Cololejeunea hodgsoniae – an obligate muscicolous microepiphyll?

Matt A. M. Renner

Cololejeunea hodgsoniae is rather small, even for a liverwort. The shoots are approximately 250 μm wide and up to a millimetre or two long, at the most. Not many liverworts are this small. It is characterised by its acute leaf tips, papillae on the upper surfaces of the leaves, and lobules that are usually dimorphic, uncompressed 5-carinate perianths, and like all *Cololejeunea*, complete absence of under-leaves. This combination of characters means confusion with any other NZ species is near impossible.

Its size makes detection in the field somewhat problematic, so not surprisingly this species has rarely been collected specifically. More commonly it is encountered in the laboratory as an incidental amongst more obvious hepatics collected in the field. I have only observed it *in situ* once, growing fairly abundantly over *Radula marginata* on rocks in the stream between tracks 8 and 9, on the northern side of Little Barrier. In this case, I was searching for sporophytes on the *Radula,* so had my nose fairly close to the rock. Even this observation can be considered a little accidental.

During my habitual (everyone has their addictions) inspection of freshly collected and herbarium material of *Radula*, I have turned up *C. hodgsoniae* on a number of occasions. Interestingly it was also present in 50% of the specimens of *R. marginata* collected from Waipoua to South Westland loaned from Field, Herbarium.

As regards habitat, I have only ever observed this plant growing as an epiphyll on the leaves (rarely on the perianths) of *R. marginata,* and less commonly, on the leaves of *R. silvosa.* These two species often frequent hyper-humid streamside habitats, and it is here *C. hodgsoniae* grows. *Cololejeunea hodgsoniae* is almost without exception fertile. The fact that this species can complete its whole lifecycle upon a single leaf, or perianth of *Radula marginata*, is not surprising, perianths at least last little more than a year on most species before being overgrown by other shoots.

Try it for yourself - behold any sizeable patch of *R. marginata* growing on rocks in a streambed or on streamside banks, and those paler green specks will be *C. hodgsoniae*, promise.

Observations on karaka (*Corynocarpus laevigatus*) and its fruit

Graeme Platt

Terraced hill tops and promontories are to be regularly encountered at scattered locations around New Zealand, providing convincing evidence of historic, fortified military compounds and the country's totally dysfunctional early history. Today these defensive fortifications are referred to as "pa sites".

What is interesting about pa sites is the relict vegetation remaining in place around some of them. Two species stand out in particular – cabbage trees (*Cordyline australis*) and karaka (*Corynocarpus laevigatus*) – both known to be have been utilised by Maori as a source of food. Sadly, commencing in the first quarter of 1983 many of the cabbage trees have progressively died, all but eliminating them as a distinctive feature at many of these sites. On the other hand karaka trees remain evident at many pa sites, particularly those in and around Taranaki. There is very conclusive evidence that some of these trees were selected by Maori for their superior fruiting qualities.

When selecting superior lines of fruiting trees there is a combination of factors to be considered, such as disease resistance, size of fruit, volume of crop, fruit quality, flavour, and keeping qualities amongst others. Using only one of these factors - size of fruit - I have spent a considerable amount of time during my wanderings looking at karaka trees both at confirmed pa sites and those in natural stands, taking into account that it would be a very brave or foolish person to claim any particular grove of karaka trees was completely natural. Karaka is a species of climax broadleaved forest and its three most common companions are puriri (*Vitex lucens*), taraire (*Beilschmiedia tarairi*) and kohekohe *(Dysoxylum spectabile*). At locations where these four species coexist in mixed groves it is reasonable to assume the trees are natural.

It is evident that trees producing fruit of superior size were selected for planting around some pa sites. The size of fruit proved to be consistently larger on trees growing at pa sites then those located in natural forest. I never found a hint of any evidence suggesting karaka trees were ever clonally propagated. Superior trees were most probably transplanted as seedlings that had germinated naturally under large-fruited trees or were directly sown as large seeds themselves.

While it would be very easy to cook the books using my crude sampling methods, the fact remains that the largest karaka fruit I have ever seen was from a pa site, and consistently the smallest were from natural

stands well away from pa sites or camping grounds. Some shady groves of large-seeded karaka trees on the coastline growing beside streams are almost certainly groves planted by Maori. After visiting enough of these groves you can feel it in the air as the requirements for a good campsite 250 years ago are exactly the same as they are today.

The toxicity or otherwise of karaka seed is also a matter of ongoing interest. The ripe fleshy fruit surrounding the large central seed is definitely not poisonous. As children we used to enthusiastically eat these fruit with exaggerated relish in front of anyone who had the temerity to warn us they were poisonous. Grownups have a very narrow view on what is good for children.

Subsequently I was advised by a research worker that ground-up karaka seeds had been fed to both rats and pigeons, neither of which displayed any ill effects. Rats certainly eat the seeds in very large numbers, often storing them in food caches for the winter leaving behind many empty seed cases by the spring.

During the flowering period I have seen quantities of stupefied bees crawling about on the ground under karaka trees indicating the presence of either a toxin or a narcotic in the nectar. Possums strip the flesh off the fruit and leave the cleaned seeds both hanging on the trees and lying all over the ground.

Some years ago when I was visiting Brent and Barbara Jury in north Taranaki I noticed their sheep eating whole karaka fruit as they fell from the trees. Barbara advised me the sheep ate the entire crop. I collected a bucket of fruit from another tree growing outside of the sheep compound and emptied the bucket of fruit into a pile inside the pen and watched two or three sheep eat the lot. Next morning the sheep were back for more showing no apparent ill effects whatsoever. On subsequent occasions I have observed sheep eating whole seeds in Cornwall Park, Auckland.

Karaka on One Tree Hill, Auckland.

Karaka seeds have been proven to contain a toxic alkaloid known as karakin and fresh seed certainly have a slightly acrid bitter taste indicating the presence of such an alkaloid. The question is not whether karakin exists or not, but just how toxic is it? I have not been able to find any convincing direct evidence as to whether karaka seeds are toxic or otherwise. They are eaten by native wood pigeons, rats and sheep in very large numbers.

Maori steamed the seed in an umu for three hours and then steeped the seed in running water ostensibly to remove any residual heat modified toxin. I

remember locating one reference defining the steeping period as being one week. Freshly steamed karaka seed steeped in running creek water would be a stinking putrid mess long before a week was up. Reports of Maori being poisoned as a result of eating karaka seeds should be taken very seriously, however, as some of the most toxic compounds known to science are produced by fungi often found infecting improperly stored seeds, grains and nuts.

As karaka seed have enormous potential for development as a food crop this whole issue needs to be approached with an open mind and in the light of a new day. Fresh cashew nuts, almonds and apricots are three nuts that contain toxic organic compounds. The presence of toxins has not hindered their development as major commercial crops.

The tree producing the very large seeds in the photograph growing at the north Taranaki pa site was destroyed not long after I commenced taking an interest in it. Fortunately cuttings were taken and the tree is currently represented by one small tree under cultivation.

Distribution and abundance of *Pimelea tomentosa* in the Auckland Region

Ewen K. Cameron

Nationally

The endemic New Zealand shrub *Pimelea tomentosa* (Thymelaeaceae) is listed as Nationally Threatened under the category 'Declining' (de Lange *et al.* 1999). It appears to have no common or Maori name, and has been recorded from the North Island and northern South Island to nearly latitude 42º (Allan 1961). In the past it has also been recorded from the Three Kings Islands (e.g. Allan 1961), but the Three Kings entity appears to be an undescribed taxon (*pers. ob.*). *Pimelea tomentosa* occurs in coastal to lower montane shrublands and open places (Allan 1961) as an erect shrub; usually 0.3-0.5m tall, but when shaded can reach 1.5m (*pers. ob.*). It appears to be sexually perfect and self-compatible because in cultivation Peter de Lange (*pers. comm.*) found it freely produced seedlings - a feature he has not experienced with other *Pimelea* species. It is nicely illustrated by Audrey Eagle (1986: no.26) showing its white flowers and the usual dark coloured fruit.

Auckland Region

Based on specimens in the herbaria of Auckland Museum (AK, including AKU), Landcare Research (CHR), Forest Research Rotorua (NZFRI), Waikato University (WAIK) and Te Papa Museum (WELT) its distribution in the Auckland Region has been recorded from Woodhill Forest dunes (1986- present); Te Henga (1977); Remuera (1860s), Orakei (1870s), Waikowhai (1934), Purewa (1947), Murrays Bay (1959), Goat Id (Motu Hawere) (1966-1973, extinct 1996 *pers. ob.*); Waiheke Id (1895 & present), Ponui Id (1978); Little Barrier Id (1981); Great Barrier Id (1867-present). Note - the only confirmed localities in the last 20 years are Woodhill Forest (population estimated to be c.40, pers. ob.), Waiheke Island (population c.35) and Great Barrier Island (>130, see below).

Table 1. Herbarium specimens (29) literature records (2) and *pers. ob.* (1) of *Pimelea tomentosa* from the Auckland Region by Ecological Districts

Kaipara Ecological District

AK 275456 (ex AKU 19084), Woodhill, Coal Seam Hill Biological Reserve, 8 Jan 1986, *E.K. Cameron 3830* & P.J. Bellingham, single tall shaded plant.

AK 206008, Woodhill, Hodges Basin Biological Reserve, 13 Dec 1991, *E.K. Cameron 6647* & P.J. Bellingham, c.25 plants under 8m kanuka canopy.

AK 210008, Woodhill, Hodges Basin Biological Reserve, 10 Oct 1992, J. Komsars, locally common under kanuka.

Pers. ob., Woodhill, Old Lookout Biological Reserve, 15 Jul 2000, 12 plants.

Rodney Ecological District

AK 128892, [Leigh] Goat Island, 18 Dec 1966, *B.S. Parris*.

AK 216108, Leigh, Goat Island, 21 Aug 1970, *A.E. Esler*, ex. herb. Esler.

AK 129040, [Leigh] Goat Island, 3 Dec 1970, *B.S. Parris*.

AK 268995 (ex AKU 11313), near Leigh, Goat Island, 28 Jul 1973, E.K. Cameron, small shrub.

Waitakere Ecological District

AK 262297 (ex AKU 3530), Waitakerei [Waitakere], Oct 1885, *Ball*.

AK 141240, Bethells Beach [Te Henga], 6 Feb 1977, *A.E. Wright 1885*, roadside bank below native forest.