

LUCY M. CRANWELL LECTURE 2000

Lucy Cranwell and New Zealand Conifers, with an emphasis on northern species

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Introduction

Thank you for the invitation to present this year's Lucy Cranwell memorial lecture. It is indeed a great honour to present it to members and friends of the Auckland Botanical Society which she founded in 1937, especially in this, the year of her death, aged 92. The venue is also appropriate, namely, the Auckland War Memorial Museum wherein she worked with such distinction and enthusiasm from 1929. The Museum duly recognised her distinguished career by bestowing an Honorary Life Membership to her in 1964, and a Fellowship in 1999 (Cameron 2000).

I did not know Lucy Cranwell (Fig. 1) personally, but I spoke to her by telephone in connection with her revised edition of the *Botany of Auckland*, probably her last major publication as a sole author (Cranwell 1981). This conversation was prompted by my late colleague Lucy Moore (Fig. 2), whose early botanical career was inextricably interwoven with that of Lucy Cranwell from their student days at Auckland University College. After graduation, the "two Lucys", so dubbed by their mentor, the eminent New Zealand botanist Leonard Cockayne, collaborated in rigorous fieldwork (Fig. 3) resulting in joint botanical papers notable for their thoroughness and attention to detail (e.g., Cranwell & Moore 1931, 1935, 1936; Moore & Cranwell 1934). The distinguished careers of these two renowned botanists, Cranwell and Moore, have been highlighted by



Fig. 3: Lucy Cranwell (left) and Lucy Moore coming down the Ohau River, Tararua Range, 3 January 1933.
Photo: Victor Zotov.

Cameron (2000) and Godley (1987), respectively.

In what follows, which is an abridged version of my oral presentation, I propose to focus on the "two Lucys" treatment of some northern conifers in recognition of their early partnership. One of their favourite places to study was Moehau (also known as Te Moehau) at the northernmost extremity of the Coromandel Peninsula (Fig. 4). Between 1929 and 1934, they ascended Moehau together ten times for a total of some 20 days, with additional visits of one day's duration by Lucy Moore in 1939, and Lucy Moore and Alan Esler in 1971 (Moore 1973).

I was privileged to visit Moehau on 28 February 1986, ascending from the

Colville side with my companion, the late John Johns, photographer to the New Zealand Forest Service. Coincidentally, whilst on the summit of Moehau that day, we were greeted by two young trampers who had ascended from the Port Charles side, one of whom claimed to be a niece of Lucy Moore! Perhaps Lucy had sent her along to keep an eye on us?

The Conifers of Moehau – Earlier References

Apparently the first botanist to ascend Moehau was James Adams, who reported his findings to the Auckland Institute on 22 August 1888 (Adams 1889). Before ascending the summit, he recorded the presence of miro *Podocarpus ferrugineus* (now known as *Prumnopitys ferruginea*), rimu *Dacrydium cupressinum* and kauri *Agathis australis* - "on the lower ground". On the summit of Moehau he recorded *Dacrydium bidwillii* (now *Halocarpus bidwillii*), *Phyllocladus glaucus* (now *Phyllocladus toatoa*), *P. alpinus*, *P. trichomanoides* and *Podocarpus nivalis*. A surprising omission is kaikawaka *Libocedrus bidwillii*, which is plentiful on Moehau. I could find no reference in his paper to silver pine *Dacrydium colensoi* (now *Manoao colensoi*, as claimed by Moore (1973), who may have misinterpreted his reference to *Dacrydium bidwillii*).

In their paper on the induced dominance of the bush ricegrass *Microlaena avenacea* on Moehau, Moore & Cranwell (1934) make brief reference to *Dacrydium*

cupressinum, *Agathis australis*, *Phyllocladus glaucus*, *Podocarpus ferrugineus* and *P. hallii* in the forest associations discussed. In a later paper on high altitude kauri on Moehau, Cranwell & Moore (1936) refer to *Dacrydium cupressinum*, *Agathis australis*, *Podocarpus ferrugineus*, *P. hallii* and *Libocedrus bidwillii* in their treatment of the synecology of the various forest associations. And in her seminal paper on the pollen grains of New Zealand conifers, Cranwell (1941) cites the following species from Moehau: *Phyllocladus alpinus* – “abundant in montane forest and scrub from Te Moehau Summit (less than 3,000 ft) South”; *Dacrydium cupressinum* – “ascending higher on Te Moehau”; *Dacrydium bidwillii* – “from summit of Moehau (J. Adams, quoted by Cheeseman but not found there by Miss L. B. Moore and the author)”; *Dacrydium intermedium* (now *Lepidothamnus intermedium*) – “found scattered from Bay of Islands and Te Moehau to Stewart Island”; *Podocarpus nivalis* – “rare on Te Moehau”; and *Libocedrus bidwillii* – “develops a flat bushy crown in severe exposure as on Te Moehau”.

Other botanists to visit Moehau about this time included Mason & Chambers (1950) who listed the following conifers from the lower slopes and summits of Moehau and Little Moehau: *Agathis australis*, *Dacrydium bidwillii*, *D. cupressinum*; *D. intermedium*, *Podocarpus nivalis*; *P. totara*; *P. ferrugineus*; *Libocedrus plumosa*; *Phyllocladus alpinus*, *P. glaucus* and *P. trichomanoides*.

In comparing the botany of the three high peaks overlooking the Hauraki Gulf (Mt. Hobson, Hauturu, Moehau), Moore (1973) singled out six conifers found on Moehau: *Dacrydium biforme* (now *Halocarpus biformis*) – “Confined to the rocky peak (Little Moehau)”; *D. intermedium* – “very rare on Moehau”; *Phyllocladus alpinus* – “Found in many places along the Moehau Range”, *P. glaucus* – a common constituent of upland forest; *Podocarpus nivalis* – “Confined to the rocky peak (Little Moehau)”, and *Libocedrus bidwillii* – “Found in many places along the Moehau Range”.

Finally, in the first Lucy Cranwell Lecture, Moore (1986) drew attention to *Dacrydium* (*Halocarpus*) *biforme*, *Phyllocladus alpinus* (*aspleniifolius*), *Podocarpus nivalis* or its hybrid with *P. hallii*, and *Libocedrus bidwillii* as “a few of the more anomalous

plants growing on top of old Moehau”.

From these accounts, recent name changes apart, it seems that certain conifers found on Moehau have been incorrectly identified by the various authors, including the two Lucys. This situation is highlighted also by the labels and annotations placed on specimens of conifers gathered from Moehau and now lodged in the Landcare Research Herbarium at Lincoln, including those collected by Cranwell and Moore and successive botanists. It is perhaps timely for me to help resolve the difficulties encountered with conifer identification on Moehau, and possibly further afield.

The Conifers Of Moehau – A Contemporary View

During my visit to Moehau in 1986, ascending from the Colville side, the presence of the following conifers was confirmed: *Podocarpus totara*, *P. hallii*, *P. hallii* x *P. totara*, *Dacrydium dacrydioides*, *Dacrydium cupressinum*, *Prumnopitys ferruginea*, *Phyllocladus trichomanoides* – from low to mid-altitude – with the addition of *Phyllocladus toatao*, *Phyllocladus* aff. *alpinus*, *Podocarpus hallii* x *P. nivalis*, *Halocarpus biformis*, *Lepidothamnus intermedium* and *Libocedrus bidwillii* at higher levels up to the summit of Moehau. I did not see *Podocarpus nivalis*, *Halocarpus bidwillii*, *Libocedrus plumosa* or *Manoao colensoi* referred to by previous authors/collectors, and it is unlikely that these conifers occur on Moehau.

The conifer genera represented on Moehau which have proved difficult to identify at species level are *Podocarpus* and *Halocarpus* in particular, and to a lesser extent *Phyllocladus* and *Libocedrus*. These are discussed further below.

For information on recent name changes of New Zealand conifers, the following primary sources can be consulted: *Dacrydium* (de Laubenfels 1969); *Prumnopitys* (de Laubenfels 1978); *Halocarpus* and *Lepidothamnus* (Quinn 1982); *Manoao* (Molloy 1995); and *Phyllocladus* (Molloy 1996).

Podocarpus

The separation of *Podocarpus totara* from *P. hallii*, two of our most widespread native trees, has been a perennial problem for field botanists, let alone the recognition of hybrids between these two. While there are a number of features which collectively help to separate them, such as leaf and cone morphology and

Fig. 2: Lucy Moore (1906-1987) and the author alongside the McKinney kauri, Warkworth, 5 June 1986; probably the last photograph of a notable New Zealand botanist. Photo: John Johns.

Fig. 4: Moehau, 892m (left) and: “Little Moehau”, 28 February 1986; favourite botanical stamping ground of the “two Lucys”. Photo: John Johns.

Fig. 5: Terminal resting bud of lowland or true totara *Podocarpus totara*. Photo: John Johns.

Fig. 6: Terminal resting bud of upland or mountain totara *Podocarpus hallii* (also known as Hall’s totara and *P. cunninghamii*). Photo: John Johns.

Fig. 7: Summit of Little Moehau, habitat of the natural hybrid *Podocarpus hallii* x *P. nivalis*, and pink pine *Halocarpus biformis*. Photo: John Johns.

Fig. 8: Representative male branches of snow totara *Podocarpus nivalis* (left), mountain totara *P. hallii* (right) and the Moehau hybrid *P. hallii* x *P. nivalis* (centre). Photo: Robert Lamberts.



2	4
	5 & 6
7	8





11	12
13	14



Fig.11: The Scottsberg toatoa, Cockayne Memorial Garden, 9th March 1986. Since then this tree has gradually declined in vigour and its replacement is inevitable.
Photo: Brian Molloy.

Fig.12: Regenerating kaikawaka (also known as pahautea) *Libocedrus bidwillii* (centre foreground), on the disturbed SW slope below the Moehau trig, 28th February 1986.
Photo: Brian Molloy.

Fig.13: Bog pine *Halocarpus bidwillii* (left); pink pine *H. biformis* (right); and the natural hybrid *H. bidwillii* x *H. biformis* (centre). The *H. biformis* branchlet is 3mm wide.
Photo: Robert Lamberts.

Fig.14: Lucy Cranwell at home in Tucson, Arizona, USA, 1993; perhaps the most recent glimpse of an esteemed New Zealand botanist. Photo: Merrick Bonewitz.

type and thickness of bark, these same features vary somewhat making identification difficult. One character I have found reliable in its application is the terminal resting bud of inactive shoots which

are always present on some parts of trees, and may even be seen on dead branchlets on the ground. In *P. totara* (Fig. 5) the terminal bud is ovate in outline, dark brown to black, about the same width



Fig.9: Lucy Cranwell (centre) and Prof. Carl Skottsberg (right) in the Waitakere Range 1938. Photo: Charles Fleming.

as the stem, and the outer scales are lanceolate to acicular and overtop the inner scales. In *P. hallii* (Fig. 6) the terminal bud is globose or oval in outline, yellow-green or green, wider than the stem, and all the scales are ovate, appressed and tightly overlapping. Natural hybrids between these two species occur where they co-exist or are in close proximity to each other, as on Moehau. They are usually intermediate in character and it takes time and experience to recognise them.

Natural hybrids between *P. hallii* and *P. nivalis* are not uncommon in the wild, usually where both species co-exist, but also in such places as Moehau (Fig. 7) and Banks Peninsula where only one parent, *P. hallii*, is present and hybrids result from the long-distance dispersal of the pollen of the other parent *P. nivalis*. In the case of Moehau such pollen would have to come from Central North Island or East Cape mountain ranges where *P. nivalis* is present today.

Several plants of *P. hallii* x *P. nivalis* occur on Moehau, especially on Little Moehau (Fig. 7), but also in the adjoining forest margin. Their hybrid origin has been confirmed by chromosome count (Hair & Beuzenberg 1958). They all appear to be first generation hybrids, and are intermediate in character between their

putative parents (Fig. 8), although some back-crossing may be taking place which could result in variable progeny. It is these hybrids that have been mistakenly identified as *P. nivalis* by most authors and collectors who have visited Moehau.

Phyllocladus

Three species occur on Moehau – *Phyllocladus trichomanoides*, *P. toatoa* and *P. aff. alpinus*, and hybrids between all three are evident, especially in disturbed areas, although I have not studied them in detail. The two Lucys were fully aware of these hybrids. *Phyllocladus trichomanoides* and *P. toatoa* are well illustrated in popular books on our native trees (e.g., Salmon 1986) and they are usually easy to recognise. However, problems of identification can arise if hybrids between these two are present, as is often the case. The name *P. toatoa* is new, and replaces the former name *P. glaucus* which was based on a young plant of the Australian species *P. asplenifolius* and was therefore invalid (Molloy 1996).

Mention of *P. toatoa* recalls the visit of Prof. Carl Skottsberg to New Zealand in 1938, his outing with Lucy Cranwell and others in the Waitakere Range (Fig. 9), and his planting of *P. toatoa* in the Memorial Garden of his great friend and correspondent Leonard Cockayne (Fig. 10). Sadly, this tree has declined in health in recent years and will need to be replaced to perpetuate this historic relationship (Fig. 11). As a result of this lecture, I am pleased to say that I was able to take several replacement plants back to the Cockayne Memorial Garden, courtesy of the Oratia Native Plant Nursery.

Moehau is the northern limit of an entity within the *Phyllocladus alpinus* complex. This entity forms a shrub or small tree with distinctive broadly oblong phylloclades with a rounded apex (see Molloy & Markham 1999, Fig. 1,Q) and extends southwards to Mt Te Aroha, and along the summits of the East Cape mountains to about Arowhana. The status of this entity, along with others in the *P. alpinus* complex, is under review. Any notion that *P. alpinus* is a variety of the Australian species *P. asplenifolius* can be dismissed. The latter is a distinct species which differs markedly from the *P. alpinus* complex in a number of character states, its flavonoid compounds (Molloy & Markham 1999), and its DNA profile (Wagstaff & Molloy unpublished).

Libocedrus

Only one species of *Libocedrus* has been recorded from Moehau, namely, *L. bidwillii* or kaikawaka which reaches its northern limits there (Fig. 12). Both adult and young trees are present in quantity below the Moehau Trig and in the upper forest margins. In the past this species has been confused with the kawaka *L. plumosa*, but the two differ in a number of features such as their juvenile foliage, cone-size, bark, flowering time, and altitudinal distribution. *Libocedrus plumosa* is a lowland tree, occurring down to sea level

in Nelson and usually flowers a good month before *L. bidwillii*. Hybrids between the two species are sometimes mentioned in the literature, but I am not aware of any natural examples. The two species can be separated readily at any time by their foliage, especially when in the juvenile state or when taken from lower branches of trees. This distinction is well illustrated by Kirk (1889, Plate 82 A, 1, 2), where in *L. plumosa* the dorsal and ventral imbricate scale leaves are much smaller than the lateral ones, and do not completely cover the margins where the latter meet. Although I am confident there is no *L. plumosa* on Moehau, there is subfossil evidence of its former presence in kauri forest at lower altitudes on the Coromandel Peninsula.

Halocarpus

Pink pine *Halocarpus biformis* is the only member of the genus found on Moehau, where it reaches its northern limit in the country (Moore 1973). It is readily seen on Little Moehau (Fig. 7) and I suspect the single plant there has been the source of most herbarium specimens of this species gathered from Moehau. There are, however, several smaller plants of this species, some still with juvenile foliage of spreading leaves, in the forest margins nearby.

In the past the Moehau pink pine has been incorrectly identified as *Halocarpus bidwillii*, a species not known from the Coromandel Peninsula. The confusion is not unexpected as the two species are similar in some respects although they can be readily distinguished in the juvenile state and when in cone (see, for example, Salmon 1986). Mature plants in the vegetative state are more difficult to identify when growing alone, less so if the two species are growing together, unless natural hybrids occur, as happens at Arthurs Pass for example. The most reliable vegetative character in the field is the width and nature of the branchlets. In *H. biformis* these are 2-3mm wide and strongly "beaded" due to the well-developed dorsal ridges of their imbricate leaves. In *H. bidwillii* the branchlets are much narrower, 1-1.5mm wide, and are relatively smooth by comparison. Hybrids are intermediate in both respects (Fig. 13).

The other member of the genus, *H. kirkii*, a constituent of kauri forest, has not been recorded from Moehau but occurs elsewhere on the Coromandel Peninsula and further north. It is one of our less common conifers and its chief distinguishing characters are adequately illustrated by Salmon (1986).

Other Conifers

A few small plants of yellow-silver pine *Lepidothamnus intermedius* occur below the summit of Moehau, but I have not seen silver pine *Manoao colensoi* there. Both species are found elsewhere on the Coromandel Peninsula, often together, forming good populations of sizeable trees. Where they coexist they can be identified readily. Like all imbricate-leaved conifers



Fig.10: Dr. F.W. Hilgendorf (left) watching Prof. Carl Skottsberg planting a toatoa *Phyllocladus toatoa*, in the Cockayne Memorial Garden, Christchurch, 4 November 1938.

they are more difficult to identify when growing alone and in a vegetative state. Again, the field guide of Salmon (1986) can be helpful in this respect.

Conclusion

Moehau is clearly a very special place for native conifers, harbouring many species of interest. At least three native conifers reach their northern limit there, and all New Zealand conifer genera except *Manoao* are represented in the vicinity, especially *Phyllocladus* with two well known species and possibly one unnamed one, as well as putative hybrids. The natural hybrid *Podocarpus hallii* x *P. nivalis* is also the northern most example known, and is an especially interesting case of long-distance pollen dispersal. In many respects Moehau has acted like a "mainland island", with its own unique assemblage of rock types which in turn have influenced the kind of plants that grow there.

We are indebted to the two Lucys for drawing our attention to this botanical gem, and we can understand why they went there so often. Perhaps Lucy Cranwell (Fig. 14) derived her inspiration to study the pollen grains of our conifers from her experiences on Moehau with her friend and fellow botanist Lucy Moore. I like to think she did.

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More botany from the south end of Lake Taupo

Rhys Gardner

Introduction

This article is the overflow, so to speak, of fieldwork I did earlier this year concerning one of the streams at Turangi, in relation to proposals to ameliorate its flooding above State Highway 41 (Fig. 1). The stream is called the Hangareto, though you won't find this name on any of the inch to mile or metric topographical sheets, nor even on the 1937 Geological Survey map, which otherwise has such a nice lot of incidental information that I have reproduced it here as Fig. 2. But the name does appear on a copy of an old ink-and-wash survey plan that I found in the Turangi Public Library, a work marvellously besprinkled with long-forgotten names for streams, hillocks and personages as well as with swamps, graves, mills, potato fields and perhaps the first willow in the district. Unfortunately the copy is not clear enough to be reproduced (but I will tip a photocopy into the AK file of this journal). As yet I have not located the original.

Botanical Notes

1. Waihi. Thomas Cheeseman collected *Rhabdothamnus solandri* (AK 8608) from here in January 1905, by far the most inland station for this plant. There seems to be no old collection of the thermal fern *Christella dentata* from Waihi, the first (AK) being made in 1984 by ethnobotanist Peter de Lange:

"several plants growing above a hot spring used for cleaning pigs".

In 1905 J. Adams and also Thomas Cheeseman collected (together ?) the mistletoe *Ileostylus micranthus* from Waihi; neither of these two AK collections indicate a host. Then in 1964 a G. L. Zinzen sent the plant to Bob Cooper at AK, from a plum tree at the fishing lodge "Braxmere" just south of Waihi Village. Now, with rare-plant botanist P. J. de Lange having taken an interest, specimens from this population fill two boxes at AK, along with an astonishing diversity of native and exotic hosts, the latter including ash, dawn redwood, rosemary and ivy! In the absence of a big grant to study this bizarre behaviour all I can do here is speculate: might not this profligacy be caused by an unusually high local rate of plant wounding, as by activities of neophyte members of the fly-fishing guild, perhaps after pre-dinner ingestion of excessive numbers of the cocktail known as a "Braxmere Bombshell" ?

2. Tokaanu. The thermal springs (a DoC reserve) are dominated by kanuka (*Leptospermum ericoides* s. l.) and jointed rush (*Apodasmia similis*). There are a few manuka (*L. scoparium*) here too, some with the mistletoe *Korthalsella salicornioides*. The orchid