

Due to the small number and size of populations, and loss of at least one population, *Cladia blanchonii* was listed as 'Nationally Vulnerable' by de Lange et al. (2018). In Auckland, the apparent stronghold (and Type locality) for the species is the Unitec campus in Mt Albert, where it can be found on basalt outcrops near waterways. Unfortunately, most of the habitat (including the type locality) occupied by *C. blanchonii* at this site has or will be acquired by the Crown and is to be cleared for intensive housing and landscaping. Finding a second population in the Auckland Isthmus is therefore somewhat of a partial relief, particularly being found in a relatively protected area. It would be useful to properly survey Maungawhau, as at least one other population has been subsequently found by local lichenologist Marley Ford nearby.



Fig. 1. *Cladia blanchonii* on basalt boulder, Maungawhau. Photo: D. Blanchon, 4 April 20.

References

- de Lange, P.; Blanchon, D.; Knight, A.; Elix, J.; Lücking, R.; Frogley, K.; Harris, A.; Cooper, J.; Rolfe, J. 2018: *Conservation status of New Zealand indigenous lichens and lichenicolous fungi*, 2018: New Zealand Threat Classification Series 27. Department of Conservation, Wellington. 64 p.
- Parnmen, S., Leavitt, S. D., Rangsiruji, A. & Lumbsch, H. T. 2013: Identification of species in the *Cladia aggregata* group using DNA barcoding (Ascomycota: Lecanorales). *Phytotaxa* 115: 1–14.

The world's tallest palm and tallest monocot: Andean wax palm (*Ceroxylon quindiuense*) in Auckland

Ewen K. Cameron

The palm genus *Ceroxylon* contains 12 dioecious species all from the Andes. They have wax on their trunks formerly used for candles, wax matches, gramophone records; and their leaves were over-exploited for Christian Palm Sunday ceremonies (Sanín & Galeano 2011, Mabberley 2017). The genus contains two world palm records, *C. quindiuense* as the tallest palm (and hence the tallest monocot), and *C. utile* occurring at the highest elevation of any palm, at over 4000 m in Colombia (Uhl & Dransfield 1987). Corner (1966: 92) commented that *Ceroxylon* palms with their tall trunks at high altitude "...bears the crown far above the dwarfed dicotyledonous vegetation...". There are some amazing images of them in the wild - see the *Palmpedia* website.

Some 20 years ago the retired DSIR regional Auckland botanist, Alan Esler (1929–2016), showed me a large, at that stage, trunkless, palm that he had planted in his front garden at 7 Stilwell Road, Mt Albert, Auckland City. It was native to South America and there was a peg in the ground with its name,

but I was focused on other plants in his garden at the time and failed to record it or even collect a piece of frond for the herbarium. I remember the large, stiffly erect pinnate fronds which were dark green above and silver-white underneath (at a rather similar stage to a current pictured *Ceroxylon* in Northland, Fig. 1). Recently, driving past the ex-Esler property I couldn't help but notice how the palm had shot up, with a thick, white trunk now over 8 m tall, with stiff semi-erect fronds c.4 m long (sheath excluded) (Figs. 2–4). After admiring the Esler palm I drove around the corner and there at 36 Allendale Road was another one of a similar size – both are clearly visible on *Google Maps* (street view).

Earlier in the year when Cheryl and I enjoyed our daily Covid-19 lockdown neighbourhood walks around Mt Eden/Balmoral/Sandringham, the diversity and number of the planted palms in our area impressed and surprised me – not to mention the other currently fashionable plantings of *Magnolia* species and their numerous cultivars. However, the



Figs. 1–4: **1.** Shaded, trunkless, probable *Ceroxylon ventricosum*, planted c.25 years ago, fronds c.3.5 m long, and Tim Martin; note the bunched pinnae. Takou Bay, Northland. Photo: Tim’s father, 12 Sep 2020. **2.** Andean wax palm (*Ceroxylon quindiuense*) c. 12 m tall, semi-adult crown (close to first flowering). 7 Stilwell Rd, Mt Albert, Auckland. 29 Aug 2020. Photos are by the author unless otherwise stated. **3.** Semi-adult wax palm crown. Note the characteristic pendulous pinnae (in one plane), and the long leaf-sheath (c.1.4 m long). 7 Stilwell Rd, 29 Aug 2020. **4.** The attractive trunk, with thick white wax covering, 45.7 cm diameter. Note – between the prominent, horizontal leaf scars, the large gaps, 20–26 cm apart, indicating rapid growth. 7 Stilwell Rd, 5 Sep 2020.



Figs. 5–8: **5.** Two Andean wax palms with juvenile crowns (shuttlecock shape) as illustrated by Dick Endt in his book on *Landsend* (Endt 2009: 108), Oratia, Auckland. Reproduced with permission. **6.** The same two palms as in Fig. 5, 11 years later, now with adult hemispherical crowns. The daintier palm in the middle is *Euterpes edulis*, also South American. 29 Aug 2020. **7.** Old inflorescence hanging down on the left side of the crown of the shorter of the two palms in Figs. 5 & 6. 29 Aug 2020. **8.** Two probable *Ceroxylon ventricosum* wax palms, one c.16 m tall (including fronds) still with a juvenile crown, and a smaller one to the right, both planted in 1993. Keith Boyer's west Auckland property. The figure just discernable at the base of the taller palm is 1.69 m tall. 12 Sep 2020.

Esler palm was different from these more popular species that were familiar to me. I asked Tim Martin if he would try to identify it if I sent him some photos. Before I sent an image he had looked on *Google Maps* and said: "it looks good for a *Ceroxylon* (Andean wax palm), possibly *C. quindiuense*". I agreed; it was a perfect match from the impressive range of images on the internet. For over 150 images see *Palmpedia* ([http://www.palmpedia.net/wiki/Ceroxylon quindiuense](http://www.palmpedia.net/wiki/Ceroxylon_quindiuense)).

Mike Wilcox briefly mentions the species without images in his 'Palms of Auckland' article (Wilcox 2002) and in *Auckland's remarkable urban forest* book (Wilcox 2012), referencing Endt's (2009) account. The late Dick Endt (2009) recorded that he collected seeds of Andean wax palm (*Ceroxylon quindiuense*) in Colombia 25 years ago [= 1984] and planted some out in his west Auckland property, *Landsend*, in Oratia, now known as *Jungle Flora Bamboo – No More Neighbours* (www.jungleflora.co.nz). Other *Ceroxylon* species were also imported by him around that time. In his book about *Landsend* there is a photograph of two giant Andean wax palms grown from that Colombian seed that were nearly 15 m tall (Endt 2009) – the crowns were still at the juvenile, shuttlecock stage (Fig. 5). Eleven years later the crowns had matured after flowering (Figs. 6, 7). With the success of the Andean tamarillo (*Solanum betaceum*) in New Zealand, Dick Endt wondered about other potential Andean crop species, and travelled in South America with his wife and brought back various Andean seed to their Oratia property to evaluate (Endt 1994). These imports included the Andean wax palm seed. This was before the strict rules about importing new organisms into New Zealand, i.e., the HASNO Act (1996).

Another person collecting palm seed in South America a few years later was local palm expert Keith Boyer, author of *Palms and Cycads—beyond the tropics* (Boyer 1992). Keith brought back some 1,000 seeds of the smaller wax palm, *Ceroxylon ceriferum*, from Venezuela in 1994, and at one stage the seedlings covered his west Auckland lawn (K. Boyer pers. comm.). A few hundred died, others were sold or given away as *C. interruptum* (now treated as a synonym of *C. ceriferum*), and now only a few remain on his property. *Ceroxylon* taxa that Keith has germinated at his west Auckland property along with the year of germination: *C. ventricosum* 1986, *C. quindiuense* 1987, *C. sp.* (2300 m Andes) 1988, *C. alpinum* 1991, and *C. ceriferum* collected as *C. interruptum* 1994. Of these, few remain on his property, the *C. ceriferum*, along with two fine probable *C. ventricosum* specimens (Fig. 8), several *C. alpinum* specimens and another smaller *Ceroxylon* species. He only ever had a few *C. quindiuense* seeds and some may have survived, but are still

trunkless. Boyer (1992) covers the optimum conditions for germinating and growing *Ceroxylon* spp. from his personal experiences of growing them in west Auckland.

In their monograph of the genus, Sanín & Galeano (2011) record the following features of Andean wax palm (*C. quindiuense*) – if from a different source the reference is added:

Local Colombian names: Palma de cera, palma de ramo

Etymology: *Ceroxylon* is derived from Latin, *cēra* ("wax") and Ancient Greek, *xúlon* ("wood"); *quindiuense* is derived from the region where this palm is indigenous, Quindio in Colombia (in part from *Palmpedia*).

Stem: (13-)20-45(-60) m tall, 25-40 cm diameter [palms lack 2° xylem, therefore, although they can grow in height, the stems can't expand in circumference]; white with prominent leaf scars; Mabberley (2017) says it grows to 60(-75) m and that their trunks could produce 10 kg of wax per tree per year. The world's tallest living palm was recorded as *C. quindiuense* 59.2 m at La Carbonera, Tochechito, Colombia, Sep 2017 (Bernal, R. et al. 2018: fig. 4). The stem grows rapidly once it starts going up, then flowers, then the crown becomes hemispherical and the growth rate slows right down (Carolyn Melling pers. comm.). Sanin et al. (2013) record the leaf scars in the reproductive part of the stem as diagonal and intersecting with 35.8 scars/m; compared with 4-5 horizontal scars/m of the juvenile part of the stem in Auckland (cf. Fig. 4). In the Central Andes of Colombia, leaf production was estimated at 3.92 leaves per year (Girón-Vanderhuck et al. 2001).

Fronds: sheath 70-120(-176), petiole (29-)44-80, rachis 185-350(-540). A fallen frond at the Endt property from an adult crown measured 5.5 m long, including 1.4 m sheath (EKC pers. obs.).

Reproductive age: Madriñan & Schultes (1995) record it at a minimum of 80 years, when 9-23 m tall (Sanin et al. 2013). However, several of the palms at the Endt property have flowered, starting several years ago (Carolyn Melling pers. comm., Fig. 7), meaning that in Auckland they first flowered at just over 30 years of age in optimal conditions (not dense shade).

Fruit: globose, ripen to orange-red, 1.6-2.0 cm diameter, 1-seeded and eaten by Andean birds such as thrushes (*Turdus* spp.), green jays, emerald toucanets and parrot species. Fruit not yet seen in New Zealand (Carolyn Melling and Stephen Dobbs pers. comm.).

Seeds: c. 1 cm diameter.

Longevity: at least 123-169 years (Sanin et al. 2013) based on frond scars and frond production rate in the Andes.

Distribution and habitat: usually grows at 2000-3000(-3150) m, with disjunct populations in the

Andes in Colombia (main population) and northern Peru (not recorded in Ecuador); forming dense populations, many of which remain on pastures and forest remnants, especially on steep slopes.

Conservation status: it was abundant in Colombia until early last century; most forests where it occurred are now in pasture, and while the adults are often left behind there is no regeneration. The cutting of young fronds for Palm Sunday caused the death of many individuals or a delay to normal growth. The honourable way to extract the wax is to climb the stem and scrap it off (see Madriñan & Schultes: fig. 7), but most commonly the palms were felled. Also in the 1990s an unknown disease caused the death of many adult palms (Cardozo & Guzman 1993). In Colombia, Andean wax palm was classified as Endangered in 2005, and the threat situation in Peru is believed to be similar. Sherriff (2018) updated the Andean wax palm status for the most famous stand in the Cocora Valley, which is a major tourist attraction, referring to them as: 'Living corpses' ...their seeds..."either get burned in the sun or they get eaten by the cows...and the country's national tree is on the verge of extinction and most Colombians are not even aware of the problem."

The Andean wax palm appears to be uncommon in Auckland. I have managed to record only 11- 13 individuals, 10.0–16.5 m tall, most of them on the

Landseendt property where they are within 90 m of each other (most much closer), and have mainly reached their adult form after flowering (sex unknown) (see Fig. 7 and Table 1). It is not present at the Auckland Botanic gardens (Emma Bodley pers. comm.). However, it is currently available at *South Pacific Palms* in Kerikeri in 35, 45 and 60 litre bags (<https://www.southpacificpalms.co.nz/full-catalogue.php>). Stephen Dobbs of *South Pacific Palms* (pers. comm.) said that their mature Andean wax palms have not flowered yet, their tallest is 15 m tall, and as far as he knows there is no New Zealand seed available – our..."original seed came from South America 15-20 years ago". Stephen added: "our *Ceroxylon parvum* [dwarf wax palm], however, is flowering so hopefully we will have some young plants [of this palm] on the way soon".

Do we have the right wax palm species name? San Francisco Botanic Gardens (SFBG) has two large Andean wax palms planted in 1983, claiming the planting to be one of very few displays of trunking wax palms accessible to the public in North America (Deweese 2018). They have thrived in the Gardens' cool climate and in 2018 their crowns (still of juvenile form) were 20 m tall. "I hope people visiting...will be lured into the Garden by the sight of these beautiful palms, now but a third of their potential height..." (Deweese 2018: 118). However, a recent visiting *Ceroxylon* expert to the SFBG, Mario José Sanín,

Table 1. Location and approximate size of Auckland's giant Andean wax palms.
(All measurements and estimates made in early September 2020.)

Total est. height: trunk + crown (m)	Form of the crown	Measured diameter at 1.4 m (cm)	Evidence of flowering	Location	Seed source and probable identification	
18	adult	50.2	yes	Endt property, Oratia (Fig. 6)	Dick Endt;	<i>C. quindiuense</i>
17	adult	48.2	not checked	Endt property, Oratia	Dick Endt;	<i>C. quindiuense</i>
16	adult	42.8	yes	Endt property, Oratia (Fig. 6)	Dick Endt;	<i>C. quindiuense</i>
16	adult	-	not checked	Endt property, Oratia	Dick Endt;	<i>C. quindiuense</i>
13.5	adult	-	yes	Endt property, Oratia	Dick Endt;	<i>C. quindiuense</i>
13.5	juvenile	-	no	Endt property, Oratia	Dick Endt;	<i>C. quindiuense</i>
12	juvenile	-	no	Endt property, Oratia	Dick Endt;	<i>C. quindiuense</i>
12	juvenile	-	no	208 Parker Rd, Oratia	Dick Endt;	<i>C. quindiuense</i>
13	semi-adult	45.7	no	7 Stilwell Rd, Mt Albert	Dick Endt;	<i>C. quindiuense</i>
13	adult	-	yes	36 Allendale Rd, Mt Albert	Dick Endt?;	<i>C. quindiuense</i>
10	juvenile	-	no	Ayrlies Garden, Whitford (unseen by EKC)	Dick Endt;	<i>C. quindiuense</i>
16	Juvenile	-	no	Opanuku Rd, Henderson Valley	Keith Boyer;	<i>C. ventricosum</i>
9.5	juvenile	-	no	Opanuku Rd, Henderson Valley	Keith Boyer;	<i>C. ventricosum</i>

suspects the two giant palms may in fact be *C. ventricosum* (Anon. 2019). Now that it's flowering a definitive identification will be possible. The images of the two giant SFBG palms (Deweese 2018: fig. 1) look similar to the large Auckland wax palms and also match the image of *C. ventricosum* of Sanín & Galeano (2011: fig. 31) which they record as growing to 6-25(-35) m tall with a stem diameter of 20-44(-60) cm and covered with a thick layer of wax. It occurs from southern Colombia to SE Ecuador at (1800-)2000-3000 m, which is a very similar altitude to *C. quindiuense*. Sanín and Galeano (2011: 53) suggest that the best way to distinguish *C. ventricosum* from *C. quindiuense* is "...in its grouped pinnae spreading in various planes, whereas *C. quindiuense* has regularly arranged [not grouped], pendulous (in one plane) pinnae". This "pendulous in one plane" description seems to fit the Endt-sourced material, but not the trunkless Northland juvenile which also has "grouped pinnae" (Fig. 1), or perhaps the Boyer pair (Fig. 8), which Keith imported as *C. ventricosum*. A future study of the pinnae arrangement of the fallen fronds of all the Auckland wax palms should be able to confirm their identifications.

In the future, depending on the availability and public uptake of this relatively new palm to New Zealand, the common emergents of Auckland's cultivated skyline, the Norfolk Island pines (*Araucaria heterophylla*), might be challenged by these potential new skyscrapers. Keith Boyer told me recently, from observing his *Ceroxylon* spp. on his west Auckland property, that they grow best in spring and autumn when the day and night periods are about the same, mimicking conditions of the Andes. Jones (1996: 133) referring to the genus in Australia said: "These stately, attractive palms have tremendous potential for cultivation in subtropical and temperate regions."

Although they have smallish fleshy fruit that could be dispersed by several frugivorous bird species in

New Zealand, this Andean wax palm takes at least 30 years in Auckland to mature (much longer if in total shade) and being some 13-16 m tall before reproducing makes them very obvious in the landscape. Therefore this palm is unlikely to become a future environmental weed problem in northern New Zealand. However, perhaps they should be sold with a warning – not to be planted near playgrounds – the large fronds falling from great heights could be a severe health risk, although the fronds are probably no heavier than several of the other tall, common palms currently grown in Auckland, e.g. Canary Island date palm (*Phoenix canariensis*), Queen palm (*Syagrus romanzoffiana*) and Washington fan palm (*Washingtonia robusta*). I hope the Auckland Botanic Gardens will add a group of Andean wax palms to their already impressive Palm Section of the Gardens and whether it is *C. quindiuense* or *C. ventricosum* it will be a splendid addition.

Acknowledgements

I thank: Keith Boyer for his palm information, observations, several references, a guided tour of his wonderful west Auckland garden, and comments on a draft of this article; Carolyn Melling (Dick Endt's daughter) and Annemarie Endt-Ferwerda (Dick's wife) for information and access to their 'green jungle', the Oratia Endt property, and permission to reproduce Fig. 5; Tim Martin for the initial suggestion of the Esler palm and providing Fig. 1; Beverly McConnell for information on her palm at *Ayrli's Garden & Wetlands* in Whitford; Emma Bodley for a reference and information on the palms grown at the Auckland Botanic Gardens; permission by the new residents of the ex-Esler property for access to measure their palm; Stephen Dobbs of *South Pacific Palms* for information on their palms; and Joshua Salter for comments on a draft of this article and for improving the images.

References

- Anon. 2019: Palm News, continued from p.108... *Palms* 63(3): 154.
 Bernal, R.; Martínez, B.; Sanín, M.J. 2018: The world's tallest palms. *Palms* 62(1): 5–16.
https://www.researchgate.net/publication/323812300_The_World%27s_Tallest_Palms Accessed 1 Oct 2020
 Boyer, K. 1992: *Palms & Cycads beyond the Tropics*. The Public Fund, Palm and Cycad Societies of Australia. 149p.
 Corner, E.J.H. 1966: *The natural history of palms*. Weidenfeld and Nicolson, London. 393p.
 Deweese, J. 2019: Palms of the San Francisco Botanical Garden. *Palms* 62(3): 109–119.
 Endt, D. 1994: Legacy of the Incas. A rich harvest of productive crops from the ancient civilisations of South America. *Growing Today* 8(7): 46–51.
 Endt, Dick 2009: *The subtropical garden at Landsend. A plant collector's dream*. Landsend Publications, Auckland.
 Girón-Vanderhuck, M., Salazar, G.E. & Agudelo, F.D. 2001: Estructura poblacional de la palma de cera *Ceroxylon quindiuense* (Karst.) H. Wendl. en Toche, Tolima. In: Girón-Vanderhuck, M. (ed.), *Bosques de Palma de Cera*. Universidad del Quindío, pp. 31–41.
 Jones, D.L. 1996: *Palms in Australia, over 450 native and exotic species*, 3rd ed. Reed Books, Port Melbourne.
 Mabberley, D.J. 2017: *Mabberley's Plant-book*, 4th ed. Cambridge University Press, Cambridge.
 Madriñán, S.; Schultes, R.E. 1995: Colombia's national tree: the wax palm *Ceroxylon quindiuense* and its relatives. *Elaeis* 7(1): 35–56.
 Sanín, M.J.; Galeano, G. 2011: A revision of the Andean wax palms *Ceroxylon* (Arecaceae). *Phytotaxa* 34: 47–50.
<https://www.mapress.com/phytotaxa/content/2011/f/pt00034p064.pdf> Accessed 28 Aug 2020.
 Sanín, M.J.; Anthelme, F.; Pintaud, J.-C.; Galeano, G.; Bernal, R. 2013: Juvenile resilience and adult longevity explain residual populations of the Andean wax palm *Ceroxylon quindiuense* after deforestation. *PLoS ONE* 8(10): e74139.
<https://doi.org/10.1371/journal.pone.0074139> Accessed, 11 Sep 2020
 Wilcox, M. 2002: Palms in Auckland. *Auckland Botanical Society Journal* 57: 114–122.

Websites

Palmpedia http://www.palmpedia.net/wiki/Ceroxylon_quindiuense (accessed 4 Sep 2020)

Sherriff, L. 2018: 'Living corpses': Why Colombia's national tree is at risk.

<https://www.bbc.com/news/world-latin-america-45901218> (accessed 11 Sep 2020)

***Davallia tasmanii* Field subsp. *tasmanii* in my garden**

Maureen Young

In 1887 a government expedition to annex the Kermadec Islands gave Thomas Cheeseman, curator of the Auckland Museum, an opportunity to study the flora and fauna there. On the return journey the party visited the Three Kings Islands, and Cheeseman found a fern growing abundantly in dry scrub, creeping on the ground or climbing the bases of rocks and trees, that was new to the New Zealand flora and endemic to the islands. After his marriage in 1889 Cheeseman returned to the islands, taking his new bride as his assistant – an unusual honeymoon for a Victorian lady (Goulding 1996). The fern was subsequently named *Davallia tasmanii* by H.C. Field (Field 1890), the specific name celebrating the explorer Abel Tasman, who spied the island group off North Cape on Twelfth Night, 1643, this being the celebration of the day the biblical three kings visited the Christ child.

The fern is notable for having thick rhizomes densely clothed with chestnut scales, glabrous stipes, and roughly triangular-shaped fronds that are smooth and leathery with cup-shaped indusia (Smith-Dodsworth & Brownsey 2000). Although

abundant on the Kings, because of the restricted habitat it is given the threat classification of At Risk - Naturally Uncommon.

In 1962 Ross Michie, a retired farmer from Kaitaia and knowledgeable northern botanist, was fortunate enough to visit the Three Kings, and he returned with a rhizome of *D. tasmanii*, which he successfully propagated in his garden. In 1985 my late partner, Frank Hudson, and I were introduced to Ross by Lucy Moore, and I was given a cutting of the fern to take home. Although it is recommended that it is grown in light shade in fairly dry conditions, I just planted it on the shady side of my Warkworth house and it has thrived there for 35 years among the mint and *Adiantum aethiopicum*. It gives me pleasure to connect my plant to Ross Michie and his 1962 visit to the Three Kings Islands.

This dry summer-autumn my *davallia* was showing signs of stress, with fronds browning and with no new growth, so I made sure that it was periodically doused with a share of my soapy shower-water. Now that conditions have become a little damper it



Fig. 1: *Davallia tasmanii* and the author's back-doorstep. Photos by: Vivienne Paterson, 30 May 2020.



Fig. 2: *Davallia tasmanii* showing the pouched indusia.