NEW ZEALAND BOTANICAL SOCIETY

NEWSLETTER

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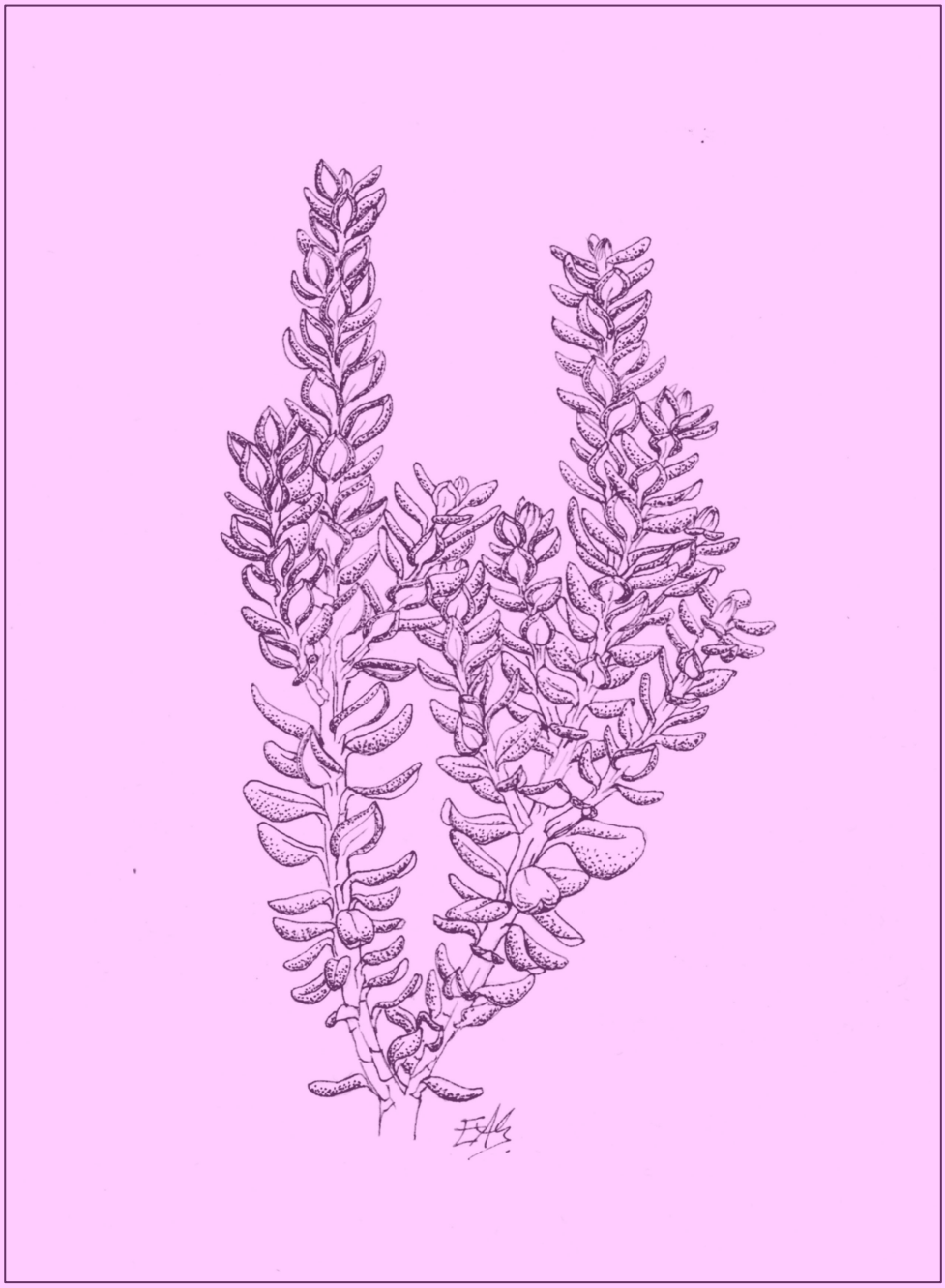

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Subscriptions

The 2022 ordinary and institutional subscriptions are $28 (reduced to $25 if paid by the due date on the subscription invoice). The 2022 student subscription, available to full-time students, is $15 (reduced to $10 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 December 2022 issue is 25 November 2022.

Please post contributions to:
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Send email contributions to lara.shepherd@tepapa.govt.nz Files are preferably in MS Word, as a Microsoft Word document. 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
Olearia nummulariifolia by Eleanor Burton.

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New Zealand Botanical Society News

- **New Zealand Botanical Society website relaunched**

The original NZ Botanical Society (NZBS) website was created by Murray Dawson in August 2009. Its main function was to serve as an online repository for our newsletters that were part of an intensive digitisation project that ran from 2008 to 2009.

Our old website was looking quite dated and Bruce Clarkson recently suggested to Murray that redevelopment was needed. This was readily agreed to, and Murray completed the redesign work 7 August 2022.

The new website has responsive design, so pages should display well on large screens, tablets, and smartphones.

The home page is more attractive and now has embedded Facebook posts to news and events, such as zoom talks from regional societies. To enable this functionality, Lara Shepherd migrated our Facebook presence from a group to a page – we are now found at www.facebook.com/NZBotSoc (@NZBotSoc).

Although all pages have been updated, their addresses are unchanged, so links to them from other websites remain valid.

New pages have been added that profile all Allan Mere recipients. The Allan Mere is awarded by the NZBS to outstanding botanists to acknowledge their contribution and work. Profiles of early recipients (from 1986) are of historic interest, as well as celebrating the accomplishments of contemporary botanists.

More recent newsletters have also been uploaded. Please check out our relaunched website at www.nzbotanicalsociety.org.nz

- **Allan Mere Award 2022**

After no award being made in 2021, the NZBS Committee is pleased to announce that the 2022 award of the Allan Mere is to Dr Carol West. Carol was nominated by the Wellington Botanical Society and supported by the Waikato Botanical Society. A summary of the nomination is given below.

Carol has contributed to the study and preservation of New Zealand flora for more than forty years. Areas of her focus include vegetation regeneration after a large-scale disturbance and pest plant species invasions. She has taken on many roles to study, protect and cherish New Zealand's indigenous flora, and encouraged many others to do the same.

Carol completed her MSc at the University of Auckland on the regeneration of native plants on Tiritiri Matangi Island, this was followed with a doctorate on the population ecology of *Beilschmiedia tawa* at Pureora Forest, commenting on the impact of logging native forest at

different intensities. This was important work at a time when 'selective logging' of native forests was a controversial issue.

Then for her first employment, she joined Botany Division, Department of Scientific and Industrial Research in 1984 and was based for three years at the Taitā Substation with Tony Druce and Ian Atkinson. Her post-doctoral work on the impact and ecology of *Clematis vitalba* filled an important gap in understanding one of our most significant pest plants. Her next employment was as editor of the New Zealand Journal of Botany until 1992.

Her third employment was as the Conservancy Scientist for the Department of Conservation (DoC) Southland. In this role, Carol provided science advice to the DoC Southland Senior Management Team and Biodiversity staff. She drove the establishment of the Southland Resource Inventory, improved data recording and management for DoC Southland and wrote the first Subantarctic Research Strategy. Monitoring projects included weeds on the Fiordland coast and general monitoring of rare Southland ecosystems. She was a strong advocate for protection, management and enhancement of indigenous ecosystems in Southland and for weed control in the region, including wildling pines.

Carol returned to Wellington to continue her work with DoC as the Threats Management Manager and then Director Terrestrial Ecosystems. Even while working at a senior level of management, she continued her scientific work centred on the impacts of plant and animal pests on a wide range of ecosystems. As part of this work at DoC, Carol has played a significant role in the Kermadecs flora where she has collected and recorded the plants and monitored plots and pest incursions for many years. She continues to contribute to the Kermadec flora through her analysis of repeated measurement of the vegetation plots. She also oversaw the very important weed eradication programme that started in 1990 and ran until Covid forced weeders to leave Raoul Island.

In 2017, Carol 'retired' to the position of Honorary Research Associate of DoC, keen to work on writing and publishing her research, particularly her work on the Kermadec Islands.

Volunteer work

Outside of her official work, Carol has contributed to many organisations that study and protect our native flora. While in Invercargill, she was a founding member of the Ōtatara Landcare Group and was actively involved with the Southland Natural History Field Club. In Wellington, she is an avid supporter of Ōtari-Wilton's Bush, the only botanic garden dedicated to New Zealand plants. She has led many tours through the garden and bush, raising both funds and awareness, and has been Chairperson of the Ōtari-Wilton's Bush Trust since July 2020. Carol has been an active and enthusiastic member of the Wellington Botanical Society for more than 30 years where she has served on their committee many times: as secretary, president and vice-president. In addition to this, she was a founding a member of the New Zealand Botanical Society and has served on its committee since 1988. Carol is very supportive of amateur and beginner botanists and a mentor for DoC staff and young ecologists in Southland.

Congratulations

I remember occasionally assisting Carol in the field when she was completing her MSc and PhD at the University of Auckland – she always was always keen to learn and capture plenty of data to be able to show what was really happening. Through her various work experiences, she became an excellent administer/manager providing DoC with quality scientific based advice. On behalf of the Society, congratulations Carol and our President hopes to present you with the Allan Mere later in the year at a Wellington Botanical Society meeting.

Ewen Cameron, Secretary, New Zealand Botanical Society

- **Call for New Zealand Botanical Society Nominations**

Nominations are called for the following positions of Officers and Committee of the New Zealand Botanical Society for 2022:

• President
• Secretary/Treasurer
• 3 Committee Members
• Editor

Nominations for all positions open on 1 September 2022 and close on 20 November 2022.

Nominations shall be made in writing to the Secretary, c/o Canterbury Museum, Rolleston Avenue, Christchurch 8013, and shall be signed by the Proposer, the Seconder, and by the Nominee to indicate their acceptance of nomination. If necessary, ballot papers for a postal election will be circulated with your December *Newsletter*.

Regional Botanical Society News

- **Auckland Botanical Society**

June meeting
This meeting began with our annual book auction. Bookshelves were culled for books that were no longer needed, and the money so raised added to our Lucy Cranwell Grant fund. Our new president, Bec Stanley, began her reign by introducing us to the concept of green roofs (or less confusingly, living roofs) that is becoming very popular overseas. Some pictures taken from rooftops in Germany showed how the concrete and stone cities are coming to life, with huge benefits for the environment and to human health. She demonstrated which plants are most suited for such a habitat, and how they can be cared for. Her advice was to start small, with letterboxes and chicken coops.

June field trip
On a rather wet winter's day, a walk along Quinns Road to the Transmitter Track in the Waitakere Range was a good way to keep out of slippery mud. The roadside botany was interesting, and rather similar to that of the Cutty Grass Track followed in April. A post-walk coffee at the Elevation Café warmed us all before driving home.

July meeting
The Plant of the Month talk by Yumiko Baba introduced us to the wheel tree, *Trachodendron aralioides*, from Japan, Korea and Taiwan. Ewen Cameron spoke on a family winter holiday in the Cairns area of northern Queensland. In contrast to the eucalypt forests so prevalent in the rest of Australia, this part of the continent has the oldest continuously surviving tropical rainforests on Earth. A consequence of listening to this presentation was that many in the audience expressed an urge to follow Ewen's footsteps.

July field trip
A walk in the Auckland Botanic Gardens was a popular mid-winter option. In the forty years since the Garden was established on bare paddocks an amazing transformation has taken place. With only one short shower to avoid, an enjoyable time was had exploring the garden showcasing the rare plants from the northern North Island. It was explained how difficult it is to prevent the herbaceous species from being overwhelmed by exotic weeds, a problem that also occurs in the wild. A very cheerful luncheon in the garden's café was then held in true Bot Soc tradition.

August meeting
Josh Salter wondered about the identity of two eucalyptus trees growing in her garden, and this lead to a very scholarly Plant of the Month talk. Identifying them as two subspecies of *Eucalyptus leucoxylon* by dissecting the buds and using a microscope to study the way the stamens were folded inside the capsule led to the final identification.

Mike Wilcox then spoke on his mammoth study of the seaweeds found in the general Auckland area. By occasionally putting his life in danger, and by losing more than one camera, he comprehensively covered all the reds, greens and browns, plus a few outliers, which led to the publication of "Seaweeds of Auckland".

August field trip
Tewnty-three members visited the Puhinui Reserve on the 20 of August. Our group had been given special permission by Auckland Council to access the coastal scrub and swamps on the edge of the Manukau Harbour (normally restricted public access). The swamps were quite wet, but the group were well rewarded with some interesting local wetland plants such as *Gleichenia microphylla, Nertera scapanioides, Coprosma tenuicalis, C. propinqua, Machaerina teretifolia, M. tenax* and *Netrostylis (Tetraria) capillaris.*

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aucklandbotanicalsociety@gmail.com

- **Nelson Botanical Society**

April Field Trip to Nell's Bush
Nine of us assembled at a grassy clearing where there is a good view of the Ōtūwhero wetland. We started by following the track that winds along the toe of the hill where there are a variety of ferns and sedges and tall forest trees of kahikatea, matai, beeches and abundant understorey shrubs. The understorey contained *Coprosma dumosa, C. tenuicaulis*; *C. rhamnoides, C. microcarpa*, *Raukaua anomalus* and *Lophomyrtus obcordata*. Species added to the plant list here were *Libertia mooreae* and a *Cardamine*. Some time was spent discussing the differences between *Fuscospora solandri* and *F. truncata*. We passed a large slip, which provided open habitat for *Veronica subfulvida*, another addition to the plant list. When we reached the top ridge, we had to follow the forestry road on the boundary for a few minutes. Following the track west down the ridge where it descended steeply back to the wetland we added *Erythranthe guttata*, a weedy monkey musk, to the list before joining the forest track back towards the road. On the way we spotted a very large *Astelia grandis*, which was just visible above some very tall *Parablechnum novae-zelandiae*. Back at the grassy clearing we noticed that there was a small population of the native musk *Thyridia repens* at the edge of the water. A lovely walk accompanied by the constant sound of many bellbirds singing and beautiful calm sunny weather.

Astelia grandis has one strong, whitish, costa (vein) down each side of the midrib and leaves almost broad to the pointed tip compared to *A. fragrans* which has a faintly reddish costa and very long tapering leaf tips.

May Meeting and AGM
At a well-attended AGM held at Founder's Park there were major changes to the committee with following officers elected: president: Helen Lindsay, secretary: Fini Shaw and treasurer: Chris Ecroyd. Jane Connor continues as our newsletter editor.

FUTURE EVENTS
September 18: Weeding in Wairoa Valley.
October (Labour weekend): camp at Karamea.

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- **Canterbury Botanical Society**

The Canterbury Botanical Society held their AGM a month later this year in an in-person meeting – the first for the year. While most positions rolled over, past president Paula Greer resigned and we have two new committee members, Jane Gosden and Kate Steel. Our long serving newsletter editor Dean Pendrigh was awarded the Senior Bledisloe Trophy.

After the AGM we had a debate based on the film by Gerald Smyth asking if Christchurch could still be called the Garden city. Some of those interviewed in the film were woeful of the current state of Christchurch's public gardens, had an image of ideal gardens being highly manicured full of exotic flowering plants.

July Field Trip - Pūtaringamotu Riccarton Bush
The last trees standing from Canterbury Plains swamp forest, the scattering of 150 to 600 year-old kahikatea high above a 30 year-old mahoe sub canopy, tells the story of the recent settlement of Christchurch. Ranger Mike Steenson recounted the history of the bush to 25 BOTSOC members, from a mahinga kai site for Maōri, to a supply of tōtara and mātai for new settlers, and the critical guardianship by the Deans family. In the 1990's Dr Molloy changed management from woodland to wildland to allow natural regeneration and decomposition to rebuild the forest. Now the management issues are people, pigeons, pest plants, and potential encroachment of infill housing into tree root zone.

August Meeting
Dr Colin Meurk, a man of many awards, spoke on the Grime Stress-Disturbance model of plant evolutionary strategies. First proposed in 1977 there are Botanical Society members who had requested Colin talk on this subject.

August Field Trip: Te Oka scenic reserve, Okuti. This never-visited land-locked reserve sits high up above Okuti valley, just below Bossu Road. The core of the reserve is a century old, with an extension in 2004 to increase the area to just under 20 hectares. Hugh Wilson's summary of the reserve notes the presence of several old tōtara and mātai trees. Last year the wild goats in the catchment were eliminated.

FUTURE EVENTS

September 10th	Arboretum trip (McHughs, Adams, Coleridge). Leader Tom Ferguson.
October 3rd	Talk: Carla-Lisa Schoots - The End Peak wetland complex - A high alpine patterned wetland complex in Central Otago.
October 8th	Fieldtrip: A significant dryland remnant in the Waimakariri catchment. Leader Jason Butt.
November 7th	TBA a viewing of the film Ngā Reporepo followed by a panel discussion.
November 11th - 13th	Spring camp: Upper Rakaia area, based at Glenroy
December 5th	Talk: Paul Maurice - In the Steps of the Great Plant Hunters of China.
December 10th	Boundary Creek reserve, Motunau. Leader Alice Shanks

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Whanganui Museum Botanical Group
Our meetings are held every two months on the second Tuesday, alternating with 'Nature Talks' (where the Whanganui Botanical Group has merged with Birding Whanganui and the Whanganui branch of Forest and Bird), which are held on the third Tuesday in even-numbered months. It is intended to continue with monthly botanical field trips to which members of the other two groups are invited.

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NOTES AND REPORTS

- **Cook, scurvey, and the Māori: did he steal their *taonga* greens?**

Rhys Gardner, rhysogardner@hotmail.com

The picture we have of Captain James Cook in New Zealand almost invariably includes him collecting edible 'scurvy grass' herbs by the boatload, in order to stave off the Vitamin C deficiency disease of scurvy (de Lange & Norton 1996; de Lange 2020). A colourful account of this disease is given by Aimer (1997); for more about its former prevalence and cures real and imaginary see Lorentz (1953), Watt (1979, 1981; Note 1), Hughes (1999), and the review of Baron (2009). Here I outline an 'indigenous aspect' of the scurvy problem.

Scurvy was not just a sailors' disease—from medieval times onwards in Britain and Europe outbreaks of 'land scurvy' occurred quite often (with the first appearance of the term 'scurvy grass' coming in the 1500s; Note 2). But in the tropical Pacific, among the Polynesians of Cook's time, it seems to have been of negligible incidence. The carbohydrate staples here, especially the kumara (*Ipomoea batatas*) and the breadfruit (*Artocarpus altilis*), contain good amounts of Vitamin C, and the only greens the Polynesians are known to have eaten regularly and in quantity, the cooked leaves of the taro (*Colocasia esculenta*), contain a high concentration of it. When such food was scarce, they could go to their wild plants for the vitamins that all greens contain: in the forest, species of *Asplenium*, *Ficus* and *Pisonia*; on the shore, *Portulaca lutea* and *Boerhavia* spp.; and in the cultivations, *Solanum americanum*. Note though that the coastal cress *Lepidium bidentatum* is recorded as having been eaten only on the Cook Islands atoll of Manihiki (Linton 1933; Whistler 1990, 2015).

I suggest then that in their Polynesian homeland the Māori had not been avid eaters of a wide range of leafy vegetables. It seems significant too that neither Polynesians nor Māori are known to have eaten the leaves of the kumara plant, although these are exceptionally high in Vitamin C (Note 3).

The fastidious Māori must have wondered to see Cook's sailors scrambling around the rocks collecting plants from places where birds would congregate and where other homely inputs of nitrogen would no doubt occur from time to time (Note 4). And once they learnt these plants were intended for the pot, I think they were likely to have been even less impressed. At least, there seems to be nothing in the literature to indicate that a vital resource of theirs was at stake.

There was, in fact, no need for Maori to eat 'scurvy grasses' to stay healthy. Admittedly, taro leaves would generally have been in short supply, but kumara was often plentiful, and, when steamed in a *hangi* rather than baked at the higher temperature of the traditional Polynesian earth-oven, would have retained a fair amount of its Vitamin C. Secondly, Māori ate a diversity of minor foods, both animal and vegetable, and the vitamin would be present in some of these (Note 5). For example, although fish and seaweed generally have rather low concentrations, oysters and some other molluscs, and also the roe of the *kina* (sea-urchin), are excellent sources. Lastly, it is possible that the pollen of raupō (*Typha orientalis*), which could be stored and consumed in winter, might also be such a source, to judge by the notably high levels recorded for *T. domingensis* in South America (Arenas & Scarpa 2003).

I think we must acquit Cook of the charge, nor do I believe that our coastal cresses (*Lepidium oleraceum* in particular) and the other 'scurvy grasses' were ever cultivated or regarded as a kind of *taonga* (treasure).

Notes

Note 1 Medical historian Sir James Watt (1979, 1981) has examined the Cook's Voyages records and has shown that Cook's major contribution, in addition his taking aboard fresh food wherever possible, was in alleviating the rigour of shipboard conditions, which allowed his sailors to keep adequate amounts of Vitamin C in their bodies for longer. But he retarded progress by failing (in the Second Voyage) to ensure planned experiments were carried out and by his support of the false idea that "wort of malt" was a satisfactory preventative.

Note 2 The history of scurvy is full of anomalies. Hughes (1999), for example, shows that the three traditional British 'scurvy grasses' (*Cochlearia officinalis*, *Nasturtium officinale*, and *Veronica beccabunga*) are not particularly high in Vitamin C. He also records a very high concentration in the nettle (*Urtica dioica*), but although this plant was often consumed by country people it seems never to have been a widely accepted scurvy remedy.

Note 3 On their long voyages the Polynesians would have had to rely largely on the Vitamin C content of fish they caught and on their stores of kumara, taro, breadfruit and *Dioscorea* yams; bananas have only a modest amount and coconuts almost none.

Note 4 There is a hint in the journal of Cook's Third Voyage surgeon William Anderson (quoted by de Lange 2020: 7) to the effect that "wild celery" (*Apium* sp.) in particular might have been relatively abundant near Māori coastal settlements. This and the other 'scurvy grasses' are well-known to be nitrophiles.

Note 5 Information on Vitamin C content is lacking for some of these minor foods, in particular, for the flesh of the *kiore* (*Rattus exulans*) and the *koura* (freshwater crayfish), and the fruit of the kahikatea (*Dacrycarpus dacrydioides*). For some others, e.g., the rhizomes of bracken, the kernels of karaka (*Corynocarpus laevigatus*) and tawa (*Beilschmiedia tawa*), and the flesh of the drupes of hīnau (*Elaeocarpus dentatus*), the levels of Vitamin C are likely to be low because of the way these foods were processed. An essential early account of Māori foodstuffs is that of Colenso (1880).

To revert to the topic of anomalies in the history of scurvy: Polar explorers were slow to realize they should copy the Eskimo and eat animal flesh (penguin, seal and whale) nearly raw rather than cooked. In this regard, the "Belgica" Expedition to Antarctica in 1897–99 made medical history, but only just—as the title of a terrific recent retelling of the story suggests (Sancton 2021).

References

Aimer, D. 1998: A scurvy business. *New Zealand Geographic* 37 [pagination not known]. https://www.nzgeo.com/stories/a-scurvy-business/

Arenas, P.: Scarpa, G.F. 2003: The consumption of *Typha domingensis* Pers. (Typhaceae) pollen among the ethnic groups of the Gran Chaco, South America. *Economic Botany* 57: 181–188.

Baron, J.H. 2009: Sailors' scurvy before and after James Lind - a reassessment. *Nutrition Reviews* 67: 315–332.

Colenso, W. 1880: On the vegetable food of the ancient New Zealanders. *Transactions of the New Zealand Institute* 13: 1–38.

Hughes, R.E. 1990: The rise and fall of the "antiscorbutics" some notes on the traditional cures for "land scurvy". *Medical History* 34: 52–64. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1036000/

Lange, P.J. de; Norton, D.A. 1996: To what New Zealand plant does the vernacular "scurvy grass" refer? *New Zealand Journal of Botany* 34: 417–420.

Lange, P.J. de 2020: Lockdown musings on scurvy grass (*Lepidium oleraceum*). *Trilepidea* 198: 4-11.

Linton, A.M. 1933: Notes on the vegetation on Penrhyn and Manihiki Islands. *Journal of the Polynesian Society* 42: 300–307.

Lorentz, A.J. 1953: Some pre-Lind writers on scurvy [Lind Bicentenary Symposium]. *Proceedings of the Nutrition Society (Britain)* 12: 306–324. (See also articles at www.jameslindlibrary.org/).

Packer, L.; Fuchs, J. (eds) 1997: *Vitamin C in health and disease*. Dekker, New York.

Sancton, J. 2021: *Madhouse at the end of the earth*. W.H. Allen, London.

Watt, J. 1979: Medical aspects and consequences of Cook's Voyages. Pp. 129–157 in R. Fisher & H. Johnston (eds.) *Captain James Cook and his times*. Douglas & McIntyre, Vancouver.

Watt, J. 1981: Some consequences of nutritional disorders in eighteenth-century British circumnavigations. Pp. 51–71 in J. Watt et al. (eds.) *Starving Sailors: the influence of nutrition upon naval and maritime history*. National Maritime Museum, Greenwich.

Whistler, W.A. 1990: Ethnobotany of the Cook Islands. *Allertonia* 5: 347–424.

Whistler, W.A. 2015: Annotated list of Tahitian plant names. *Allertonia* 14: 1–121.

▪ The weedy purple tops (*Verbena* spp.)

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The purple tops (*Verbena* spp.) have caused much confusion in New Zealand. A recent revision undertook some 'taxonomic housekeeping' by outlining how the name *Verbena bonariensis* has been misapplied in New Zealand (Ford 2022). The revision shows the species *Verbena incompta* seems a better fit for our widespread purple top,

Fig. 1. Flower spikelet of *Verbena incompta*. M. Ford, 2020.

with *V. bonariensis* a rarer species here. This dilemma is not specific to New Zealand, *V. incompta* was first split from *V. bonariensis* in Australia where the plant is also exotic. Seemingly this species is native to South America but has naturalized across the globe. New Zealand had seven species of *Vebena*, all adventives. The common name of species in this genus is vervians or purple top and they occupy a range of 'weedy' habitats.

Fig. 2. Flower spikelet of *Verbena bonariensis*. M. Ford, 2020.

I first pondered purple tops in my Far North travels, when I noticed a large purple flowered plant lining the weedy roadsides. I thought about this more while undertaking a species list on my family land (Ford 2019). I tried to get to know the wild purple tops but quickly realised my specimen didn't match *V. bonariensis*, the species thought to be the common widespread of the purple tops. My first thought was to check IiNaturalist where I saw overseas botanists suggesting that *V. incompta* was present in New Zealand. From here the paper by Micheal (1995) naming this species from an Australian specimen was found and even proving its presence in New Zealand. Thinking Australia is not too far away I matched my weedy *Verbena* to the description of *V. incompta*. Armed with newfound knowledge and the encouragement of fellow botanists I reviewed specimens across New Zealand's main herbaria - Auckland Museum, Te Papa and the Allan collections as well as observations on iNaturalist. I quickly realized the common weedy purple top in New Zealand was *V. incompta*.

Verbena incompta is a more robust plant than the rarer *V. bonariensis*, and these species can be easily separated. *Verbena incompta* has elongated flower spikes (Fig 1) and *V. bonariensis* has a broader corolla (Fig 2). The species epithet of *V. incompta* refers to the untidy nature of this plant and the untidy places it often inhabits (Micheal 1995). It is a widespread weed in the North Island and the northern South Island, often seen in disused land. In contrast, *V. bonariensis* is a rare weed mostly seen as a garden escape, but can be locally common. In the southern South Island, this species is the most common of the pair. From the review of specimens *V. incompta* appears to be spreading in the South Island. In the North Island, this species is not a terrible weed as natural forest succession displaces local populations. Micheal (1995) outlined this species' preference for moisture, less apparent in the moist country of New Zealand. Hopefully, this preference will keep it from invading indigenous dryland environments where it poses the most threat.

Verbena incompta is the name best suited to the weedy, widespread purple top of New Zealand (Ford 2022). Since the revision, true *V. bonairensis* has been found throughout Auckland and on the Chatham Islands but remains the less common of the pair.

Acknowledgements

I would like to thank Ewen Cameron, Peter de Lange and Rhys Garder for their support and the assistance from New Zealand's multiple herberia.

For a copy of the paper email Marley at: mfecobotany@gmail.com

References

Ford M (2019). Puriritahi, a coastal forest in the Hokianga. *Auckland Botanical Society Journal* 74 (2): 93–96.

Ford M (2022). *Verbena incompta* P.W.Michael: an overlooked name for an old weed in New Zealand. *New Zealand Journal of Botany*: 1–12.

Michael PW (1995). A new name for a widespread and misunderstood species of *Verbena* (Verbenaceae). *Telopea. 6*(2-3):181–183.

- **Are recently proposed genus changes for several New Zealand trees consistent with minimising change within a scientifically-based taxonomy?**

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Introduction

While I feel privileged to work as a taxonomist, I have the impression that this field of practice is sometimes poorly regarded. My view has developed from interactions with general users of scientific names for plants, be this in person as part of botanical societies and the like, or online communities with a focus on plant identification. From this feedback, mostly indirect but some direct, I have come to agree with the sentiments expressed by Drew et al. (2017) that taxonomic decisions should be made with the desires of general users in mind. A central aspect of this is a dislike of name changes. Entwisle & Weston (2005, p. 3) described this dislike as "almost axiomatic rather than something to be tested", and it certainly accords with my anecdotal observations.

However, some taxonomists produce work explicitly aimed at themselves (e.g., de Gasper et al. 2016, who argued that segregating *Blechnum* ferns into multiple genera would make for easier study). Even where no justification is provided for taxonomic changes, it seems to me there is often a disconnect between taxonomists, as the producer, and general users as consumers – if taxonomists were selling their revised taxonomies as products, I suspect there would be few willing buyers. Indeed, this may at least partially reflect why taxonomy is chronically underfunded, including in Aotearoa New Zealand (Nelson et al. 2015).

By scientific names, I mean those of the Linnaean system, with binomials of a genus name and a species epithet for each species, which are hierarchically grouped within genera, families, etc. Nowadays, species are usually construed as a hypothesis of a separate evolutionary lineage that exists objectively. Different sources of evidence can be used to test this hypothesis. Species delimitation is occasionally controversial, such as when different data are incongruent (e.g., Heenan et al. 2021, Shepherd & Heenan 2021; two cases that may provide fundamental insight into plant diversification within Aotearoa). General users can be confused and inconvenienced while taxonomists debate the merits of the data and hypothesised delimitations. But this is done within a scientific framework of testability, where some uncertainly is unavoidable.

The taxonomic recognition of groupings of species such as genera, families, orders, etc. is fundamentally different as these are subjective constructions. This article examines taxonomic decision-making that moves a species from one genus to another. I contend this is probably the principal means by which taxonomists frustrate general users, since by-definition it entails a change to the genus part of the binomial name. The genus name is not affected by changes at other ranks above the species level.

I begin by discussing relevant taxonomic criteria. I then apply these to recent taxonomic studies that have suggested generic transfers of New Zealand species in *Dysoxylum*, *Nestegis*, *Olearia*, *Prumnopitys*, and *Weinmannia*.

Monophyly

A monophyletic group is one whose members are all more closely related to each other than to any outside the group. For example, while the group of monocotyledonous plants is monophyletic, the traditionally-circumscribed group of dicotyledonous plants is not (Fig. 1). This is because some dicots are more closely related to monocots than they are to other dicots.

Most modern taxonomic studies give formal Linnaean recognition (i.e., genus, family, etc.) only to groupings of species that are monophyletic (or, at least, not demonstrably non-monophyletic). Doing so makes this aspect of classification scientific in the sense that monophyly is testable. Without monophyly, classifications above the species rank are subjective and fundamentally unscientific. Taxonomists generally think of themselves as scientists, so it is no surprise that they usually implement monophyly as a criterion. Indeed, this was the first guideline of Entwisle & Weston (2005, p. 1), a paper that summarised guidelines for taxonomists developed by a workshop of Australian botanical taxonomists: "Where possible, named taxa should be monophyletic based on current reliable evidence".

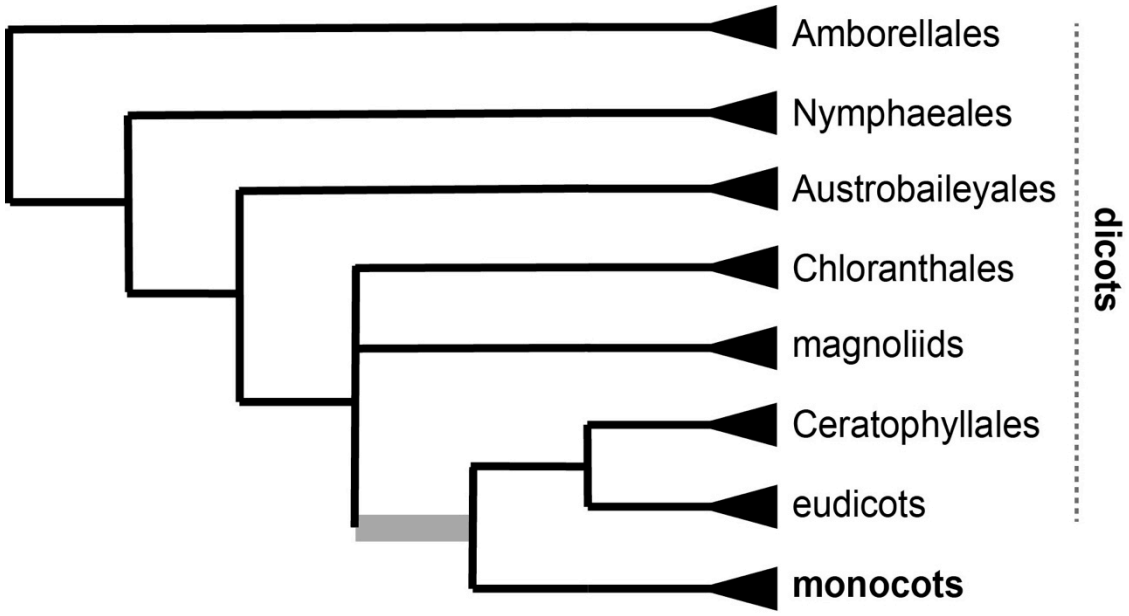

Fig. 1. Relationships of the angiosperms based on APG IV (2016). Although part of the traditionally circumscribed dicots, the Ceratophyllales and the eudicots are actually more closely related to the monocots than they are to the remaining dicots – as indicated by the thickened grey line. This means that the dicots are not monophyletic.

However, even when only monophyletic groups of species are named, it still needs to be determined which groups should be given a Linnaean rank, and what rank should be used. Entwisle & Weston (2005, p. 2) wrote it "seems best to regard the absolute ranks of taxa as arbitrary, to be fixed on the basis of purely pragmatic criteria". (I agree, but contend that the species rank can be approximated to the boundary between divergent and reticulate relationships, at least for sexually-reproducing lineages.)

Minimising change

Underpinning such "pragmatic criteria" is the second guideline of Entwisle & Weston (2005, p. 2.): "Minimise taxonomic change". Minimising taxonomic change is not the same as no taxonomic change. When new data robustly indicate an existing classification is non-monophyletic, it should be changed in order to be scientifically defensible, *but as little change as possible should be undertaken*. That represents a compromise between taxonomists' desire to be scientific (in the sense of having testable hypotheses) and general users' dislike of change. If implemented appropriately, this should lead to a convergence, with fewer and fewer name changes even while knowledge of evolutionary relationships increases.

Minimising taxonomic change prioritises stability over morphological recognition and diagnosis for groupings of species. That is not to mean that morphology is unimportant, but

arguments about what groups of species can be recognised (With or without a microscope? External morphology only, or anatomy too? How many exceptions are allowed? By beginners or just experts?) should not trump taxonomic stability of scientific names. If the constituent species are recognisable, then the groups they are classified into will be recognisable too, even if inelegantly. However, morphological diagnosis is a useful secondary criterion when choosing between alternative prospective solutions for achieving monophyly that involve similar numbers of name changes (see the *Olearia* example below). Moreover, groupings of species that might be morphologically useful to recognise can be formalised above or below the genus level without necessitating changes to scientific names.

If a taxonomic classification is apparently monophyletic (or at least not demonstrably non-monophyletic), then any change is contrary to the principle of minimising change. Unfortunately, this happens all too often, with some taxonomists thinking the benefits accrued (which, cynically, sometimes seems little more than for their own ego) outweigh the inconvenience imposed on general users. Without a commitment to minimise it, taxonomic change will be never-ending as taxonomists indulge their subjectivity.

In theory, individual users are free to adopt or reject proposed suggestions for taxonomic change. In reality, few of us have the capacity or capability, and absolute individuality would lead to an anarchic inability to communicate. Consequently, general users usually look to authoritative sources for guidance. Australia has the Australian Plant Census, where representatives of the state herbaria 'vote' on taxonomic changes, and the majority view prevails in national products like the Atlas of Living Australia. The guidelines of Entwisle & Weston (2005) were developed for this purpose, although I do not know to what extent they are followed today.

New Zealand has two authorities providing plant names. One is the Biota of New Zealand (biotanz.landcareresearch.co.nz), formerly the New Zealand Plant Names Database. It is maintained by Maanaki Whenua Landcare Research, which houses the principal group of botanists funded by government (largely via the Ministry of Business, Innovation & Employment). The other is the New Zealand Plant Conservation Network (www.nzpcn.org.nz), which provides comprehensive webpages for New Zealand plants. It is a subscription-based organisation that has a mission of promoting native plant conservation.

As best I can tell, neither curate their accepted lists of New Zealand plant names in accord with the principle of minimising taxonomic change. The Biota of New Zealand's forerunner, the New Zealand Plant Names Database, explicitly did not, saying "All taxonomic treatments are applied without prejudice unless there are serious scientific or nomenclatural errors…" (Schonberger et al. 2021). However, for ferns and lycophytes, the Biota of New Zealand has followed the Flora of New Zealand (Brownsey & Perrie 2022), which did not adopt all taxonomic changes that have been published in recent times (Perrie & Brownsey 2017). I do not know the criteria used by the New Zealand Plant Conservation Network, but base my judgement above on the changes that they have adopted (including those discussed below).

Because neither of these authorities seem to be doing so, I explore what the perspective of minimising taxonomic change while aiming for a scientifically-defensible classification means for recently proposals affecting New Zealand species of *Dysoxylum*, *Nestegis*, *Olearia*, *Prumnopitys*, and *Weinmannia*.

Prumnopitys

Page (2019) proposed the transfer of six species, including New Zealand's miro, *Prumnopitys ferruginea* (Fig. 2), from *Prumnopitys* to a genus he newly described, *Pectinopitys*. He retained three species within *Prumnopitys*, including New Zealand's mātai, *Prumnopitys taxifolia*. He also maintained as a distinct genus the Malesian-Australian monotypic *Sundacarpus* that he had earlier described.

Page (2019) referenced earlier phylogenetic studies of DNA sequences, the more recent being Biffin et al. (2012), Knopf et al. (2012), and Little et al. (2013). There seems to be

some conflict among the studied DNA loci, and relatively little data were studied given the deep divergences involved. Nevertheless, there seems to be overall agreement in recognising three lineages, with *Sundacarpus* sister to *Prumnopitys s.s.*, and their clade sister to *Pectinopitys*. Having found the sole species of *Sundacarpus* to be nested within *Prumnopitys s.l.*, the simplest course of action would be to return the former to the latter, as done explicitly by Knopf et al. (2012) and Little et al. (2013), and implicitly by Biffin et al. (2012). The alternative solution proffered by Page is perverse from the perspective of minimising taxonomic change (i.e., six additional name changes globally).

Page's reasoning seems to have two parts. Firstly, *Sundacarpus* looks really different, and should therefore be a different genus, and that similar reasoning can be applied to *Pectinopitys* and *Prumnopitys* s.s. While these differences can be scientifically catalogued, the judgement as to how much difference is fit for recognition as a genus (or one of the other arbitrary categories of species groupings) is subjective, and not scientific. Such reasoning is a recipe for never-ending taxonomic change as taxonomists argue unscientifically about what a genus should be, and it has long been rejected by most modern taxonomists.

The second part is that the divergences within *Prumnopitys s.l.* are temporally deep and equivalent to those between genera elsewhere in the Podocarpaceae. But this is a parallel recipe for subjective-caused instability. Which genera within the Podocarpaceae should be the benchmarks? Further taxonomic name changes would inevitably be required as comparisons are variously made across conifers, gymnosperms, seed plants, land plants, and life. It is worth quoting Entwisle & Weston (2005, p.2) at length on this point: "The only criterion of absolute rank that we think is objective and logically defensible is Hennig's (1966) idea of tying rank to geological age. However we believe this criterion is hopelessly impractical, for several reasons…". Until this "hopelessly impractical" option is realised across the classification of life, taxonomists should refrain from trying to give equivalency to taxa of the same rank, as it is subjective and only induces instability.

Prumnopitys as broadly defined (i.e., including *Pectinopitys* and *Sundacarpus*) is monophyletic, and *Prumnopitys ferruginea* should be used for miro by those interested in minimising name changes while aiming for a scientific classification. This is done by the Biota of New Zealand, but the New Zealand Plant Conservation Network uses *Pectinopitys ferruginea*.

Weinmannia

Pillon et al. (2021) proposed the transfer of 68 species from *Weinmannia* to a resurrected *Pterophylla*. The latter occurs in Malesia, Pacific Islands, Madagascar, Comoros, and includes New Zealand's kāmahi *W. racemosa* and tōwai *W. sylvicola* (Fig. 2), as *P. racemosa* and *P. sylvicola*. This was based on a large amount of DNA sequence data that suggested strongly that *Weinmannia* as recently circumscribed was non-monophyletic, since the *Pterophylla* clade was more closely related to a clade of *Cunonia* (24 species in New Caledonia and 1 in South Africa) and *Pancheria* (27 species in New Caledonia) than it was to the clade that included the type of *Weinmannia* (90 species in the New World and 2 in the Mascarenes). However, very few species were included in the DNA analyses, with 4 from the *Pterophylla* clade and 2 from the clade including the type of *Weinmannia*.

An alternative approach to resolving the non-monophyly of recent circumscriptions of *Weinmannia* is to expand it to include the 51 species of *Cunonia* and *Pancheria*. With this expanded circumscription, *Cunonia* and *Weinmannia* would have equal priority, being simultaneously published by Linnaeus in 1779. Selecting *Weinmannia* over *Cunonia* would clearly invoke fewer species name changes (51 cf. 187), and also result in a monophyletic classification with fewer changes than resurrecting *Pterophylla* (51 cf. 68).

With an aim of minimising name changes while aiming for a scientific classification, simple numbers favour expanding *Weinmannia* rather than shrinking it through the resurrection of *Pterophylla*. When I asked one of the authors why they favoured the latter, they replied that they thought there would be little attachment to *Weinmannia*. The swearing I heard on a

recent Botanical Society trip attests otherwise. Nevertheless, someone somewhere is going to have to incur name changes to engender a monophyletic classification. It might be argued, for example, that those affected by a transfer of *Cunonia* and *Pancheria* to *Weinmannia* would be more disadvantaged than those having to adopt *Pterophylla* – but how is that measurable? *Cunonia* and *Pancheria* are prominent in New Caledonia, while species of the *Pterophylla* clade are common in other parts of the Pacific, including New Zealand where *W. racemosa* and *W. sylvicola* are some of the country's most abundant trees.

For now, I am sticking with *Weinmannia* for the New Zealand species, thinking of *Weinmannia* as monophyletic with the inclusion of *Cunonia* and *Pancheria* pending. This expansion has at least some merit that should be explored further. In any case, before adopting any changes, more species should be included in DNA analyses to obtain a more comprehensive understanding of the phylogeny. With so many unsampled species (96%), it would be no surprise to find that some species do not fit nicely into the presently identified clades (e.g., might *Weinmannia s.s.* be found to be paraphyletic to the other clades?). Neither the Biota of New Zealand nor the New Zealand Plant Conservation Network have taken a similarly cautious approach; both have embraced *Pterophylla*.

Nestegis

Dupin et al. (2022) proposed the transfer of the four species of *Nestegis* in New Zealand (Fig. 2) and Norfolk Island to an expanded *Notolaea*. Their analysis of DNA sequences found the four New Zealand species to be most closely related to *Notolaea*, previously circumscribed for 12 species endemic to mainland Australia. Sister to this clade were four species endemic to New Caledonia which had been treated in *Osmanthus* section *Notosmanthus*, but were clearly distinct from 'true' *Osmanthus* of Eurasia. Finally, sister to all of these was the Hawaiian endemic *Nestegis sandwicensis*. Thus, both *Nestegis* and *Osmanthus* were non-monophyletic.

Of the 21 Pacific species, Dupin et al. (2022) wrote "we opt to recognize a single genus that accounts for the lack of morphological distinctiveness among these taxa". With *Notolaea* having priority at the genus level, this entailed nine name changes. However, retaining *Notolaea* as endemic to mainland Australia (including Tasmania), and *Nestegis* for the New Zealand and Norfolk Island species would have meant just five name changes, with a new genus name being required for the four New Caledonia species, and another for the Hawaiian species.

As noted by Dupin et al. (2022), an advantage of broader circumscriptions is that they tend to "offer a robust and stable classification", better able to accommodate newly sampled or discovered species without requiring rearrangements or new genera. However, with most known species already sampled, and, as explained by Dupin et al. (2022), few new species expected given low rates of recent discovery, this is less of a concern in this case.

To achieve a monophyletic classification, the New Caledonian and Hawaiian species need name changes regardless of whether a broader or narrower *Notolaea* is adopted. However, retaining *Nestegis* for the New Zealand and Norfolk Island species makes for fewer species name changes overall. At the time of writing (10th July 2022), both the Biota of New Zealand and the New Zealand Plant Conservation Network were using *Nestegis*, although that may be because they had not yet considered the proposal (as the combinations in *Notolaea* were not included in synonymy).

Dysoxylum

Holzmeyer et al. (2021) proposed the transfer of New Zealand's kohekohe (Fig. 2) from *Dysoxylum spectabile* to *Didymocheton spectabilis*. This was part of a broader rearrangement of generic circumscriptions with and around *Dysoxylum*. Albeit with relatively little DNA sequence data, they found strong support that *Dysoxylum* as usually circumscribed was not monophyletic.

Kohekohe fell within Clade 1 of Holzmeyer et al. (2021), which, with 43 species, was the largest of the clades previously attributed to *Dysoxylum*. However, this Clade 1 was more closely related to several clades already recognised as separate genera, including *Aglaia* with some 125 species, than it was to Clade 6 (28 species) within which Holzmeyer et al. (2021) designated the type of *Dysoxylum*. Circumscribing a genus that was monophyletic and encompassed both Clade 1 (including kohekohe) and Clade 6 (with the type of *Dysoxylum*) would by necessity include *Aglaia*, which is an older name and has priority – in other words, there would be no species accepted in *Dysoxylum*. Instead, with the type of *Dysoxylum* as therein chosen, recognising Clade 1 as the separate genus *Didymocheton* involves the fewest changes to species names globally.

Regarding picking a species in Clade 6 as the type of *Dysoxylum*, Holzmeyer et al. (2021, p. 1257) wrote: "By this the continued use of the generic name for the second-biggest clade of *Dysoxylum* s.l. is enabled. This prevents the coining of more than 25 new names in an as yet unnamed genus, for a group of common and ecologically highly significant trees…". It nevertheless still entailed 29 new combinations in *Didymocheton*. Choosing a species from Clade 1 as the type of *Dysoxylum* was an option (i.e., *Dysoxylum mollissimum* was among their type candidates), and would have involved fewer name changes. Perhaps they felt this slight difference in numbers was outweighed by Clade 1 already having a genus name available (i.e., *Didymocheton*) while Clade 6 was without one, or they considered the trees of Clade 1 to be less common and significant.

Given the typification of *Dysoxylum*, *Didymocheton spectabilis* should be used for kokekohe by those interested in minimising name changes while aiming for a scientific classification. This is done by both the Biota of New Zealand and the New Zealand Plant Conservation Network.

Olearia

Saldivia et al. (2022) proposed the transfer of six New Zealand species from *Olearia,* including the widespread leatherwood, tūpare, *O. colensoi* (Fig. 2), to the new genus *Macrolearia*. This was informed by the results of Saldivia et al. (2020), itself building on earlier work, that found, although with comparatively limited DNA sequence data, strong support for these species being part of a "*Pleurophyllum* clade". This comprised moderate support for both a clade of these six "macrocephalous *Olearia* species" and a clade of the three species of *Pleurophyllum*, alongside the monotypic *Damnamenia*.

This *Pleurophyllum* clade was comparatively distantly related to the type species of *Olearia*, and also other, larger clades labelled as *Olearia*. As a step towards resolving the current non-monophyly of *Olearia*, the six species in the *Pleurophyllum* clade need to be transferred to a different genus. Saldivia et al. (2022, p. 617) favoured a new genus – *Macrolearia* – rather than "lumping them along with *Damnamenia* in *Pleurophyllum* [which would involve the same number of name changes but] would result in… a loss of two stable generic identities".

Adopting *Macrolearia* is consistent with minimising name changes while aiming for a scientific classification (an explicit goal of Saldivia et al. 2022). *Macrolearia* is used by both the Biota of New Zealand and the New Zealand Plant Conservation Network.

Conclusion

The recently proposed changes to *Didymocheton* and *Macrolearia* appear consistent with minimising change within a scientific classification; both are adopted by the Biota of New Zealand and the New Zealand Plant Conservation Network. However, both authorities have adopted *Pterophylla* when the retention of *Weinmannia* is arguably preferable, with regard to name changes and the current strength of the underlying phylogenetic hypothesis. The New Zealand Plant Conservation Network's adoption of *Pectinopitys* is clearly at odds with

minimising name changes. It will be interesting to see how the two authorities approach *Nestegis*/*Notolaea*.

I need to acknowledge that deciding how to minimise taxonomic change is not always easy. Simple numbers are not necessarily the full story. Perhaps a name change for one species that is globally well-known is more disruptive to general users than changes for 10 poorly known species. But often the solution that minimises taxonomic change and disruption is clear. Taxonomists and those who aggregate and curate taxonomists' outputs should be mindful of how to best meet the needs of their general users. That could be a factor in reconciling the present situation in New Zealand which, although optimistically equivalent in size and taxonomic expertise to one Australian state, runs two parallel and often diverging taxonomic authorities for plant names.

Ultimately, scientific names are principally labels for communicating about species. For most of us, it takes a lot of effort to learn and remember them. As a scientific taxonomist, I think it is important that genera be monophyletic. But as a frustrated user, the only reason that I cede to taxonomists for making changes to the generic parts of scientific names is robustly supported non-monophyly, nomenclatural issues notwithstanding.

Acknowledgements

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References

APG IV. 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. Botanical Journal of the Linnean Society 181: 1-20.

Biffin E, Brodribb TJ, Hill RS, Thomas P, Lowe AJ. 2012. Leaf evolution in Southern Hemisphere conifers tracks the angiosperm ecological radiation. Proceedings of the Royal Society, B 279: 341-348.

Brownsey PJ, Perrie LR. 2022. Introduction. In: Breitwieser I (ed.). Flora of New Zealand – Ferns and Lycophytes. Fascicle I. Manaaki Whenua Press, Lincoln.

de Gasper AL, Almeida TE, Dittrich VAO, Smith AR, Salino A. 2016. Molecular phylogeny of the fern family Blechnaceae (Polypodiales) with a revised genus-level treatment. Cladistics 275: 191-227.

Drew T, González-Gallegos JG, Xiang C-L, et al. 2017. *Salvia* united: the greatest good for the greatest number. Taxon 66: 133-145.

Dupin J, Hong-Wa C, Pillon Y, Besnard H. 2022. From the Mediterranean to the Pacific: re-circumscription towards *Notolaea s.l.* and historical biogeography of a generic complex in Oleinae (Oleaceae). Botanical Journal of the Linnean Society, https://doi.org/10.1093/botlinnean/boac024

Entwisle TJ, Weston PH. 2005. Majority rules, when systematists disagree. Australian Systematic Botany 18: 1-6.

Heenen PB, McGlone MS, Mitchell CM, Cheeseman DF, Houliston GJ. 2021. Genetic variation reveals broad-scale biogeographic patterns and challenges species' classification in the *Kunzea ericoides* (kānuka; Myrtaceae) complex from New Zealand. New Zealand Journal of Botany 60: 2-26.

Holzmeyer L, Hauenschild F, Mabberley DJ, Muellner-Riehl AN. 2022. Confirmed polyphyly, generic recircumscription and typification of *Dysoxylum* (Meliaceae), with revised disposition of currently accepted species. Taxon 70: 1248-1272.

Knopf P, Schulz C, Little DP, Stützel T, Stevenson DW. 2012. Relationships within Podocarpaceae based on DNA sequence, anatomical, morphological, and biogeographical data. Cladistics 28: 271-299.

Little DP, Knopf P, Schulz C. 2013. DNA barcode identification of Podocarpaceae – the second largest conifer family. PLoS ONE 8(11): e81008.

Nelson W, Breitwieser I, Fordyce E, et al. 2015. National Taxonomic Collections in New Zealand. Wellington, Royal Society of New Zealand.

Page CN. 2019. New and maintained genera in the taxonomic alliance of *Prumnopitys s.l.* (Podocarpaceae), and circumscription of a new genus: *Pectinopitys*. New Zealand Journal of Botany 57: 137-153.
Perrie LR, Brownsey PJ. 2017. The Pteridophyte Phylogeny Group's recommendations in relation to ferns and lycophytes in the eFloraNZ. New Zealand Botanical Society Newsletter 127: 14-17.
Pillon Y, Hopkins HCF, Maurin O, Epitawalage N, Bradford J, Rogers ZS, Baker WJ, Forest F. 2021. Phylogenomics and biogeography of Cunoniaceae (Oxalidales) with complete generic sampling and taxonomic realignments. American Journal of Botany 108: 1181-1200.
Saldivia P, Wagstaff SJ, Breitwieser I, Orlovich DA, Lord JM. 2022. A generic taxonomic synopsis of the *Pleurophyllum* clade (Asteraceae: Astereae: Celmisiinae) with the recognition of the New Zealand endemic new genus *Macrolearia*. Systematic Botany 47: 607-634.
Schönberger I, Wilton AD, Boardman KF, et al. 2021. Checklist of the New Zealand Flora – Seed Plants. Lincoln, Manaaki Whenua Landcare Research. http://dx.doi.org/10.26065/ax7t-8y85
Shepherd LD, Heenan PB. 2022. Phylogenomic analyses reveal a history of hybridisation and introgression between *Sophora* sect. *Edwardsia* (Fabaceae) species in New Zealand. New Zealand Journal of Botany 60: 113-133.

Figure 2. Clockwise from top left: kohekohe, *Didymocheton spectabilis* (previously *Dysoxylum spectabile*); rōroro, narrow-leaved maire, *Nestegis montana*; towai, *Weinmannia sylvicola*; miro, *Prumnopitys ferruginea*; tūpare, leatherwood, *Macrolearia colensoi* (previously *Olearia colensoi*). All photos by the author.

BIOGRAPHY / BIBLIOGRAPHY

- **Biographical Sketch – Rex Bertram Filson (1930 -)**

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Rex Bertram Nancarrow, the son of drapery salesman Bertram James Nancarrow (1905-1973) and his wife Alice Esther Prince, lady baker (1905-1986), was born in Bondi, Sydney on 16 March 1930. In September that year the family moved to Exeter, England, where Jean Florence Nancarrow was born on 28 October 1933. Rex commenced primary school in 1935. His parents divorced and later that year he, Alice and Jean returned to Australia (Newcastle). In 1941 Alice married marine engineer Hugh Filson (1898-1976) who formally adopted Rex and Jean and in 1944 William Hugh Filson was born. By then Rex had been pressed to leave school and begin a carpentry and joinery apprenticeship; he earned his trades certificate, but his real interests were in bush walking, photography and (encouraged by an interested neighbour) botany, especially of the Australian Orchidaceae. He was also a skilled, self-taught illustrator.

Rexiella sullivanii by Allison Knight

In 1949 he purchased a Ford panel van and began an extended working and plant-collecting holiday around Australia. In 1961, after a newspaper advertisement, three applications and an interview, he was employed as a carpenter by the Australian Antarctic Division. His career as a lichenologist began at Mawson (there are no flowering plants there); he borrowed a microscope and on the return journey also collected on Heard Island and Kerguelen. After a week or so on Macquarie Island during the changeover, and again on the 1963 summer trip there, he was seconded to the National Herbarium, Royal Botanic Gardens (Melbourne) to complete his Antarctic lichen work and tidy the herbarium lichen collection. His monograph *The Lichens and Mosses of Mac.Robertson Land,* which documents his Antarctic research and includes some of his fine artwork, was published in 1966. He became a seed-collector and finally Senior Botanist with the Victorian Department of Crown Lands and Survey.

Enthusiastic walking and climbing with the Melbourne Bushwalkers each weekend led to his club nickname "Barrington Tops" (his favourite area) and getting to know Susan Ann Hill (born 19 November 1942) in a group overcome by the photogenic beauty of several ground orchids. They married the next year and missed hardly a step for the births of their sons Matthew in October 1967 and Timothy two years later. In 1970 Filson was awarded a Churchill Fellowship to study type specimens of Australian lichens in northern hemisphere herbaria, and 1978 is notable as the year the Filsons bought a property at Booral, north of Newcastle. But there was still much to be done. In 1979 he attended the International Botanical Congress in Costa Rica to make preparations for the 1981 Australian Congress in Sydney for which he facilitated the lichen programmes, and in 1982 (en route to a stint as Australian Botanical Liaison Officer at Kew Gardens) he spent three months studying the Arctic lichen flora, comparing it with that of the Antarctic. The next year, frustrated and under-valued, he embarked on five years of Monash University study side by side with his regular work, Susan's part-time library employment and her mother's back-up home help, to earn his Master of Science degree in 1985 (with his 1981 monograph of *Cladia*) and doctorate in 1988. Ten years later the Filsons retired to their Booral property in New South Wales, where they threw themselves into an oesophageal cancer research funding campaign after the untimely death of their son Matt on 23 February 2008, and in 2021 they moved on to Dapto, south of Wollongong, to be near Tim and their grandchildren Keller and Maile.

Rexiella sullivanii

Rexiella, a fruiticose lichen genus in the family Cladoniaceae, was proposed in 2019 to contain the species *Cladonia sullivanii* first described by Swiss botanist Johannes Müller Argoviensis in 1882 and known recently as *Cladia sullivanii.* The name honours two Australian botanists. A terricolous (earth-dwelling) fruiticose lichen of southwest and southeast Australia, it is found also in southern South America and in New Zealand's North, South and Stewart islands, on sandy soil, subalpine peat bogs, alpine grasslands and lowland peat soils and heaths. The crystalline outer surface (seen with a x10 lens) distinguishes it from the related *Rexiella fuliginosa* and, along with the dark internal medullla, from the morphologically similar *Pulchrocladia retipora*.

References

Filson, S and R 2022. pers comm.
Knight, A 2022. pers. comm.
Rexiella. https://en.wikipedia.org/ (accessed 6 May 2022).

PUBLICATIONS

- **Publications Received**

Auckland Botanical Society Newssheet July – talk report, upcoming trip, coastal maire in suburbia, NZ verbenas, planting day, books for sale.

Auckland Botanical Society Journal June – trip report for Whatipū Sands, Mahurangi East Regional Park extension, Point Wells native plants of Ōtuataua lava field, plant list for Piggott Wetland, ghost of a kauri forest past in Warkworth, The Domain, Tutamoe, lichens of Westmere, native orchid mycorrhizal investigations, wild gingers, *Lobelia pedunculata* flowers, *Ficus endochaete* from montane New Guinea, epiphytes of Canary Island palms.

Waikato Botanical Society Newsletter June – upcoming talks and trips, talk reports, fieldtrip report for WERT nursery, endangered plant garden and St Joan's rest-home update.

The New Zealand Native Orchid Journal No 166 August 2022 – upcoming trips, research update on swamp helmet orchid, call for observations on the white sun orchid, the type locality of *Prasophyllum pauciflorum*.

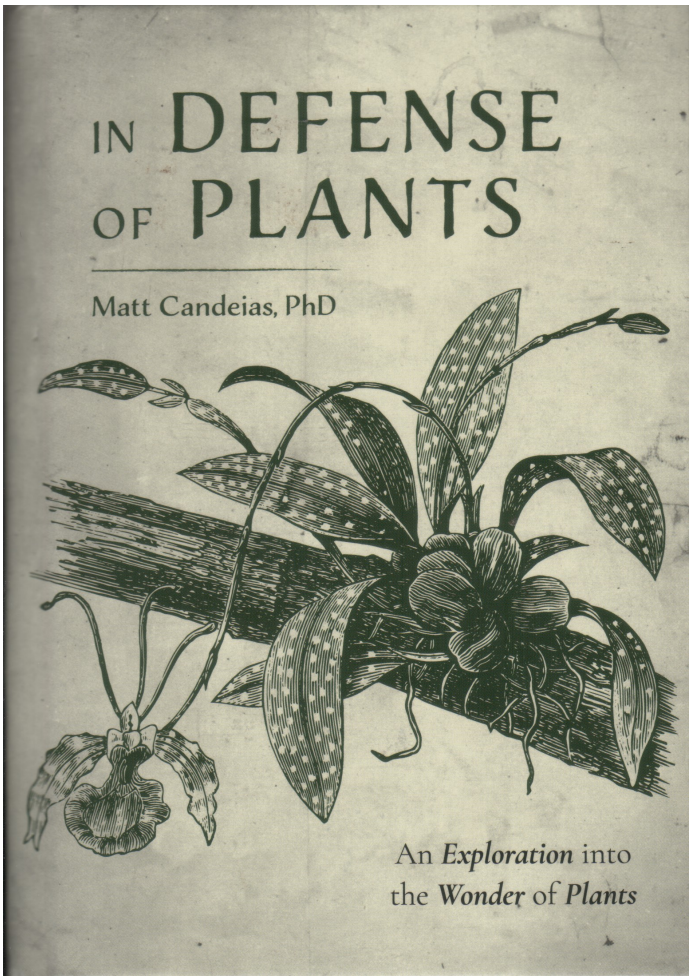
Nelson Botanical Society Newsletter Autumn 2022 – reports on Nell's Bush fieldtrip, *Notothlaspi viretum* hunting and how to distinguish the three *Notothlaspi* species, flowers of *Euphrasia* and *Ourisia*, mistletoe translocation, *Traversia baccharoides*, ID of small-leaved *Hydrocotyle*, practical field botany course review, mangroves at Māpua, *Pilularia novae-hollandiae*, karaka, oyster mushrooms.

Botanical Society of Otago Newsletter 96, June 2022 – Upcoming trips and talks, BSO Audrey Eagle botanical drawing competition, Ann Wylie's centenary, breeding system of a rare limestone Gentian, kerbside forest, book review – *Tree Sense. Ways of thinking about trees*, life on a log, *Chenia leptophylla*, trip and talk reports, photo competition winners.

- **Book review - In defense of plants: An exploration of the wonder of plants**

By Matt Candeias
Published by Mango Publishing Group, USA, 2021
Hardback, B&W illustrations, 280 pages, 130 × 185 mm
ISBN: (p) 978-1-64250-453-8, (e) 978-1-64250-454-5
$NZ40.00 (Hardcover), $NZ16.00 (ebook)

Reviewed by Murray Dawson



Author Dr Matt Candeias is an ecologist and science communicator based in the USA. Since 2015, he has run a blog and weekly podcast named 'In Defense of Plants', the same main title as his current book (and using the American spelling of the word 'defence').

Both Matt's podcast and book aim to share his love of botany and ecology with the rest of the world. He is also one of seven authors of the 2018 book 'Flora: Inside the Secret World of Plants', which follows a similar premise.

In the preface of his current book 'Why in Defense of Plants?', Matt contends that plants don't have a voice in today's busy word, and are either overlooked, or noticed only for their weedy, poisonous, or economic values. The author rightly states that the attitude "we only seem to care what plants can do for humans" ignores the incredible complexity and ecological relationships plants have in the natural world. The author defends plants against this human-centric and narrow view by drawing from his background to share stories about a deeper understanding of botany and ecology. The subtitle 'An exploration of the wonder of plants' conveys a sense of this message well.

Each chapter of this book introduces a topic that provides a springboard for telling a variety of plant stories.

In the first chapter, ‘A Rocky Start: How I Learned to Love Plants in the Bottom of a Quarry’, Matt confesses that he used to think that plants were boring. Growing up he describes himself as a ‘nature nut’, but one consumed by creatures that swim, crawl, or slither – especially fish, but also insects, lizards, and snakes. This led to university studies in zoology, with career aspirations in fisheries biology. Matt explains how that all changed following a field trip to a commercial fishery, with the overwhelming smell of dead fish. This led to a switch in majors to ecology, and the study of interactions between organisms. What followed was a job in habitat restoration in a limestone quarry. Matt highlights the challenges of establishing blue lupine (*Lupinus perennis*) to encourage Karner blue butterfly (*Plebejus melissa samuelis*), an endangered subspecies.

In Chapter Two, ‘My Own Green Revolution’, Matt tells the reader of the consuming interest he developed in gardening and growing plants, and the importance of encouraging native biodiversity. The author provides the example of his work in a local woodland to reveal several plant-insect-bird interactions and the negative effects of an invasive plant (garlic mustard) on the mycorrhizal fungi that the native plants rely upon. In this chapter, Matt also recounts being given an exotic orchid which leads to his exploration of orchid pollination systems. He concludes “If my time growing orchids and other curious plants has taught me anything, it’s that plant sex is strange” which nicely introduces the next chapter.

The title of the third chapter, ‘The Wild World of Plant Sex’, is rather attention grabbing. Covered here is the reproductive biology of non-vascular plants (such as mosses and liverworts), ferns, cycads, and flowering plants. Interesting examples of pollinators are given, including various insects, lizards, bats, and even rodents. Orchids are featured for their food deception (where the pollinators are attracted to the plants for a food reward that does not exist) and sexual deception (where the flowers deceive insects through chemical and physical mimicry into ‘pseudo-copulation’ which achieves pollination for the plant rather than mating for the unwitting insect).

Chapter Four, ‘Plants on the Move’, naturally enough covers propagule dispersal: for seeds, “wind, explosions, shots, guts, fur, feathers, or skin”. Explosive dispersal was fun to read, featuring the squirting cucumber (*Ecballium elaterium*) whose ripe fruit detaches to squirt a stream of mucilaginous liquid containing its seeds. On the micro scale we learn of “poop mosses” (family Splachnaceae) that use flies to spread their spores. On the macro scale the so-called jumping cholla cactus (*Cylindropuntia fulgida*) has spiny stems that detach when brushed by the merest touch effecting dispersal. Also covered are plants that produce or place their fruits directly underground (geocarpy). Peanuts (*Arachis hypogaea*) are the most well-known example of this (hence their other common name, groundnut). We are also told of a less well-known example of geocarpy, the ivy-leaved toadflax (*Cymbalaria muralis*), which uses negative phototropism that reverses the direction of its flower stems to push its seeds into wall and rock crevices where it likes to grow. Ivy-leaved toadflax is common in New Zealand.

In Chapter Five, ‘The Fight for Survival’, we learn of plant competition for growing space, light, and nutrients, and the strategies used to help ensure survival. The author states that “Chemical warfare may be the most effective means of defense for plants.” He explains that some plants produce chemical compounds in their falling leaves that inhibit seedling germination and growth of competing species. And others translocate or hyper-accumulate heavy metals, or produce toxins, stinging cells, or sharp needle-shaped crystals of calcium oxalate (raphides) to discourage browsing. Matt Candeias then switches gears to show plant species that have adaptations for housing beneficial ant colonies that provide nutrients and defends them against plant and insect threats.

Chapter Six, ‘Eating Animals (and Other Things)’, is devoted to carnivorous plants. Matt tells us “There are pitfall traps and sticky traps, snap traps and lobster pots, suction bladders, and even catapults”, and that some form of carnivory has evolved in ten different plant families. Details are revealed of how pitcher plants, Venus flytraps, bladderworts, and sundews (and other plants that use sticky traps) gain insect-based and other nutrients. At the end of this chapter the author hopes he has convinced us that “carnivorous plants are among the coolest plants in the world.”

Chapter Seven is ‘Parasitic Plants’; those that “live off or in another organism, obtaining nourishment and protection, while the host organism receives no benefit in return.” As is usual in this book a really

interesting account is given. A wide range of plants from several countries are featured, including orchids (a self-confessed favourite of the author and for good reason due to their diversity), mistletoes, dodders (*Cuscuta* species), and the gigantic corpse flower (*Rafflesia arnoldii*) of Sumatra and Borneo. The author points out that angiosperms (flowering plants) such as these "have truly cornered the market on parasitism", then discusses non-vascular plants that parasitise fungi (*Cryptothallus* liverworts that are now placed within the genus *Aneura*) and the world's only known parasitic gymnosperm (*Parasitaxus usta* of New Caledonia, a species that is rare and lacks roots).

The final chapter, 'The Problems Plants Face' (Chapter Eight), highlights profound issues of habitat destruction and fragmentation; loss of biodiversity and genetic diversity; displacement by invasive species; plant poaching, over-collecting and illegal logging; impacts of climate change; and threats of extinction. Matt Candeias tells us that "40% of plants are at risk of extinction worldwide, and humans are to blame." Rather than ending on a completely depressing note, Matt offers some hope by devoting several pages to what we can do as individuals. Suggestions include protecting local wild spaces, volunteering with and supporting conservation organisations, planting native species rather than exotics, reducing lawn and encouraging rewilding on domestic sections, and so on. The last sentence of this chapter ends quoting American author and environmental activist Edward Abbey, "It is not enough to fight for the land; it is even more important to enjoy it. While you can. While it's still here."

This summary of the chapters only scratches the surface of a huge range of stories that are told. As well as explaining the familiar, known to most biology students for example, the author moves into the obscure and unusual. The flow within and between these chapters' works well which is essential for good storytelling and makes the science communication approachable.

The book concludes with a useful chapter-by-chapter bibliography pointing to the underpinning research papers for those who want to delve more deeply.

The off-white colour of the pages gives this book a timeless and rather classy character, even though it's slightly harder to read under dim light. The cover has a nice line drawing of an epiphytic orchid, which is apt as several stories of orchids are told. Perhaps in keeping with this aesthetic, the photographs throughout have been printed in greyscale. I feel this was a mistake, as without colour many of the photographs appear dull and the reader cannot always see what's being described. "The stunning floral display of Oswego tea acts as a beacon for hummingbirds" (p. 56) and "The bright orange stems of dodder parasitizing a wild hydrangea" (p. 220) are examples of these let-downs – the ebook does, however, use full colour illustrations. I also noticed a few small mistakes in a printed text.

Minor criticisms aside, I enjoyed the journey this book took me on. There are many interesting stories that are well-told showing the wondrous world of plants from a botanical and ecological perspective.