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

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NEW ZEALAND

PLANT OF THE MONTH, p. 3

Poa antipoda. Photo: Rowan Hindmarsh-Walls

Brief observations of vegetation following a fire on Flagstaff, Dunedin

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On Monday 16 September 2019 a fire swept through c. 30 ha of montane tussock-shrub/flaxland on the popular Pineapple Track that traverses Flagstaff (668 m) above Dunedin. Billowing smoke and flames were clearly evident from the city and it took eight helicopters and 35 firemen to contain the fire. Dampening down continued through Tuesday, and surveillance of hot spots was ongoing for several days. The Pineapple Track was closed for a week.

Evidence from sub-fossil logs suggests there was a cover of montane forest on Flagstaff until about 1300 AD. *Chionochloa rigida*-dominant tussocklands are thought to have been present since at least the mid 19th century and maintained by periodic fires (Wardle & Mark 1956). A hot spring fire in late 1976 burnt c. 100 ha. Given its close proximity to Dunedin, the area around Flagstaff has been a convenient research site for investigating the effects of fire on snow tussock, e.g. Gitay et al. (1991).

I walked through the burn site on 28 September, almost two weeks after the fire started (Fig. 1). As expected, it was a scene of blackened devastation (Figs. 2 & 3) with bare charred rocky ground punctuated by tussock and flax stumps and burnt stems of exotic broom and native shrubs.

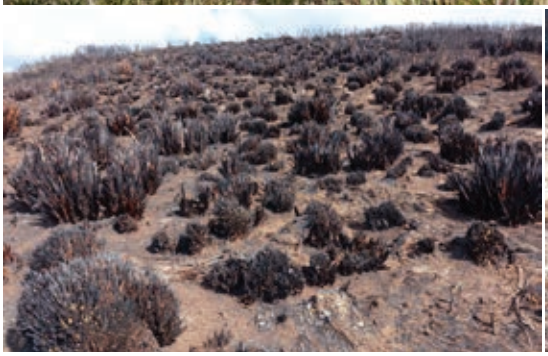

Figure 1 (top). View east towards Dunedin over south-facing burnt slopes, September 2019.
Figure 2 (above left). A bare charred tussock-flax-shrubland, September 2019.
Figure 3 (above right). Burnt flax, September 2019.

I returned to the burn site on 25 April 2020, some seven months or one growing season later (Fig 4). Mountain flax or whaririki (*Phormium cookianum*) has universally survived and vigorous regrowth was clear (Fig 5). Some snow tussocks have perished but the majority have survived, as evidenced by modest new tiller growth. Near the lower altitude margins of the burn some native shrubs, especially *Olearia arborescens*, have resprouted extensively from their bases (Fig 6).

Figure 4 (top). View east towards Dunedin over south-facing burnt slopes, April 2020.
Figure 5 (above left). Recovering flax, April 2020.
Figure 6 (above right). Tussock hawkweed with basal resprout of *Olearia arborescens* behind, April 2020.

Much of the previously burnt bare ground has been colonised by a range of native and exotic plants. Common native species include mountain astelia (*Astelia nervosa*), prickly shield fern (*Polystichum vestitum*), mountain kiokio (*Blechnum montanum*), and alpine clubmoss (*Lycopodium fastigiatum*). Common exotics include a range of pasture grasses, especially browntop (*Agrostis capillaris*) and sweet vernal (*Anthoxanthum odoratum*), catsear (*Hypochaeris radicata*), tussock hawkweed (*Hieracium lepidulum*), and swathes of seedling exotic broom (*Cytisus scoparius*) and gorse (*Ulex europaeus*). Burnt tussock stumps in particular seem to be favoured establishment sites for wild broom seedlings.

There are encouraging signs of recovery of native species, including some structural dominants, and it seems inevitable that the vegetation will rapidly transition towards its pre-burn state. That vegetation, without intervention, is likely to include a significant and increasing component of woody weeds such as exotic broom and gorse.

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PLANT OF THE MONTH – *POA ANTIPODA*

Rowan Hindmarsh-Walls

The plant of the month for May is the sub-antarctic grass, *Poa antipoda,* one of about seven species of native *Poa* found in the New Zealand sub-antarctic region. The species is found on Auckland, Campbell and Antipodes Islands, as well as Herekopere Island off Rakiura.

Poa antipoda, Falla Peninsula, Auckland Island, January 2020; (left) growth habit, (right) inflorescence.

Poa antipoda typically occurs on cliffs and rocky outcrops, both on the coast and inland. It prefers damp places, often within the dripline at the bottom of bluffs. The species is moderate in size and bright yellow-green with soft, flat leaves. The flowering culms are usually open, with 3–4 flowered spikelets that are green with pinkish-red tips. Like other *Poa* species, *Poa antipoda* has soft membranous ligules.

This species is somewhat similar to a few of the other sub-antarctic *Poa*, namely *P. foliosa, P. ramosissima* and *P. tennantiana*. *P. foliosa* differs from *P. antipoda* by being more robust and much larger in size (up to 1.5 m compared to 20–60cm). *P. ramosissima* has lacerate ligules while P. antipoda has entire ligules and *P. tennantiana* has plants that are stout and stiff-leaved, unlike the soft drooping leaves of *Poa antipoda*.

Poa antipoda is endemic to the New Zealand region and has a threat ranking of "At Risk – Naturally Uncommon" due to its restricted distribution in the New Zealand sub-antarctic region. On some of the sub-antarctic islands, the species is possibly threatened by competition with exotic grass and herb species. On Auckland Island, seed predation by mice is a potential factor limiting its spread.

The name *Poa* is the Greek word for meadow-grass or fodder. The species epithet *antipoda* means Antipodean, of the Antipodes Islands.

You can view the NZPCN website factsheets for *Poa antipoda* at:
https://www.nzpcn.org.nz/flora/species/poa-antipoda/

Lockdown musings on scurvy grass (*Lepidium oleraceum*)

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In the dim dark days when we still had Standards and Forms in New Zealand schools, my Standard 4 class studied Captain James Cook (1728–1779) and aspects of his 'discovery' of Aotearoa / New Zealand. My memory of the lessons, some 43 years later is of course vague but I do recollect in the school journal a lithograph of a plant called 'Cook's scurvy grass'. Fledgling botanist that I was then this intrigued me. After all, the illustration of the plant so named looked more like a herb than a grass to me. I wanted to know more about it of course but all I gleaned from the journal story was that Cook instructed his crew to harvest lots of it, which he then fed, willingly or not, to them, so saving them from scurvy.

Further reading later deduced that 'Cook's scurvy grass' was not a grass at all but rather a kind of cress in the genus *Lepidium*, *L. oleraceum*, allied to the cress plant *Lepidium sativum* which we used to grow with mustard (*Sinapsis arvensis*) and then use as a sandwich filling. Cook it transpired used the vernacular 'scurvy grass' because in his childhood he and his father went out foraging for 'scurvy grasses to supplement the family's diet. While they had a broad definition of 'scurvy grass' then, the name was mostly applied, as it still is, to species in the brassicaceous genus *Cochlearia* (Fig. 1). As for me, I pretty much forgot all about scurvy grass until 1981, when wandering through a book shop in Wellington, I found a lovely book called 'Rare and Endangered Plants of New Zealand' that had just come out for sale. That book was written by the late David Given (1943–2005), and in it there was a colour picture of 'Cook's scurvy grass'. Given (1981) noted that the plant was endangered with extinction, repeated the tale about Cook using it to cure scurvy, and then offered some reasons for its demise. Like the school journal before, Given repeated the story that *Lepidium oleraceum* was once really common throughout New Zealand; common enough that Cook's crew could collect whole boat loads of it to make into scrumptious, life-saving, salads.

Figure 1. One of the European scurvy grasses, *Cochlearia officinalis*, seen here at Friesetraatweg, Groningen, Netherlands. Species of *Cochlearia* were (and still are) eaten by Europeans as a salad herb. Photo: A. Hospr.

My first hands-on experience of *Lepidium oleraceum* came by accident in 1985 whilst engaged in a second year University of Waikato Earth Science undergraduate paper that required field work whilst based at Port Waikato. One exercise involved mapping a coastal exposure at Ngatutura Point. Ngatutura is located c.24 km south of Port Waikato, near the Kaawa River mouth on the rugged western Waikato coastline. There, whilst struggling up and down the cliff faces, sketching, sampling rocks and taking strike and dips I was amazed to find some Cook's scurvy grass. That plant grew near the top of the point in coastal turf, close to a towering near shore stack known as 'Shag Rock', on account of a spotted shag (*Phalacrocorax punctatus*) colony that bred there. Binoculars soon confirmed that the plant I found was probably derived from Shag Rock, where I could see many more growing in crevices below and around the shag nests. I have since had the joy of seeing this plant and its close allies wild in an array of places spanning from Dayrell Island in the Kermadecs to Otago Peninsula and the Chatham Islands.

At the time Given (1981) wrote about it, *Lepidium oleraceum* was a name applied in a very broad sense. Indeed, almost from the time it was first described by Anders Sparrman (1780) the species was known

to be 'variable' resulting in attempts to segregate that variation into taxonomic units. Pioneer botanist Thomas Kirk (1828–1898) for example, described two varieties *Lepidium oleraceum* var. *acutidentatum* Kirk, and var. *frondosum* Kirk (Kirk 1899), and Albert Thellung (1881–1928) recognised another, var. *serrulatum* Thell. (Thellung 1906). However, by the time Harry Allan (1882–1957) assessed the situation the application of these names had become confused (Allan 1961), in part because the species was already in such serious decline that Given (1981) pessimistically attested that resolution of these names based on what was left in the wild was likely now impossible. However, critical study of *Lepidium oleraceum* throughout its range, supplemented with DNA based phylogenetic analyses and patient study of the type specimens scattered around the world has resulted in a new interpretation of the species (de Lange et al. 2013). That monograph redefined *Lepidium oleraceum*, to encompass those plants with glabrous (hairless) stems, persistent, toothed, stem leaves, glabrous pedicels, flowers with four stamens and by the acute silicles which lack a marginal wing (de Lange et al. 2013) (Fig. 2A–F). Plants matching these characters are known from the Kermadec Islands, North Island, northern South Island and Chatham Islands. In the same treatment other plants that had been referred to *L. oleraceum* were split into a further 10 species: *L. aegrum* Heenan et de Lange, *L. castellanum* de Lange et Heenan, *L. crassum* Heenan et de Lange, *L. juvencum* Heenan et de Lange, *L. limenophylax* de Lange, B.D.Rance et D.A.Norton, *L. oblitum* Houliston, Heenan et de Lange, *L. oligodontum* de Lange et Heenan, *L. panniforme* de Lange et Heenan, *L. rekohuense* de Lange et Heenan and *L. seditiosum* de Lange, Heenan et J.Rolfe (see de Lange et al. 2013).

Figure 2. *Lepidium oleraceum* in cultivation, Mt Albert, Auckland, showing diagnostic characters of this species: (A) Foliage, (B) Flowering plant, (C) close up of foliage, flowers and immature fruits, (D) flowers showing the four stamens that help distinguish *L. oleraceum* from other allied species in New Zealand, (E) mature and immature silicles – note the lack of a marginal wing to the silicles, the acute silicle apex and lack of any notching, and (F) mature silicle and glabrous pedicel. Photos: P.J. de Lange.

Taxonomy aside though, that research also uncovered a wealth of information and misinformation about 'Cook's scurvy grass'.

The first of these, that still needs further research, is the vexed question of whether Māori cultivated *Lepidium* species. Long before the moniker 'Cook's scurvy grass' was ever coined iwi knew *Lepidium oleraceum* and its allies by the name 'nāu'. This name is potentially significant, after all it is not unique to New Zealand; it is used for example by Cook Islanders for the superficially similar *Lepidium bidentatum* Montin (Fig. 3A, B), and the name and variants of it appear throughout Polynesia for that species and other allied *lepidia*. Discussions with the late Art Whistler (1944–2020) in 2010 helped confirm what I had long suspected, that *Lepidium bidentatum* was not used solely as a vegetable by Cook Islanders but rather that it was generically used throughout Polynesia, notably in Samoa and Tonga and the Society Islands. It should therefore be no surprise that *Lepidium oleraceum* was bequeathed the same name by those voyagers destined to become Māori. Now while I have never found convincing proof that Māori deliberately grew it, comments about its abundance near Māori settlement made by the Forster's (Forster 1777; Hoare 1982) and observations by Joseph Banks, Daniel Solander who first collected it in New Zealand, and Captain James Cook suggest that iwi certainly ate it (Beaglehole 1962a, b; 1967, 1968) and that they probably did cultivate it. In a modern sense I have always felt that the widespread usage by Māori of watercress (*Nasturtium microphyllum* and *N. officinale*) as a salad green and vegetable reflects past mātauranga reflecting the historical usage of nāu and perhaps also *Rorippa divaricata*. This needs further study.

Figure 3. *Lepidium bidentatum* (in this case var. *owaihiense*) as seen on Maui in the Hawaiian Island group. This close relative of *Lepidium oleraceum* was once wide ranging across the eastern Pacific where it was well known to many Polynesian islanders as a vegetable and medicine. Photos: F. & K. Starr).

The second issue, which David Norton and I revisited in 1996, is whether folklore that Cook collected 'boatloads' of *Lepidium oleraceum* for use as a salad green to save his crew from scurvy is fact or fiction (de Lange & Norton 1996). If you remember, as a 10 year-old I learned that Cook instructed his crew to collect scurvy grass, which they found in sufficient quantities to collect in 'boat loads' to sustain his hungry crew during their exploration of New Zealand. This story is widely accepted as fact (see for example Moore & Irwin 1978), and has been used by such authorities as Thomas Kirk,

Thomas Cheeseman, Lucy Moore and David Given as evidence that the formerly abundant *Lepidium oleraceum* had suffered a catastrophic decline that started soon after Europeans began to settle the country (Cheeseman 1914; Kirk 1899, Given 1981; Oliver 1925; Richards 1956; Moore & Irwin 1978; Wilson 1982; Wilson & Given 1989).

That *Lepidium oleraceum* was once more abundant than it is now is evident from past accounts by early voyagers, naturalists and resident botanists. However, critical assessment of the primary literature, namely the journals of Captain Cook, Joseph Banks and the Forsters does not support the notion that they were able to collect boat loads of *Lepidium oleraceum* (de Lange & Norton 1996). What they did collect is a suite of edible coastal herbs, including *Apium prostratum*, *Cardamine* spp., *Oxybasis ambigua*, *Salicornia quinqueflora*, *Tetragonia implexicoma*, *T. tetragonoides*, and the brassicaceous herbs *Lepidium flexicaule*, *L. oleraceum*, *Rorippa divaricata* and *R. palustre* (de Lange & Norton 1996; Norton et al. 1997; P.J. de Lange unpubl. data). The only place those early accounts noted *Lepidium oleraceum* as abundant was Queen Charlotte Sound where it was considered common on a few islands, notably Long Island (interestingly the Sounds remain a stronghold for *Lepidium oleraceum*). What seems clear is that Cook instructed his scientific officers and naturalists to look for edible plants, and once these became known to the crew, they were widely collected as a dietary supplement.

Of these, the one plant the crew preferred to eat however, was *Lepidium oleraceum*. Consider the comments of Anderson, a surgeon on Cook's third voyage, '*Of other plants which were useful to us may be reckon'd wild celery which grows plentifully almost in every cove, especially if the natives have ever resided there before, and one which we us'd to call scurvy grass though entirely different from the plant we gave the name to. It however is far preferable to it for common use and may be known by its jagged leaves and small clusters of white flowers on the top*' (Beaglehole 1967: 804).

Anderson's remarks are not only an apt description of *Lepidium oleraceum*, this is also the first time that the vernacular scurvy grass is directly associated with that species. However, the first usage of 'Cook's scurvy grass' seems to have come much later, about the time of Kirk (1899). So the widespread belief that Cook's scurvy grass was once so common it could be collected by the boat load really has no basis, rather it was one of a number of plants used by Cook and his crew and over time the broad concept of 'scurvy grass' was narrowed to *Lepidium oleraceum* which eventually became *the* 'Cook's scurvy grass'.

Lastly there is the matter of the decline of *Lepidium oleraceum* itself. What caused it? We do know that the New Zealand archipelago was once dominated by seabirds (Fig. 4), and these birds played a critical role in bringing nutrient from the sea to the land. This system, dubbed the 'ornithocoprophilous ecosystem' (work that one out) by Bob (Robert) Ornduff (1932–2000) (Ornduff 1965; Norton et al. 1997) received scant attention by New Zealand ecologists until the late 1980s, when it was 'rediscovered' (Ogle 1987). For our early understanding of the system we owe much to the pioneering work of Leonard Cockayne (1855–1934) who described the vegetation patterns of many predator free seabird islands but especially to Mary Gillham (1921–2013) who had a particular interest in these associations, and who in a series of landmark papers (Gillham 1956, 1960a, b, 1961), some prepared whilst on study leave from the United Kingdom in New Zealand, documented the distinct vegetation associations found on the so called 'sea bird islands' off our shoreline. Her work and that of Bob Ornduff noted a distinct correlation between particular plants and seabird nesting sites. Some species they reasoned

Figure 4. Adult masked boobies (*Sula dactylatra tasmani*) roosting on North Chanter, Herald Islets, northern Kermadec Islands group. These birds and others that nest and roost on this island are part of an intact and functional ornithocoprophilous ecosystem, that was once widespread throughout the adjacent New Zealand Archipelago. Photo: P.J. de Lange.

were utterly dependent on sea birds to maintain their habitat and perhaps for their growth and persistence. One of those plants was *Lepidium oleraceum* sens. lat.

Norton et al. (1997) reasoned that, following the colonisation of the New Zealand archipelago by humanity, the subsequent spread of introduced mammalian predators resulted in range contractions and local extirpations of the vegetation associated with seabirds. They concluded that this contraction meant that plants such as *Lepidium oleraceum* were already in decline by the time they were rediscovered and formally described by European botanists. However, they also reasoned that in those places where the ornithocoprophilous ecosystem remained intact the vegetation associated with that system would persist. What they noted was that in such places while this was true there continued to be local extirpation of key species such as *Lepidium oleraceum* sens. lat. So seabird decline whilst a factor was not the sole reason for the decline.

Kirk (1891) and Cheeseman (1914, 1925) attributed declines to direct browse pressure by sheep (*Ovis aries*) and cattle (*Bos taurus taurus*), Norton et al. (1997) suggested that rats (*Rattus* spp.) also have impacted the species through the direct browse of plants (indirectly rats are a key factor in that they contributed to the decline of seabirds). It is also evident that possum (*Trichosurus vulpecula*) are now a factor impacting members of the *Lepidium oleraceum* group throughout accessible sites in the North and South Islands and on Rekohu (Chatham Island). Esler (1975) and Given (1981) amongst others attributed an acceleration of decline to the accidental introduction of cabbage white butterflies (*Pieris rapae*) to New Zealand, it is thought, over the summer of 1929–1930 (it was officially recognised here in 1930 from specimens collected from Napier). As anyone who has grown *Lepidium oleraceum* will appreciate, cabbage white butterflies are a real pest (Fig. 5.) but there are others. For example, Ogle (1987) noted the impact of cabbage aphid (*Brevicoryne brassicae*) and diamond backed moth (*Plutella maculipennis*) as well as a host of other introduced invertebrates. It cannot be doubted that these introductions have contributed and continue to contribute to further losses.

Figure 5. Cabbage white butterfly caterpillar (*Pieris rapae*) on *Lepidium oleraceum*. Photo C.C. Ogle.

The conclusion reached by Norton et al. (1997) was that to retain *Lepidium oleraceum* populations it is critical to retain seabird breeding grounds. They reasoned, in line with the thinking of others such as Mary Gillham, that seabirds and seals contributed both nutrients and disturbance, so keeping sites open. Recently Dale et al. (2017) explored whether seabirds were essential to facilitate seed germination in *Lepidium*, discovering that seed germination was not promoted by seabird guano but that the seeds are probably dispersed by seabirds. They discovered that wetted seed releases a mucilage which enables seed to adhere to surfaces for over 24 months. That discovery may explain how *Lepidium oleraceum* in particular has such a wide geographic spread. It also shows that the overly simplistic assumptions of the importance of the nutrients left by seabirds and seals in promoting seed germination, growth and population resilience need further research. Nevertheless, as anyone who has tried growing *Lepidium oleraceum* will appreciate, plants flourish with regular applications of Nitrogen, Phosphorus fertilisers, and some gardeners use such fertilisers as a way to control the damaging effects of 'white rust' (*Albugo*) (Fig. 6A, B), noting that well fed plants seem to 'out-grow' the disease. The same logic has been employed by the Department of Conservation with managing *Lepidium banksii* and *L. rekohuense*, whereby plants are routinely 'over fertilised' to help them thrive in the wild (P.J. de Lange unpubl. data).

So what is the deal with *Albugo*? That organism has over the last 20 years become a major concern when managing *Lepidium* populations (Norton & de Lange 1999). *Albugo* is actually not a rust at all rather it is an oomycete, so more closely related to *Phytophthora* for example, nevertheless it is widely

Figure 6. *Albugo candida* infecting (A) shepherd's purse (*Capsella bursa-pastoris*) (Te One, Rekohu / Wharekauri / Chatham Island) and (B) rocket (*Eruca sativa* subsp. *vesicaria*) (Mt Albert, Auckland). Photos: P.J. de Lange.

known as 'white rust' on account of the white pustules it produces during its reproductive stage. *Albugo* is now widely acknowledged as a serious threat to New Zealand indigenous Brassicaceae, and, in particular *Lepidium* (Norton et al. 1997; de Lange et al. 2013). *Albugo* is most evident when the white pustules appear but it has been discovered that it commonly occurs as asymptomatic infections with one study noting it present in a range of apparently healthy *Lepidium oleraceum* plants spanning that species range (Armstrong 2007). *Albugo* pustules may appear all over an afflicted plant, however, they are most commonly seen on young foliage and inflorescences (including flower buds, flowers) and developing fruits (Fig. 7), thus reducing the host plants ability to thrive and reproduce. Death from severe *Albugo* infection has been reported in wild populations of *Lepidium banksii*, *L. oligodontum* and *L. panniforme* (de Lange et al. 2013). Despite a range of treatments, none used to date can truly be said to be effective, and some, such as the use of the fungicide Ridomil Gold® that is used in the treatment of some oomycete diseases, while slowing the visible pustule stages of *Albugo* are not in the long-term environmentally suitable for use in natural habitats. Worryingly, reports of *Albugo* attacking New Zealand indigenous Brassicaceae have increased in the last three years, with some seriously threatened species such as the South Island salt pan endemic *Lepidium kirkii* Petrie, and dioecious *L. sisymbrioides* Hook.f. and *L. solandri* Kirk now possibly in terminal decline because of this disease. Until recently the *Albugo* afflicting our indigenous *Lepidium* was assumed to be *A. candida* (Pers. ex J.F.Gmel.) Kuntze. This follows on from the only comprehensive study of the genus in New Zealand undertaken, that by Baker (1955). In that paper she treated what we now call *A. candida* as *A. cruciferarum* S.F.Gray, and considered it introduced on the basis that it was first recorded from New Zealand by William Colenso in 1886. To counter this view though is the fact that few people were at that time actively collecting these sorts of organisms, so it may have been here longer, possibly naturally so. There have even been some doubts raised as to

Figure 7. *Lepidium oligodontum* plant severely infected by *Albugo* (Moriori Creek, southern tablelands, Rekohu / Wharekauri / Chatham Island). Photo: P.J. de Lange.

whether the *Albugo* reported from New Zealand is actually A. candida; judging by its presence throughout the range of New Zealand's indigenous *lepidia*, and the life cycle of some species such as *L. oligodontum* that seem to 'fit around' the impact of this disease (de Lange et al. 2013). As such a revisit into the taxonomy of *Albugo* here has long been desired.

Recently, Dr Jerry Cooper of Landcare Research has been investigating those infections attributed to *Albugo candida*, notably in the South Island inland dioecious *lepidia*, *L. sisymbrioides* and *L. solandri*. Using DNA, Cooper has discovered that the *Albugo* infecting these two species is not *A. candida* but *A. lepidii* A.N.S.Rao (Fig. 8), and as a result of that discovery Jerry expanded his research to cover Chatham Islands *lepidia,* including *L. oleraceum,* finding the same *Albugo* species was involved (see for example, https://inaturalist.nz/observations/24541077). Jerry also found that *Albugo candida* is in New Zealand but that it attacks other exotic Brassicaceae. It would seem that *Albugo lepidii* is also introduced. Hopefully this knowledge may enable better management of the disease in the wild.

Figure 8. *Albugo lepidii* pustules on the rosette leaf of *Lepidium oligodontum* (Point Somes, Waitangi West, Rekohu / Wharekauri / Chatham Island). Photo: P.J. de Lange.

So returning to the original question of what caused / is causing the decline of *Lepidium oleraceum* in New Zealand? The answer is linked to the historical collapse of the ornithocoprophilous ecosystem, resulting in population fragmentation and loss of functionality, followed by a steady increase of pressures on remnant populations from introduced predators, weeds and diseases. None of these are easily resolved but the good news is people are trying and in the case of some species, such as *Lepidium banksii* and *L. rekohuense*, they are so far staving off extinction.

Acknowledgements

When I started writing this article I received the tragic news that the ongoing COVID-19 outbreak had caused the death of Art Whistler (1944–2020) whom I had assisted with reviews of his threatened plant surveys of Samoa, and in turn had learned so much of the ethnobotany of the Polynesian peoples (Art's life-long research passion). Art was convinced that Polynesians used and probably grew *Lepidium bidentatum*, and fascinated about the etymological connections between the names nāu, n'au and k'ao used for coastal *lepidia* in the eastern Pacific. I do hope people reading this are stimulated to make a study of the subject. As for me, I have been fascinated by tales of Cook's scurvy grass since I was 10, and over the many years since then I have had the pleasure of working with a raft of people on this fascinating plant and its allies. In particular, I would like to acknowledge the late David Given and Bob Ornduff for sharing their wisdom and interest in the plant and the ecosystem it inhabits. I thank also David Norton of the School of Forestry, University of Canterbury, with whom I worked in the 1990s, especially on New Zealand *Lepidium* and Jerry Cooper for taking a fresh interest in *Albugo* and sorting out a little of the mess that awaits anyone dealing with that difficult genus. Thanks also to Peter Heenan, Gary Houliston and Jeremy Rolfe for their help with the taxonomic revision of the complex. While it would seem we are a long way off halting the decline of these amazing plants, there is still hope this can be achieved.

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Funds available for possum control

The New Zealand Plant Conservation Network has the sum of $1,500.00 available for a possum control project within New Zealand. This has arisen from a self-imposed Possum Tax levy on members of the Australasian Systematic Botany Society (ASBS) during their attendance at the 2019 Joint ASBS-NZPCN Conference in Wellington. The NZPCN has matched the amount raised by their Australian counterparts and is now making these funds available for a suitable project within New Zealand.

The only criteria for applications for this funding are that the project must entail possum control and it should ideally involve a threatened native plant species. Applications are now invited and should be sent via email to info@nzpcn.org.nz. Final deadline for submission of applications is Tuesday 30 June 2020.

The successful application will be published in an upcoming issue of *Trilepidea* and a post-project story will be published at a later date.

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

The NZ Native Forest Restoration Trust

Even as the NZ Native Forest Restoration Trust were negotiating the purchase of Otatara sand dune totara forest mentioned in last month's Trilepidea, members of the Rotorua Botanical Society were suggesting to Bay of Plenty Regional Council staff that they should ask the Trust for help to save a 14 hectare sand dune kanuka forest at Thornton Beach west of Whakatane. Not just any patch of kānuka, 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."

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.

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 decide to buy. We hope you too can see the future with the weird and wonderful *Kunzea toelkenii* lining the beachfront at Thornton.

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 09 813 0229 or 021 764 967.

UPCOMING EVENTS

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

Please Note: It is strongly recommended that you contact your local Botanical Society to confirm whether the advertised meetings and field trips are proceeding as originally planned or whether there are meetings or field trips happening that are not advertised. The New Zealand Plant Conservation Network accepts no responsibility for changes to the published details.

Auckland Botanical Society

Meetings and Field Trips: Cancelled until further notice.	

Rotorua Botanical Society

Field Trip: Saturday 6 June to Matata sand dunes and coastal lagoon. **Meet:** 8.00am at the Rotorua carpark or 9.00am at the Matata campground carpark. **Grade:** Easy.	**Leader:** Sarah Beadel, email sarah.beadel@wildlands.co.nz, ph. 021 924 476.
Meeting: Monday 15 June at 6.00pm – AGM, followed by guest speaker. Wine, juice, cheese and nibbles will be provided.	**Venue:** To be advised.

Wellington Botanical Society

Field Trips: Saturday 6 June. Postponed to 3 October.	
Meeting: Monday 22 June (by Zoom only at this stage) – Speaker Mark Alpine and others from the Greater Wellington Regional Council. **Topic:** what's happening in weed bio-control in the Wellington region.	**Venue (if meeting in person):** Lecture Theatre M101, ground floor Murphy Building, west side of Kelburn Parade.

Nelson Botanical Society

Field Trips: Cancelled until further notice.	

Canterbury Botanical Society

Meetings: By Zoom or similar only at this stage.	
Field Trips: Cancelled until further notice.	

Botanical Society of Otago

Field Trips: Cancelled until further notice.	
Meeting: Wednesday 10 June at 5.20pm – Speaker Dr Allison Knight. Topic: Sexy Lichens.	**Venue:** Room 215, 2nd Floor, Zoology Benham Building, 346 Great King Street.