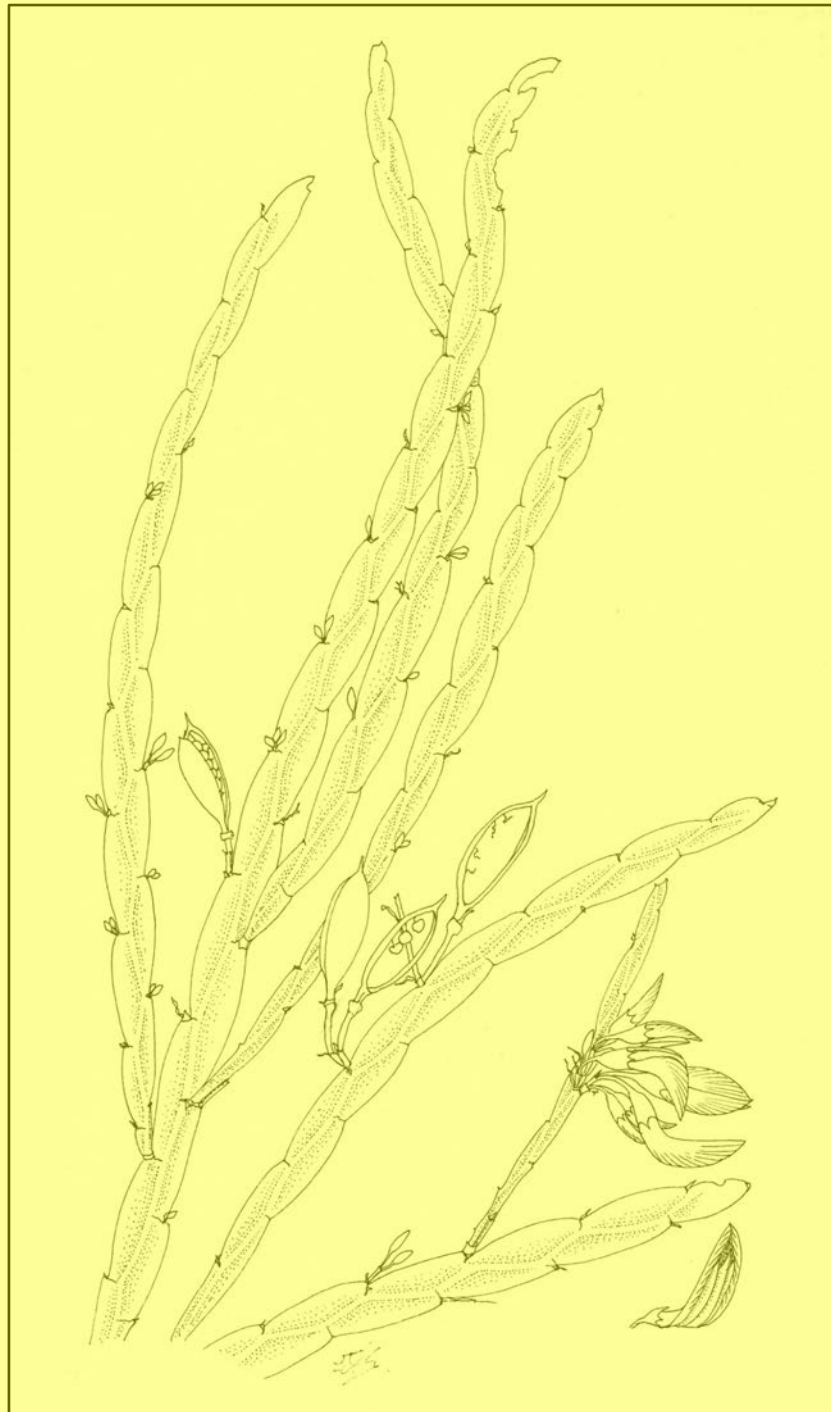


NEW ZEALAND BOTANICAL SOCIETY

NEWSLETTER

NUMBER 140

June 2020



New Zealand Botanical Society

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Subscriptions

The 2020 ordinary and institutional subscriptions are \$25 (reduced to \$18 if paid by the due date on the subscription invoice). The 2020 student subscription, available to full-time students, is \$12 (reduced to \$9 if paid by the due date on the subscription invoice).

Back issues of the *Newsletter* are available at \$7.00 each. Since 1986 the Newsletter has appeared quarterly in March, June, September and December.

New subscriptions are always welcome and these, together with back issue orders, should be sent to the Secretary/Treasurer (address above).

Subscriptions are due by 30 April each year for that calendar year. Existing subscribers are sent an invoice with the March *Newsletter* for the next years subscription which offers a reduction if this is paid by the due date. If you are in arrears with your subscription a reminder notice comes attached to each issue of the *Newsletter*.

Deadline for next issue

The deadline for the September 2020 issue is 25 August 2020.

Please post contributions to:
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Send email contributions to lara.shepherd@tepapa.govt.nz Files are preferably in MS Word, as an open text document (Open Office document with suffix ".odt") or saved as RTF or ASCII. Macintosh files can also be accepted. Graphics can be sent as TIF JPG, or BMP files; please do not embed images into documents. Alternatively photos or line drawings can be posted and will be returned if required. Drawings and photos make an article more readable so please include them if possible.

Cover Illustration

Carmichaelia williamsii by Eleanor Burton.

NEW ZEALAND BOTANICAL SOCIETY
NEWSLETTER
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NEWS

New Zealand Botanical Society News

■ From the President: Results of Postal Ballot

As outlined in the Newsletter 139, March 2020, a Postal Ballot was held to approve the 2019 Financial Statements. Voting papers needed to be received by Friday 17 April 2020.

The resolution that the 2019 Annual Financial Statement published in Newsletter 139 (March 2020), be adopted, carried unanimously. The Financial Statement has now been lodged with the Registrar of Incorporated Societies and is available online.

Thank you to everyone who took the time to return their voting papers.

Anthony Wright, President, New Zealand Botanical Society

Regional Botanical Society News

■ Auckland Botanical Society

December Field Trip & Christmas Picnic

A walk along the Ti Point Walkway, Omaha Bay, filled the morning nicely before our Christmas potluck lunch. The path leads through lovely northern coastal forest, with the pohutukawa trees in their seasonal splendor, and with coastal fivefinger (*Pseudopanax lessonii*), *Coprosma macrocarpa*, *Olearia albida*, and most interestingly, much regeneration of tawapou (*Planchonella costata*). The several Maori middens, with great depths of shells, show that this area close to Whangateau Harbour was an important food basket in days gone by. The nicely preserved Whangateau Hall was a suitable venue for the festive lunch.

January South Island Camp – Fiordland

Our biennial trip to the South Island saw us bunking down at the Borland Lodge, near Lake Monowai, a very good base for our daily expeditions. Some friends from the Otago Bot Soc joined us at times, and their local knowledge was invaluable as we became acquainted, and re-acquainted, with southern plants. Disappointment was voiced about the damage from deer grazing, but there was no disappointment about the weather, as we missed the torrential downpours by about one week.

February Field trip

The planned walk in a reserve at Martins Bay, Mahurangi Peninsula, had to be cancelled because of kauri dieback, so an alternative walk along the beach to Scandretts Regional Park was undertaken instead. We explored the clifftop vegetation with the plant-of-the-day being the many trees, some huge, of tawapou (*Planchonella costata*). The garden of the old Scandrett Homestead proved to be of interest, especially a large pecan tree (*Carya illinoensis*) bearing green nuts.

March Meeting & AGM

At the AGM our esteemed President, Ewen Cameron, was re-elected. Traditionally, the recipient of the previous year's Lucy Cranwell Grant speaks at the AGM to update us about their studies. This year it was Ryan Deregnier's turn to speak on his research topic of the interactions between native New Zealand mosses, birds and insects, and he introduced us to the dung mosses in the *Splachnaceae*.

March Field Trip

North of the Dome Forest, Warkworth, is a rough forestry road that leads to a clay track much used, and abused, by the 4WD fraternity. This leads to Matakana Valley Road, and after the dry summer the track was OK for walking. It was estimated that the second-growth bush was c. 100 years old, with good regeneration of more permanent vegetation over-topping the kanuka. Much interesting botany was found, with an interesting non-botanical find of several giraffe weevils.

Forthcoming Activities

No plans have yet been made for the upcoming year, as we await the return of botanical freedom.

Auckland Botanical Society, PO Box 26391, Epsom, Auckland 1344

President: Ewen Cameron

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■ **Rotorua Botanical Society**

February Trip - Mangawhakamana

Maungawhakamana was last visited by Rotorua Bot Soc 15 years ago. Since that time the track has been abandoned, is in poor condition and the steps and stairs are now dangerous but bypassable. The area had been strongly affected by the Tarawera eruption with scoria often evident, although the kanuka had probably arisen following establishment of the adjacent plantation perhaps 60 years ago.

The first part of the track was quite steep through tall open kanuka with limited understorey and often bare beneath. But the slope soon eased when the ridge was reached and the canopy lowered. Here there was lots of *Pimelea tomentosa* as the scrub was more open, containing mingimingi, rewarewa and hangehange especially. Not long after that we stopped for lunch in a shaded part dominated mostly by kamahi rewarewa forest with nikau. The steep gullies on both sides of the ridge now contained more natural forest of tawa, kohekohe and much supplejack. From there, the forest contained some rata pohutu-rata and pohutukawa. Then, on a steady mostly steep climb to the summit, rewarewa and kamahi became more common with lots of *Drymoanthus*. Finally transitioning to quintinia and broadleaf forest with rimu, miro and rata the last as small stemmed saplings or poles. At the summit a former bare patch around the trig was now in short manuka. Throughout the understorey contained few species and only scattered plants, perhaps because of the very free draining scoria and deep pumice

In a brief foray along the ridge from the summit, now better tracked, there was a large totara and good tawa forest in the shelter from the Tarawera eruption blast. There were very few additions to the earlier list and few weedy species were present throughout - some now absent as the forest had re-established over the 15 years.

March Field Trip - Puaiti Scenic Reserve

Puaiti Scenic Reserve is a small block of forest on rolling hills surrounded by well-managed pasture and crops. It was originally a popular local picnic spot but largely unfenced. One large patch of bamboo is still present with an even larger area of hops remaining in what was obviously a popular weed dumping ground. The whole area has since been re-fenced twice with two fence lines present in most places, about a metre or so apart. The last re-fencing, perhaps 10 years ago, followed a straighter line often enclosing small areas of former pasture. In these areas many weedy species new to the area were recorded.

This was the third visit to the reserve by Rotorua Bot Soc. Much of our route followed the fence around the area but three forays through the tract by various fragments of the group penetrated across the small reserve. Each yielded few additions for the effort.

The main canopy is tawa with mahoe, and mangeo and emergent rewarewa. As a result of the last fencing the main area has had a massive regrowth of the understorey with the loss of many low shrubs and herbaceous plants. In many parts the vegetation is now so dense that there is little understorey. An extensive number of species is now absent but an equally large number of species has replaced them. Weedy species were found most often round the fringes but now there are also more ferns such as *Hymenophyllum revolutum*, *H. demissum* and *Diplazium australe* and some plants of developed forest such as *Parietaria debilis* and *Astelia solandri*.

FUTURE EVENTS

Due to Covid 19 there was a brief field trip hiatus. It resumed with a trip on 25 May with numbers limited but the program is expected to resume normally for the June field trip.

June 6	Matata sand dunes and coastal lagoon
July 5	Jim Barnett Reserve, Puketurua
August 2	Glovers Farm, Mamaku
March 1	Atiamuri

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■ Whanganui Museum Botanical Group

For monthly meetings the Whanganui Botanical Group has merged with Birding Whanganui (local branch of OSNZ) and the Whanganui branch of Forest and Bird, under an umbrella name of 'Nature Talks'. Each group will arrange a speaker for about 4 meetings per year. Meetings will normally be on the 3rd Tuesday of each month. It is intended to continue with monthly botanical field trips to which members of the other two groups are invited.

President: Clive Higgle (06) 342 7857 clive.nicki@xtra.co.nz
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■ Wellington Botanical Society

January Camp: Lonsdale Park, Northland

Lake Waiporohita and Lake Ōhia, Karikari Peninsula

Lake Waiporohita is one of only 12 similar dune lakes in Northland. At this site we saw a fine diversity of sedges and rushes including *Machaerina articulata*, *Schoenoplectus tabernaemontani*, *Eleocharis acuta* and *E. sphacelata*. Our second stop, the gumland swamp and ephemeral lake at Lake Ōhia, revealed many threatened plants including *Cryptostylus subulata*, *Lycopodiella serpentina*, *Spiranthes australis* and *Schoenus carsei*.

Berghan Point/Te Whatu – QEII Covenant

The owners of this covenant guided us through the diversity of forest types, which were regenerating well owing to an active trapping programme. *Coprosma arborea* and *C. spathulata* proved difficult to distinguish, as did *C. macrocarpa* and *C. robusta*. A fertile *Lygodium articulatum* at eye level proved a popular photo stop.

Ranfurly Bay Scenic Reserve

The walk to the Lane Cove Hut and Dukes Nose provided some interesting botanising. Highlights included *Pseudopanax gilliesii*, four species of *Tmesipteris*, *Lobelia physaloides*, *Bulbophyllum* sp. and *Coprosma neglecta*.

Pahia School Rd Track

Bush Bay Action's Brad Windust guided us through the area, providing an overview of the pest control the group is undertaking. The mature pūriri, tōtara and rimu in the valley was most impressive. *Brachyglottis kirkii* var. *angustifolia* was pleasingly abundant but the highlights were *Pittosporum pimeleoides*, in fruit, and *Leionema nudum*.

Puketi Scenic Reserve

We had our first taste of old-growth kauri at Mangianganga Kauri Walk, followed by even more impressive trees at the Puketi Nature Walk. Highlights included *Dracophyllum latifolium* at the first site and *Syzygium maire* at the second. Several plants caused us confusion: *Weinmannia silvicola* and *Ackama rosifolia* looked remarkably similar. *Alseuosmia banksii* also proved challenging with some plants upright shrubs and others prostrate scramblers. The leaves were also morphologically diverse.

Kerikeri Valley

Kerikeri Basin Weedbuster's Barbara Parris amazed us with the diversity of weeds present along the Kerikeri River track. The worst weeds in the Basin are Taiwan cherry, monkey apple, loquat and

jasmine. It was very obvious where the weedbusters had been at work and in these areas native seedlings were flourishing.

March Field Trip: Makahuri, Te Horo

This area of private land has two adjacent patches of original swamp forest including kahikatea, pukatea, tawa, kohekohe. The first patch of forest had some splendid tall trees and a wetland area on the other side. The second patch of forest also had a wetland, which had a mosaic of species growing in the damp pan. The podocarps were particularly admired, including miro, mataī and kahikatea.

President: Jon Terry

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■ Nelson Botanical Society

December Camp: Craigieburn

Cave Stream

The group followed a track above Broken River to where *Carmichaelia kirkii* is protected from rabbit and hare browsing by a fence. Botanising in the adjacent patch of regenerating scrub we saw a number of treasures, including *Leonohebe cupressoides*, *Clematis quadribacteolata* and *Helichrysum dimorphum*. Hiding in the long grass was *Brachyglottis haastii*, *Acaena caesiiglauca* and *Pimelea oreophila*. Also on the river bank were mats of *Raoulia tenuicaulis* and *R. subsericea*. Hanging from rock faces were *Helichrysum intermedium* and *Epilobium gracilipes* and almost buried in grass was *Acaena saccaticupula*.

Porter River

Here there were many riverbed species, including *Helichrysum depressum*, *Raoulia haastii*, *Heliohebe raoulii* and *Epilobium melanocaulon*. Lurking among rocks was *Anisotome filifolia* and on rocky outcrops, *Stellaria gracilentia* and *Colobanthus acicularis*. We were led to a patch of *Montigena novae-zelandiae* in flower and we spotted *Montia erythrophylla* and *Epilobium pycnostachyum*.

Enys Scientific Reserve

Our group walked across farmland to the Enys Scientific Reserve, a patch of tussock land fenced to protect *Hebe armstrongii*. We were lucky to find a magnificent specimen whose flowers were a delicate mauve. Other plants noted in the reserve were *Aciphylla aurea*, *Prasophyllum colensoi*, *Melicytus alpinus*, *Pimelea oreophila*, *Pittosporum anomalum*, *Coprosma intertexta*, *Clematis quadribacteolata* and *Stackhousia minima*.

Craigieburn Road

We made a rewarding trip along Craigieburn Road, near Lake Sarah.

The Canterbury endemic *Carmichaelia australis* was in flower, as was *Olearia bullata* and *Hebe odora*. We saw three



Montigena novae-zelandiae. Photo by Don Pitham

species of *Carex*: *C. echinata*, *C. diandra*, and *C. sinclairii*. Smaller plants included *Epilobium chionanthum* and *Lobelia angulata*.

Otira Valley

On the Otira Valley track the sides of the path were lined with *Blechnum montanum*, *Celmisia armstrongii*, *C. discolor*, *C. semicordata*, *Brachyglottis rotundifolia*, *B. bidwillii*, *Olearia arborescens*, *O. nummulariifolia* and *O. colensoi*. *Lepidothamnus laxifolius*, was present, as was the hybrid *L. intermedius* x *laxifolius*. Other conifers included *Libocedrus bidwillii*, *Halocarpus biformis* and *Phyllocladus alpinus*. The tiny *Coprosma perpusilla* had a lovely show of male flowers and *Hebe subalpina* was also in bloom.

Dobson Nature Walk

One of our party drew our attention to a patch of *Leptinella squalida* subsp. *mediana*. *Hoheria glabrata* together with *Coprosma serrulata*, with its distinctive leathery leaves, stood guard by the stream crossing at the exit from the carpark. Across the road a few of the large-leaved *Ranunculus lyallii* had retained their white flower-heads. Also in flower along the side of the track were *Ourisia macrophylla* together with *Dolichoglottis scorzoneroides*, occasional groups of *Pterostylis oliveri* and *Celmisia armstrongii* with its long sword-like leaves and *C. semicordata* with its silvery leaves.

March Field Trip: Kotukutuku covenant, Ellis Valley

The Ellis track follows the stream into a rocky gully that would previously have been beech forest with emergent podocarps. The valley was cleared for farming and a sizeable settlement grew up after gold was found in the Baton River in the 1850s. Now broom, blackberry and hawthorn dominate the margins of the remnant forest but gradually give way to *Kunzea ericoides*, *Aristotelia serrata* and *Fuchsia excorticata*. Further up the valley large red and silver beech formed the canopy. We encountered *Coprosma rigida*, *C. rhamnoides*, *C. microcarpa* and *C. propinqua*, as well as the hybrid *C. x cunninghamii*. There were other small-leaved shrubs, including *Neomyrtus pedunculata*, *Myrsine divaricata* and *Raukava anomalus*. *Melicytus* aff. *alpinus* "Waipapa" was an interesting addition to the list, and is distinguished by its notched leaf.

Hymenophyllum sanguinolentum was curled up as a response to the drought. The very similar *H. villosum* was nearby and a fine specimen of *Leptopteris hymenophylloides* was admired. Isolated *Fuscospora solandri* were found, some having the more pointed leaves and paler undersides typical of *F. cliffortioides* and others intermediate between the two. An interesting find was *Fuscospora* x *dubia*, the hybrid of *F. solandri* and *F. fusca*. Two additions to the covenant species list were found on a damp bank: *Arthropodium candidum* and *Hebe vernicosa*.



Neomyrtus pedunculata in fruit. Photo by Steve Palmer

FUTURE EVENTS

- June 21: Field trip to Whispering Falls.
- June 22: Evening meeting on iNaturalist via Zoom.
- July 19: Field trip to Stanley Brook.
- July 20: AGM and talk by Uta Purcell on plants of Eastern Anatolia.
- August 16: Field trip to Onamalutu.

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■ Canterbury Botanical Society

February meeting

The Canterbury society started off the year with an excellent talk by Carlos Lehnebach, one of the botany curators at Te Papa. Originally from Chile, Carlos has spent the last 20 years studying New Zealand orchids. So far he has identified seven new species of orchid. His talk however, was on the sexual reproduction of spider orchids utilising fungal gnats as pollinators and the importance of the symbiotic association many orchids have with fungi.

February field trip

This trip was to the Williams Wildlife Reserve on the shore of Te Waihora where the formally dominant willows have been killed and replaced with dense native plantings. With the demise of the willow many of the original native remnant plants are now flourishing. Species of interest included *Coprosma propinqua*, *Clematis paniculata*, *Asplenium flabellifolium*, *Ranunculus glabrifolius* and *Hydrocotyle robusta*. There was even a patch of *Ranunculus macropus*, with its collar of hairs under the flower, a species rarely reported from the Te Waihora freshwater wetlands.

Alice led the group, to follow up on a sighting of the Nationally Endangered (DOC, 2018) creeping herb *Mazus novaezealandiae* subsp. *impolitus* f. *impolitus*. Unfortunately it was confirmed that it had succumbed to a dense blanket of creeping bent, bittersweet, and common buttercup that exploded with the opening of the canopy.

March Meeting

Santiago Martin-Bravos gave another excellent illustrated talk on the diverse botany of Spain. Santiago is a lecturer at Seville University in Southern Spain. Currently he is a visiting academic at Manaaki Whenua Landcare Research.

The Iberian Peninsula is isolated from the main part of Europe by the high Pyrenees Mountains. This isolation has contributed to the large number of endemic species in the area. Adding to the large diversity of species is the wide variety of ecosystems in Spain, from the new volcanic soils of the Canary Islands, the harsh high mountains in the north and the south eastern high Sierra Nevada.

March Field trip

This well-attended trip was to the dry Acheron Gorge area. The sun hebe (*Veronica raouli*) was found in open gravels. Rocky outcrops supported the fern *Cheilanthes sieberi*. A small wetland revealed *Carex tenuiculmis*. After lunch in the lower end of the gorge, kowhai bushes appearing intermediate between *Sophora microphylla* and *S. prostrata* often outnumbered one or both parents. The way back to vehicles revealed a few surprises in the tussock-grassland, including *Carmichaelia corrugata* (Nationally Vulnerable), and a beautiful gentian (probably *Gentianella serotina*) in full flower.

Future Meetings

Currently the programme for meetings and field trips is on hold until the current Coronavirus crisis is over. At this stage we are hopeful we can still hold our AGM in June

President: Paula Greer

Secretary: Fay Farrant www.canterburybotanicalsociety.org.nz

■ Botanical Society of Otago

FUTURE EVENTS

Due to Covid-19, all field trips are postponed until further notice. Talks will be held via zoom while physical meetings are inappropriate. Please check our website closer to the scheduled event times and watch out for email updates.

10th June, 5:20 pm: Sexy Lichens. Speaker: Dr Allison Knight. The lichen symbiosis is extraordinary, intertwining organisms from two or even three distantly related kingdoms. Lichenised fungi are extremophiles, capable of living in environments well beyond the range of vascular plants. Intriguingly, lichens are very sensitive indicators of air pollution and can also be useful indicators of climate change. On the lighter side, the Sexy Pavement Lichen covers footpaths and roads all over New

Zealand. It has been exploited by the unscrupulous, enticed the gullible and recently caused a global media frenzy.

8th July, 5:20 pm: Silken harp chords and the green choir. Speaker: James Crofts-Bennett. The mutualistic relationship between the plant kingdom and the arachnid order Araneae is remarkable both in nature and how often it is overlooked. So extensive is the research that beyond mere ecological significance, the relationship between spiders and plants has been adapted into agricultural practices! This talk will explore the theory, supporting evidence, then finally practical applications of exploiting this relationship.

11th July, 9:00 am: Field trip to Tavora Reserve, North Otago.. Meet at Botany Department carpark at 9am. Contact John Barkla (03 476 3686) mjbarkla@xtra.co.nz

12th Aug 5:20pm: Members night.

15th August, 9:00am: Field trip to Trotters Gorge. Meet at Botany Department carpark at 9am. Contact Gretchen Brownstein 021 065 8497 or brownsteing@landcareresearch.co.nz.

16th September, 6pm. Geoff Baylis lecture: Name changes among New Zealand ferns: the good, the bad, and the ugly? Speaker: Leon Perrie. Fern and lycophyte taxonomy is currently in a particularly pronounced flux. For instance, the scheme prescribed by the international Pteridophyte Phylogeny Group would have changes to c. 20% of the local fern and lycophyte flora!. I'll discuss my objections to this, given my personal opinion that it is important to minimise taxonomic changes while maintaining a taxonomy that still reflects evolutionary relationships.

19th September, 9:00 am: Field trip to Karitane. Meet at Botany Dept carpark at 9am. Contact Angela Brandt (brandta@landcareresearch.co.nz).

14th October, 5:20 pm: The 'other half' of New Zealand's flora: how distinct are the non-native plants from the native? Speaker: Dr. Angela Brandt. Non-native species make up about half of New Zealand's plant species, and those that have naturalised have added 68 families and 650 genera to the New Zealand flora. Non-native plants that are introduced and then naturalise are not a random subset of the global flora, but how distinct are these species from the native flora as a whole?

Chair: Gretchen Brownstein, BrownsteinG@landcareresearch.co.nz www.bso.org.nz

Secretary: Angela Brandt, P O Box 6214, Dunedin North. bsa@otago.ac.nz

■ Other Botanical Society Contacts

Waikato Botanical Society

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Taranaki Botanical Society

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Hawke's Bay Botanical Group

<https://www.facebook.com/Hawkes-Bay-Botanical-Group-590670161140095/>

Manawatu Botanical Society

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NOTES AND REPORTS

■ Sea-balls and wood-cobbles of the Kapiti Coast

Rhys Gardner, rhysogardner@hotmail.com

In October 2016 marine biologist and driftwood connoisseur Mike Bradstock took me south of the Waikanae River estuary to examine two kinds of natural object he had seen on the beach there. The origins of these stranded "balls and cobbles" are somewhat unclear but because of their curious character I thought it worthwhile to relate what we do know about them. Examples of each are shown in Figs 1 & 2.

1. Sea-balls At the time of our visit these were quite common in the driftwood-dominated strand but were absent from the higher ground, that is, the strip of sandy beach up to the low, eroding dune front. When shaken loose of their covering of fine wind-blown sand they were seen to be spheres of interwoven plant and marine-animal material. Most were between five and ten centimeters in diameter. Fibrous roots, perhaps of marram grass (*Ammophila arenaria*), were well-represented. When a ball was pulled apart no clear concentric pattern appeared, nor did its interior contain much sand. A ball of 7 cm diameter, freed of its sand and dried for a year, was found to weigh c. 15 g.

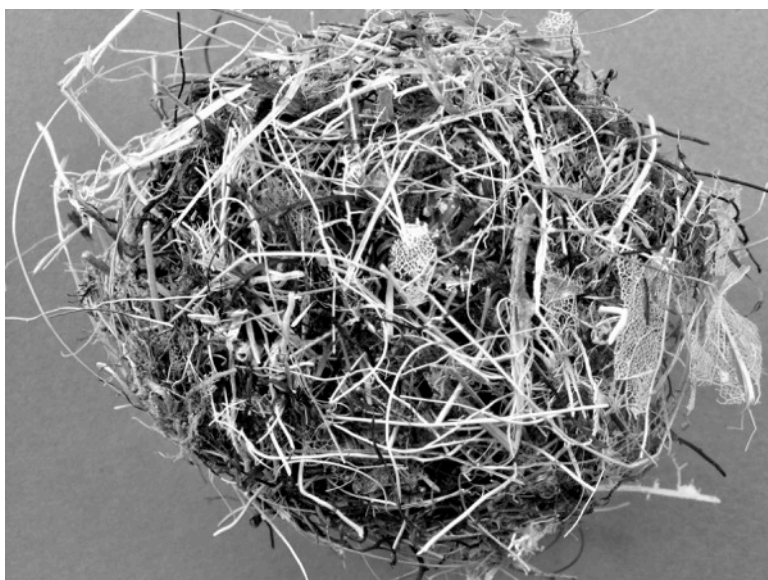


Fig. 1 Sea ball, 6 cm diam.

A little research reveals that such objects are well known to natural historians. Their *locus classicus* is the Mediterranean, where they form in great numbers from detached leaves of the sea-grass *Posidonia*. Two articles by Cannon (1985, 1986) describe their occurrence in some other parts of the world, including the shores of lakes, whose "*pilla aquatica*" are entirely composed of filamentous algae.

With respect to the formation of the marine type of ball, Cannon concluded, after experiments involving the lint tray of a top-loader washing machine, that a long period of rolling in shallow water is crucial. He also hinted that an abundance of the flexible, copiously branched roots of marram grass might be especially favourable to their growth.

Neither Mr Bradstock nor myself can recall seeing such objects on any other New Zealand shore. The southern part of Waikanae Beach may be an especially favourable situation, having a gentle gradient and rather fine sand, that is, sand not so coarse and loosely packed as to prevent an incipient ball from rolling freely. Also, there is a good supply of suitable material close by: a deep, extensive bed of soggy plant and marine material towards the seaward side of the Waikanae River's estuary. Marram grass too is locally abundant.



Fig. 2 Wood-cobble, 9 cm long

2. Wood-cobbles These are also quite common in the Waikanae Beach drift, and over several years Mr Bradstock has collected a hundred or more of them. They are quite uniform in character, being mostly five to ten centimetres long, approximately ellipsoidal, grey-black, slightly lustrous and smooth, unmarked by the activities of marine animals, and distinctly "wood" rather than "charcoal". Their grain is often distinct, and shows no sign of compression.

Firm when dry, the cobbles become soggy after soaking, and show no efflorescence when dry again. They

lack resin. 'Kitchen-bench' methods give them a specific gravity of 0.4.

I believe that all these cobbles represent podocarp wood. I examined two anatomically, and was convinced they were identical. Material from one of them was examined by Dr Rod Wallace of the University of Auckland, who reported that it matched matai (*Prumnopitys taxifolia*) "in all respects" (pers. comm., March 2020). Another cobble examined by me seems also to be matai (Fig. 3).

Presumably this subfossil material comes from the central North Island, from large trees buried by volcanic activity. The dead trunks would have broken up in a blocky way, and after exhumation and entry into the region's streams and rivers the blocks of carbonized wood would eventually have acquired their ellipsoidal shape.

It seems likely that these wood-cobbles represent material buried by the Taupo Pumice and subsequently transported into the sea, perhaps mainly by the Wanganui River (but Fleming (1953) does not mention them). The near-shore currents in this part of the coast would then have carried the sodden cobbles southwards (partly, along the sea floor ?) to reach the prograding part of the mainland opposite Kapiti Island.

Acknowledgements

Mike Bradstock shared his collections, local knowledge, and hypotheses. Dr Rod Wallace (Department of Anthropology, University of Auckland) kindly made the wood identification.

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Fig. 3 Radial longitudinal section of matai wood-cobble, showing characteristic pitting of ray cells.

■ Driftwood in the aquatic and marine environment

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One of the little-talked-about components of the carbon cycle is driftwood, the result of a process by which anything from a great tree to a puny shrub or vine becomes broken up by the forces of nature and transported, first by freshwater, then by saltwater. Along the way, physical and biological forces break down logs and branches to lumps of wood, gradually reducing them in size, eventually to small particles that may be composed of multiple cells or invisibly small fibres and cellular fragments. All the time the wood loses mass as it breaks down into carbon dioxide and water and gets bits knocked off it in the wear and tear of travel. Physics and chemistry work together with the innate qualities of the wood (soft, hard, brittle, flexible). We can call this the Driftwood Cycle.

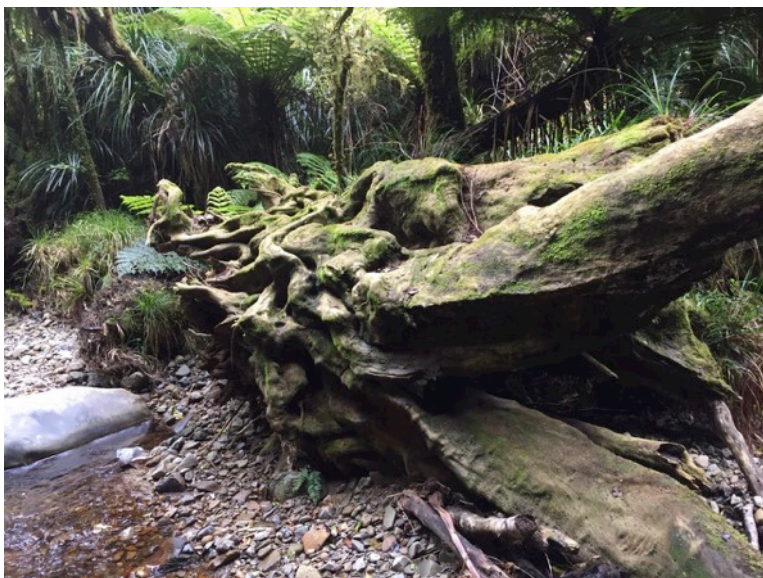


Fig. 1.

This process has often occupied my mind over the past 5 years during walks on the shores of the Kapiti coast, fossicking and reflecting on the forces of nature at work on the trees of the coastal plain and the hinterland of the Tararua Ranges. I have tried to recapitulate the process by starting in the tributaries and headwaters of local rivers and tracing the journey to the sea, observing trees and their fragments in the river beds while reflecting and hypothesising about each stage.

It all starts when a mighty tree falls. Or perhaps one less mighty. When a standing live or dead tree falls the first break may be caused by landing on a hard surface. There is a lot of power in the rotation of a many-tonne tree applied to some fulcrum or other on irregular ground, and this may break or crack large parts of the trunk, or weaken the wood along the grain without actually fracturing it. A shrub or small tree is less likely to break at this stage, owing to its low mass, and more likely to remain intact as it travels downhill or downstream.

Tomorrow's driftwood must first find its way into a river. Only a minuscule fraction of the timber biomass produced ever gets that far (let alone to the sea) from any bush catchment. Streamside trees will always make a disproportionate contribution (Figure 1), but others from above may fall and slide down too, especially the bigger hardwoods and podocarps. On steep slopes trees are more unstable to begin with because, having to grow outwards to reach the light, they are unbalanced. Some trees "die on their feet", breaking off at their bases during storms; others die with roots attached or (especially if shallow-rooted) are torn up with the root plate attached. Soon fungi often invade, soaking up the nutrients in the wood, softening the tough fibres, evaporating away mass and weakening the wood, which may break down totally where it fell. Some trees are so brittle, or so prone to rapid decay or grinding in the first fresh, that they are gone from all sight within several years of falling. Tawa, rewarewa, whiteywood and karaka are common lowland trees that can melt away quickly on the ground, especially within a forest.

Other woods last much longer whatever the conditions. Tension and compression wood and secondary roots are the most durable parts, along with wood from branches that have become oval in cross-section owing to vertical stress. Thus the density and durability of driftwood may vary depending on the part of the tree it came from.

Now consider a river bed strewn with logs, branches and fragments of wood in all states of wear and decay. A few tree species (e.g. rata, akeake) sink when fresh, while others (kanuka, manuka) rapidly become waterlogged and sink when immersed in water. Other wood is buoyant to varying degrees and may travel a large distance during every fresh (Figure 2), while waterlogged or heavy wood may become buried, jammed between rocks, and even form sunken deposits in pools. The situation may

be short or long term depending on the particular river and location along its course. Loose or shallow burial may accelerate the decay process, or at least accelerate the breakdown of sapwood so that only the resistant inner wood persists. Burial in reducing conditions will slow this decay and discolour the wood, usually turning it grey or black (though this colour will fade to silvery or white after prolonged re-exposure to sun).

During floods the sheer destructive power of the moving water/wood/gravel/rock mixture can only be imagined, but certain



Fig. 2.

principles are followed generally. Wood is scraped by bedrock, ground by gravel and sandblasted by sand. Everything gets ground, twisted, pushed and rolled in every direction. Wood that is naturally soft or decayed soon disintegrates, leaving behind the more durable parts. Floating wood is of course less affected and travels further, faster.

Once in a river bed, a large sunken wood fragment is eventually turned about by water so that its heavier end (e.g. butt and root plate of a log) lies upstream, and the downstream end may tend to dig in, opening any weakness in the long grain and jamming it with sand and gravel that continue to force it apart. This process can often be seen in river beds. Smaller fragments of wood too become scraped along their sides and bumped on their ends, opening up the grain. In finer sediment (gravel, sand) they lose rough edges, the end-grain smoothing: they are literally "sanded" all over. In this way a lot of fine sawdust-like material is generated and borne away as the less durable kinds of wood are rapidly and completely broken down. These processes continue as the wood finds its way down to the estuarine lower reaches of the river or stream.



Fig. 3.

As well as sizeable fragments of wood, smaller but still macroscopic items like leaves, twigs and bark fragments travel downstream, generally faster because of their lightness and high surface-area-to-mass ratio even when waterlogged. Along the way these fragments may form significant deposits on the riverbank, where they enter the terrestrial detrital food chain or (if they become waterlogged) in the bottom of sluggish reaches and pools, where they enter the aquatic detrital food chain. All this material will be re-mobilised in a flash. But as long as it remains in the damp river bed, whether exposed to the air or immersed, it will be broken down by fungi, bacteria and small animals such as terrestrial and riverine invertebrates, the most conspicuous of these being insects and woodlice. In fresh and estuarine waters wood provides habitat

and/or nutriment for aquatic micro-organisms including protozoa, algae, rotifers, nemerteans, crustaceans and other invertebrates. Also present will be fishes, e.g. bottom-dwelling teleosts that rest upon the wood or shelter in holes or crevices. Eels shelter under log jams or in hollow logs; galaxiids and trout use logs as velocity shelters. Less conspicuous are crustaceans (including ostracods, isopods and koura) and freshwater insects (mayflies, caddis, stoneflies). These enter terrestrial food chains, particularly as food for birds.

At the sea there is a mingling of buoyant material that has got there quickly – it is usually light and greatly fragmented and includes fragile matter like twigs and leaves – with the older, sunken wood that has taken far longer and may along the way have lingered buried or half-buried for any number of years in mud or shingle in the riverbed or sea (Figure 4). At this stage, estuarine and marine boring organisms will continue and perhaps even complete the breakdown process, so the wood finally crumbles to nothing. There is an abundant boring isopod in estuaries, whose effects are often probably blamed on teredo and it seems to do much the same job (Figure 4).

In and around the river mouth a final two-way sorting takes place between floating and sinking wood, particularly during a fresh and an onshore blow. The wood that floats is mostly young and comparatively light, and comes ashore close by. The wood that sinks may spread out on the continental shelf, sinking into the sediment if it is heavy and the right kind of shape to “dig in”. Or it may lie on the surface of the sea bed, moving frequently under the influence of any swell or current.

Based on observations on the Kapiti coast, I suspect that most of this wood is heavy and relatively small (< 500 mm) fragments. These are probably the longest-lasting driftwood items and consist typically of heavy compression wood such as roots, stem bases or heartwood fragments of Myrtaceae. At Paraparaumu, southern rata, manuka and kanuka are the commonest recognisable species. In time, these fragments too may wash ashore, especially in an onshore blow. Depending on species and how long they have been under the sea, they may have been further broken down by burrowing marine organisms such as shipworm or teredo (Figure 4). Some species of timber may be naturally repellent to boring organisms owing to their silica content, but also perhaps via a toxic or unpalatable principle. In the latter case this may gradually leach or break down so that the wood eventually becomes palatable. Examples of most wood types can be seen that have been consumed this way; it would be interesting to identify more of these by species and age. When riddled by the galleries of boring marine fauna, a lump of wood becomes less dense and is more easily carried inshore. There, in the surf, the final breaking-down process may be more physical than biological.



Fig. 4.

Not all wood travels all the way to the sea. Significant amounts have also been deposited (or grown and broken down *in situ*) among peat where ancient dune lakes have been filled in by blown sand. This wood mostly consists of root bases and compression wood fragments that are well preserved in the anoxic environment and may be thousands of years old. Identifiable kanuka stumps, for example, occur *in situ* in a pond recently excavated during motorway construction at the northern end of Queen Elizabeth II Park, Raumati South. Whenever a major storm event causes the shoreline to retreat, or a river changes its course, this long-buried material may be washed out to sea, travelling along the bottom owing to its negative buoyancy. Much of this wood is “swamp rata”, valued by carvers and sculptors and identifiable by its dark red or grey colour when cut (S.L. Myhre, pers. comm.). Typically, pieces washed up are less than 50 cm long; larger pieces may be too heavy to be readily cast ashore. “Swamp kanuka” (distinctively brown or grey when cut) is also found.

Some of the buoyant wood (particularly logs) has come from other rivers further away, even overseas. A southerly current along the Kapiti coast ensures much material may come from the numerous rivers of the North Island west coast. The sheer stringiness of the exterior of a newly beached log (and the presence of epifauna, particularly barnacles) may attest to a long period adrift. Older, heavily eroded logs from which all bark has been lost become conspicuously bleached as they frequently stay long-term, sinking into the sand under their own weight and even disappearing. Such pieces might eventually become silicified if they remain undisturbed for long enough and the shoreline does not retreat to re-expose them. Younger logs progressively lose stringy or flaking bark by decay, the lick of the sea and the scrape of the sand and rocks. They are likely to be refloated and travel further.

Burned or carbonised wood is another common feature of the drift, and of particular interest is the distinctive material inferred to be fossil charcoal created by major volcanic eruptions, sometimes in the distant past (e.g. from the Hatepe (Taupo) eruption of approx. 180 or 233 AD) and carried down the Rangitikei, Whangaehu and Whanganui rivers, among others). It is characteristically shiny dark grey or black, well rounded by long travel, usually free of cracks and devoid of any trace of volatile matter. It resembles the un-eroded material still in log form that can sometimes be seen *in situ* in road cuttings on the Volcanic Plateau. Charcoal formed more recently in beach fires is softer, crumbly and often incompletely carbonised.

The beach is for finishing and sorting. Drifts of wood fragments are sorted to a greater or lesser degree by size, shape and weight, and mixed with other debris of both terrestrial and marine origin. Some bracket fungi are sufficiently common and durable to be themselves a significant type of drift “wood”, e.g. *Ganoderma*. Japanese walnut (*Juglans ailantifolia*) seeds and well-worn corms of supplejack are common and distinctive. “Sea balls” (Gardner, 2020) are at times abundant.

Sunlight bleaches, discolours and makes things brittle. Blown and washed sand puts a tidy polish on most wood surfaces. Cracks open up longitudinally as old forces abate and new forces develop through expansion and shrinking. Some wood is internally decayed and will be found to be rough-surfaced and stringy-ended (especially monocot wood like that of cabbage tree and palms) as it rapidly erodes. At this stage it will readily and repeatedly split longitudinally and rapidly break down to fine detritus. Fibres from monocotyledonous stems and leaves are possibly the longest-lasting remnants of this type on the shore, though the wood is among the least durable.

Through these processes a “soup” of wood particles and other detritus has been generated. It includes the remnants of leaves, twigs and inflorescences as well as wood. In suspension, this is fare for filter-feeders; when settled like an ooze on the sea floor, or strained intertidally when waves soak through sand, it sustains burrowing and epifaunal deposit-feeders. It also likely adds bulk to algal felts that grow on soft sea bottoms in places that are deep enough not to be disturbed by the lift of swells. Both wood and detrital fragments may be coated with micro-organisms that also provide nutriment. Accordingly, wood may be an environmentally significant component of the inshore food chain, and even commercially and recreationally important in sustaining molluscs and fishes. Organisms that feed this way include the sand dollar (*Arachnoides*), sea urchin (*Evechinus*) and starfish (*Patiriella*) – see photos in Bradstock (1985). On the shore, they probably include the arthropods *Scyphax*, *Talorchestia*, and littoral beetles (e.g. see Morton & Miller, 1968).

The author has not yet extensively explored soft sea-floor habitats in Kapiti but has noticed that abundant chunks of driftwood can be seen jammed between rocks and in crevices on the region's exposed coasts, both intertidally and subtidally.

In conclusion, humans too cast their eyes on driftwood and find uses for it, from a walking stick to a throw-stick for the dog; the pleasure of a fire on the beach; and building structures with larger pieces. Fossickers like myself take what they can to make a driftwood fence at home. A number of local wood carvers and sculptors, both amateur and professional, keenly search for raw material, particularly swamp rata, rimu and totara, by regularly beach walking (S.L. Myhre, pers. comm.).

Acknowledgements

I am very grateful to Rhys Gardner and Steve Myhre for sharing many an interesting beach walk, and for challenging discussions about driftwood, especially its identification and origins.

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BIOGRAPHY / BIBLIOGRAPHY

■ Biographical Sketch – Friedrich August Krull (1836 – 1914)

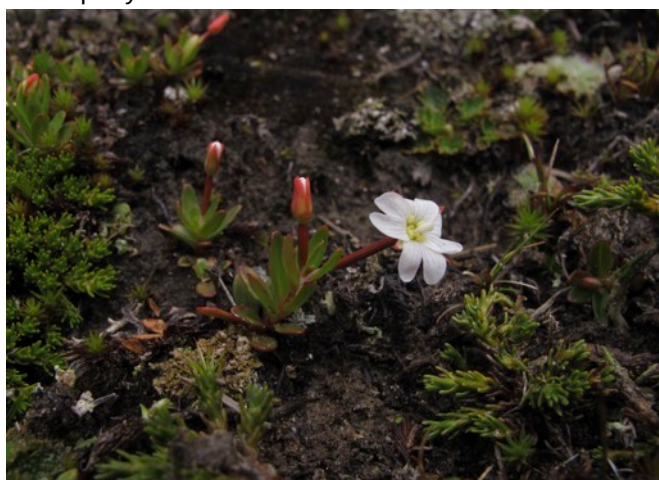
Val Smith, 80 Mill Road, New Plymouth 4310.

Friedrich August Krull, the son of Georg Friedrich Krull, a merchant, was born in January 1836 in the Grand Duchy of Mecklenburg Strelitz in Neubrandenburg, Germany. His mother's name is not known. He grew up in a mercantile environment and in 1853 studied at the commercial college in Gotha. With poor prospects in his homeland, he worked for several years in a merchant's office in France, and with his friend Karl Hartmann, left London on 18 September 1858 on the Swedish ship *Equator* to settle in New Zealand. Shortly after their arrival in Wellington on 22 January 1859 they set up in business as Krull & Co., Merchants, on Customhouse Quay.

In mid-1861 Krull initiated the establishment of the first German Consulate in New Zealand, to open trade between the two countries and to protect the interests of German immigrants. He became a naturalised New Zealander in 1862, and after a series of separate appointments and an expansion of consular duties, was appointed Consul for the German Empire in Wellington on 25 August 1871. He also took an active interest in local body affairs, serving as one of the first members of the harbour board, a city councillor, chairman of the gas company and a council member of the Chamber of Commerce.

On 10 May 1862 at St Peter's Church in Te Aro, Wellington, he married Keren Heppuch Murch, who had arrived in New Zealand in 1840 and for several years was part owner of Flat Point Station on the Wairarapa coast. On 24 February 1863 their daughter Lottie was born on board the *True Britain* off the Isle of Wight, the first of their six surviving children (four daughters and two sons). Their youngest child Gretel was born in 1875 in Neubrandenburg.

By 1878 Krull had accumulated considerable wealth, but he lost it all when the City of Glasgow Bank failed in October that year. In 1884 he sold the business and



Epilobium sp., Pisa Range, Central Otago

his family moved to Whanganui where he joined the stock and station firm Freeman R Jackson in 1886, and later became a partner. His resignation as Consul was declined on account of his long and valuable services, and he was persuaded to continue in office. He died at his home, St John's Hill, Whanganui, on 28 December 1914, following a stroke – a death believed by his family to have been premature, due to the onset of war. He was 78.

Before leaving for New Zealand Krull had been asked by his brother-in-law Ernst Boll (1817–1868), a well-known German naturalist and historian, to send reports of life in the new colony. Krull did this in a series of letters to his mother about three journeys he made in 1859 with Hartmann, on foot and on horseback, into Māori-populated regions of Wellington province. These letters, and his account of a visit to the Mecklenburg German settlement near Nelson in 1862, were published in *An Indescribable Beauty* (Awa Press, Wellington) in 2012. He gave the Berlin Herbarium 180 plant collections he had made in 1859 in New Zealand (including the Chatham Islands), and in 1884 the German pharmacist and botanical collector Heinrich Carl Haussnecht (1838–1903) published a monograph on the genus *Epilobium*, which included the first scientific description of the New Zealand endemic *Epilobium krulleanum*.

Epilobium krulleanum

Epilobium ("above the pod"), in the willowherb family Onagraceae, is a large genus of around 200 species, mainly from temperate regions. Of the many *Epilobium* species in New Zealand, some 18 species reach the alpine zone, but they are sometimes difficult to identify. *Epilobium krulleanum*, which has been included with *E. hectorii*, is a montane to alpine tufted perennial herb 60-195 mm tall, branching from a woody base, initially decumbent but soon becoming erect. Plants are distinctly hairy, the flowers white or pink darkening to rose-pink and the petals deeply notched. The ranges of both species partly overlap, but *E. krulleanum* is more common in Marlborough than elsewhere.

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PUBLICATIONS

■ Publications Received

Nelson Botanical Society Newsletter March 2020 Upcoming trips and talks.

Nelson Botanical Society Newsletter April 2020 Trip report for Kotukutuku covenant, Ellis Valley, Chilean mayten – a ticking time-bomb, weed information on Cretan brake (*Pteris cretica*).

Nelson Botanical Society Newsletter May 2020 Upcoming trips and talks. Stewart Island botany, trip report for Hoary Head, myrtle rust in the Nelson region, weed information on climbing asparagus (*Asparagus scandens*).

Canterbury Botanical Society Newsletter April 2020 Meeting report in the Flora of Spain, trip report for Acheron River.

Canterbury Botanical Society Newsletter May 2020 Online activities to keep you busy in your bubbles.

Canterbury Botanical Society Newsletter June 2020 Call for committee members.

The New Zealand Native Orchid Journal May 2020 Life membership for Eric Scalen, *Caladenia minor*, *Thelymitra cornuta*, *Corybas* "pygmy 1",

What value do you put on biodiversity (in a pandemic)?

The NZ Native Forests Restoration Trust urgently needs your help to protect two rare native habitats.

We are a charitable trust and we recognise the financial pressure many of our supporters may be experiencing in the locked-down days. We acknowledge the difficulties and hope the government's assistance will be sufficient till the crisis is over. And over it will be – someday. We live in hope for the good things we enjoyed to return, not least our freedom to wander in New Zealand's great outdoors. Meanwhile for those who can afford it, we invite you to contribute to saving two sand-dune habitats that have become increasingly rare.

For over 40 years the Trust (NFRT) has been campaigning and purchasing land to protect native habitats throughout New Zealand. We refer to 50 years as "short term", with the middle term being 500 years and the long term is beyond that. To think in these terms requires hope. Hope that we as a species do not 'foul our own nest' – nor the nests of any other creature. In the latest Forest & Bird magazine the world renowned author Margaret Atwood speaks of hope. We cannot save the planet without hope. As with all our purchases we hope our supporters see the long term vision we see.

Our current purchase, on the western edge of the suburb of Otatara, the last remnant of nationally important sand dune totara/matai/kahikatea forest needed saving to prevent it being subdivided and built on.

As so often happens, we got a call from concerned locals, Brian & Chris Rance, to see if we could help. The timing was auspicious and in less than 4 weeks we had an agreement with the vendors with settlement by 20th May. The \$1.5 million price is a lot for us to pay and we are seeking help from people like you with an interest in native plants and native habitats. The good news is we are already half way there.

The forest covers 30-40 hectares and is in poor condition having been grazed for many years. Restoration is estimated to cost as much as the purchase price so you can see we have accepted a mighty challenge. But we are confident that, with your help, we can restore it to its original vitality.

Individual residents in Invercargill were offering financial help even before we signed the agreement. We are asking supporters throughout the country for funding, and now extending that call to members of botanical societies.

Please support this purchase generously: <https://www.nfirt.org.nz/otatara-reserve-appeal/>



Wind sculptured edge of Otatara totara forest.

"Probably the largest and most important dune totara forest is in Southland, at Otatara, where several large groves of both young and old trees reach the estuarine coast."

Philip Simpson, Totara: A Natural and Cultural History, Auckland University Press.

NATURE WILL THANK YOU FOR IT, AND SO DO WE.....

BUT THAT IS NOT ALL:

Even as we were negotiating the Otatara purchase, members of the Rotorua Botanical Society were suggesting to Bay of Plenty Regional Council staff that they should ask us for help to save a 14 hectare sand dune kanuka forest at Thornton Beach west of Whakatane. Not just any patch of kanuka, but the **only** 14 hectare patch in private ownership of *Kunzea toelkenii*. This species, described in 2014, does not grow anywhere beyond the Thornton beach front and a couple of nearby islands.

CURRENT CONSERVATION STATUS

2018 - Threatened - Nationally Critical

For detail on *Kunzea toelkenii* refer to http://www.nzpcn.org.nz/flora_details.aspx?ID=7642

or

[de Lange, P.J. 2014: A revision of the New Zealand *Kunzea ericoides* \(Myrtaceae\) complex.](#)

Quote from de Lange: "Therefore, formal taxonomic recognition is accorded here to any *Kunzea* entity which demonstrates consistent morphological, cytological, molecular and ecological partitioning irrespective of whether it can or does hybridise,.....

Ecologically, *Kunzea toelkenii* is further distinguished as the only member of the *K. ericoides* complex truly endemic to sand dune systems."

While the Trust has not made a final decision to purchase the Thornton beach property, we do see the desperate need for it to be protected. To assist us it would be helpful to have an indication of potential support if we reach an agreement to buy. We hope you too can see the future with the weird and wonderful *Kunzea toelkenii* lining the beachfront at Thornton.

So we are asking the following questions:

Would you be in a position to make a donation?

If so what figure do you consider possible?

Alternatively, could you advance a loan to the Trust at very low interest (or zero).

We envisage a 2 to 5 year term. How much could you lend us, and for how long?

Alternatively, if you would like a beach front section in the Bay of Plenty, do contact us

The real estate advertisement is at <https://nz.raywhite.com/whakatane-district/thornton/2236093/>

You can contact us at admin@nznfrt.org.nz or view our website at www.nfrt.org.nz

If you would like to communicate with a Trustee, please email Geoff Davidson at

geoff.bev.davidson@gmail.com or phone him on 09 8130229 or 021 764967

We apologise if this is a repeat appeal, as we realise you may already have received it directly from NZNFRT.



The contorted form of a typical Thornton Beach *Kunzea toelkenii*.

Starting life as prostrate shrubs, they form dense thickets of foliage, developing numerous trunks and opening into sprawling adults after 30 years.