion is planned for Saturday February 10, 2018, when we will visit Puahanui Bush at Gwavas, near Tikokino. This foray will focus on expanding the original plant list by Tony Druce, and numbers will be limited to around 20. To go onto the mailing list for the Botanical Group, email the group chair, Marie Taylor at planthawkesbay@xtra.co.nz, or committee member Denise Fastier, dfastier@doc.govt.nz or secretary Edaan Lennan, edaan.lennan@gmail.com. Or you can keep in touch by following the group on Facebook.

Vodafone announcement

As all affected members are probably aware, Vodafone has announced that it will discontinue its email service on 30 November 2017. This will affect any email address ending with the following:

- clear.net.nz
- es.co.nz
- ihug.co.nz
- paradise.net.nz
- pcconnect.co.nz
- quik.co.nz
- vodafone.co.nz
- vodafone.net.nz
- wave.co.nz

Any member with any of the above endings to their former email address is asked to amend their email address in our database as soon as they have signed up with a new provider. To make the amendment, each affected person will need to login to the Network website (www.nzpcn.org.nz) and then click on 'My Profile' in the bar at the top, scroll down their profile to the email address and, after entering the new email address, scroll down to the bottom of the page and click on 'Update'. Then when email addresses are harvested to send out the monthly newsletter notification the correct email address will be picked up. Please do this NOW or you may not future newsletter notifications or other information.

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):

Auckland Botanical Society

Field trip: Saturday 2 December for a Christmas walk and shared picnic lunch at Eskdale Reserve (the Kaipatiki Project), 17 Lauderdale Rd, Birkdale, North Shore. **Leader(s):** Kaipatiki Restoration Project team.

Organizer: Bec Stanley.
Contact: Maureen Young, email: youngmaureen@xtra.co.nz.

Waikato Botanical Society

Field trip: Sunday 10 December to Killarney (Tuahu Lakes), Te Aroha (combined with Rotorua Botanical Society, see below for details.)

Rotorua Botanical Society

Field trip: Sunday 10 December to Killarney (Tuahu Lakes), Te Aroha (combined with Waikato Botanical Society). **Meet:** car park, Rotorua at 8.00 a.m. or 9.30 a.m. at corner of Te Aroha Gordon Rd and Thompsons Rd. **Grade:** medium. **Bring:** gumboots for wetland.

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

Whanganui Museum Botanical Group

Meeting: Tuesday 5 December at 7.00 p.m. for the botanical social event of the year. **Bring:** \$4 or finger food and any flowering or fruiting native plant to decorate the table and provide an discussion focus; images from the November Plantaginaceae workshop will be shown.

Venue: Supper Room adjacent to the Museum's Davis Lecture Theatre.

Wellington Botanical Society

Field trip: 4–11 January 2018 for Summer Camp in the Volcanic Plateau, Central North Island. **Base camp:** Taurewa Camp, Pukehinau Rd, Tongariro Forest Park 3989, 500 m off State Highway 47, c. 21 km (15 min) north of National Park village. Breakfasts & lunches will be prepared by BotSoc on a roster system. Dinners will be catered. Please make your own arrangements if you have special dietary needs.

Accommodation: Seven 2-person huts; bunk-rooms; camping; all \$17/person/night; self-contained cottage sleeps 7, \$25/person/night. **Booking:** booking ESSENTIAL; preference will be given to members of Wellington BotSoc; download registration form [here for doc version](#) or [here for pdf version](#). **Deposit:** \$400.00 per person to be paid at time of registration.

Leader and Contact:
Lara Shepherd, email Lara.Shepherd@tepapa.govt.nz,
ph: 027 363 5854, and
Chris Moore.

Nelson Botanical Society

Field trip: 8-18 December to Wanaka and Borland. This trip is already full.

Canterbury Botanical Society

Meeting: Monday 4 December at 7.30 p.m. for a talk by Dr Jessie Prebble, Landcare Plant Systematist titled "Why are forget-me-nots in trouble in New Zealand and comments on harebells on Banks Peninsula". **Venue:** Upper Riccarton Library community meeting room, 71 Main South Road.

Contact: Alice Shanks,
ph: 03 337 1256;
email: alice@caverock.net.nz.

University of Canterbury summer course: Practical Field Botany

Practical Field Botany (BIOL305): an intensive, short summer course designed to meet the need for training in the collection, preparation, and identification of botanical specimens. Venue: University of Canterbury, Cass Mountain Research Area, Canterbury. **Dates:** 18 – 26 January 2018. **Enrolment:** opens 4 October 2017.

More information: Matt Walters (matt.walters@canterbury.ac.nz; ph: 03 369 5211) or Pieter Pelsler (pieter.pelsler@canterbury.ac.nz; ph: 03 369 5228).

Otago Botanical Society

Meeting: Saturday 2 December at 4.00 p.m. for a pot-luck dinner at Woodhaugh Gardens. Bring: a plate and enjoy good company, good food and the flora of the town belt. We will start with some backyard botanising before dinner. All are welcome.

Field trip: Friday 8 to Sunday 10 December to Waikaia Valley and Piano Flat. **Bring:** own tent, sleeping bag, cooking gear, food, sandfly repellent, etc., and something to share for a pot-luck dinner on Saturday evening. Be prepared for adverse weather at both the camp site and in the field. Facilities are basic but include toilets, barbecues and picnic tables. **Fees:** \$5.00 / person / night.

Contact: David Lyttle,
ph: 03 454 5470.