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## *Nicotiana maritima* (not) in Victoria

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### Introduction

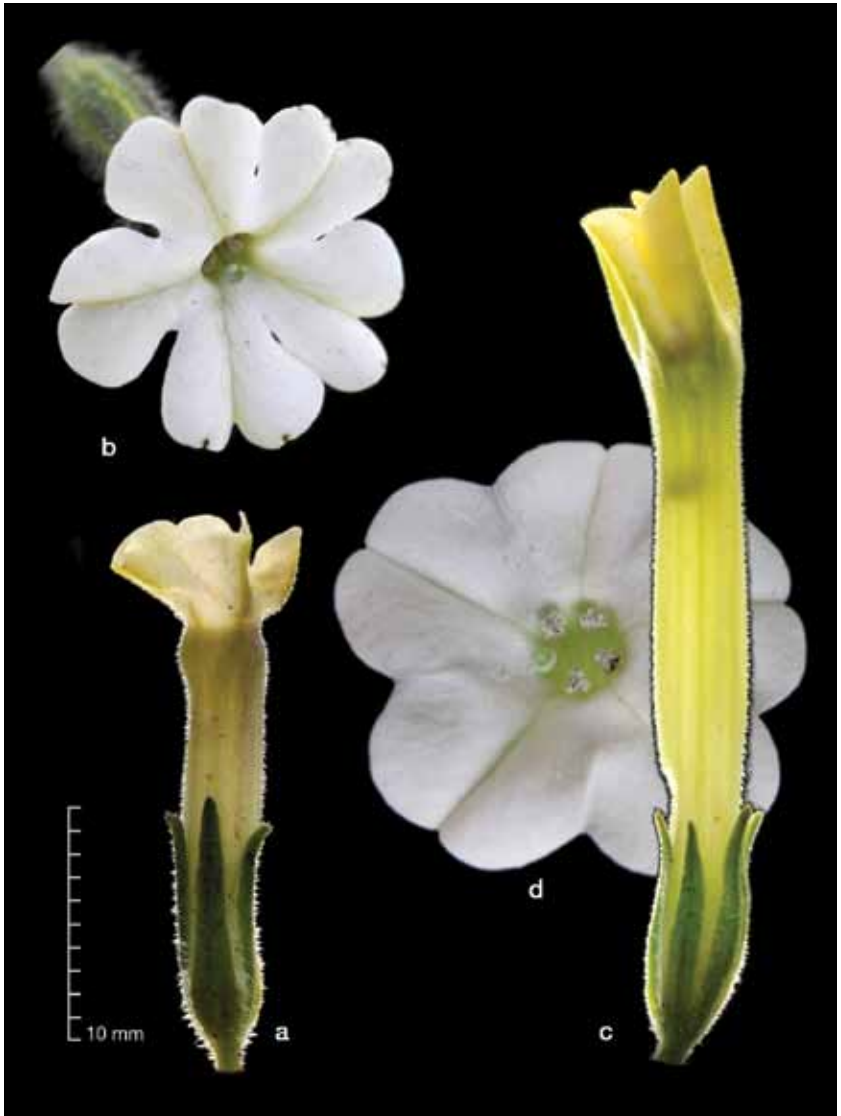
Accounts of the Victorian flora since the publication of the predominantly South Australian *Nicotiana maritima* H.-M.Wheeler (1935) have included the species as a rare occurrence in the state. Willis (1973) noted it was known from: 'two old collections from Port Phillip region and, the last made at Studley Park, Kew in Jan. 1883. No further occurrences have been noted this century'. Beaglehole (1983) repeated the localities cited by Willis. In the *Flora of Victoria* (Jeanes 1999), it was recorded as being 'known from only a few old collections from the Wimmera and near Melbourne and possibly now extinct in the State'.

Wheeler (1935) cited a single MEL specimen of *N. maritima*, collected by Mueller, from Victoria, 'Port Phillipi'. The specimen (MEL 1605904) is mixed, with two Mueller labels, both determined by him as the more widespread *Nicotiana suaveolens* Lehm., one from 'N. Holl. Austr.' (i.e. South Australia), and the other the 'Port Phillipi' locality. Wheeler's original determination as *N. maritima* has a qualification: 'referring to attached sprig bearing both leaves and flowers'. I have no doubt that Wheeler's determination is correct for the sprig to which she refers. The remaining material appears to be a single leaf of *N. maritima* and a leaf and stem fragments appearing to be *N. suaveolens*. There is no connection made (by Mueller at least) between the mounted items on the sheet and the labels. It appears that Wheeler has taken the more specific locality, i.e. 'Port Phillipi', to place the specimen(s), but, given that she regarded this as the sole Victorian occurrence, the more parsimonious conclusion would be that the genuine *N. maritima* fragment belongs with the 'N. Holl. Austr.' label, and the remainder (i.e. *N. suaveolens*) from Port Phillip. Wheeler may not have realised the important distinction between 'N. Holl. Austr.'

### Abstract

Examination of herbarium specimens, the literature and nursery trials of seed-grown Coastal Tobacco, *Nicotiana maritima* H.-M.Wheeler, and Native Tobacco, *N. suaveolens* Lehm., were undertaken to test the notion that *N. maritima* was a *bona fide* member of the Victorian flora. All evidence suggests that it is not and has probably never been a wild-occurring species in this state. A summary of the evidence from morphological evidence and reinterpretation of label information is provided and critical characters are reassessed and illustrated.

**Keywords:** Native Tobacco, misidentification, redetermination, Solanaceae, Nicotianeae, Victorian flora



**Figure 1.** Corolla tube and limb. **a., b.** *Nicotiana maritima*, *N. Walsh 8477*, MEL; **c., d.** *N. 'Cape Schanck'*, *N.G. Walsh 8476*, MEL.

and 'Port Phillip', perhaps imagining the former to be a generalised locality that included the latter. *Nicotiana suaveolens* is still known from near Melbourne (e.g. Studley Park, Kew), probably within Mueller's early concept of 'Port Phillip'. A subsequent determination on MEL 1605904 by P. Horton in 1979 notes 'Poor specimen, maybe *Nicotiana maritima* Wheeler'.

Other specimens at MEL have perpetuated the notion that *N. maritima* is or has been a Victorian species. Another early collection (MEL 1605905) also has two labels: 'Studley Park 1883' and 'Shire of Dimboola 1892', both with F.M. Reader as the collector. The Dimboola specimen has subsequently been annotated 'label does not belong with this specimen' without explanation. The sheet has a 1934 determination by Wheeler, followed by '?'. Horton has appeared to have uncritically followed Wheeler's suggestion (but without a query) and noted 'Almost glabrous nature suggests *N. suaveolens*, but upper stems and leaves of *N. maritima* occasionally are glabrous or nearly so'. My opinion is that this specimen is *N. suaveolens* on morphological grounds (see 'Identification notes' below) and the Studley Park locality accords with more recent collections from the same area. The distinction between *N. maritima* and *N. suaveolens* in recent accounts (Symon 1982; Jeanes 1999) focuses on the different indumenta of the species, e.g. 'Stems and leaves pubescent all over' (*N. maritima*) versus 'Stems and leaves glabrous, glabrescent, or pubescent near base only' (*N. suaveolens*) (Symon 1982). Consequently, applying these criteria, plants at the hairy end of the spectrum for *N. suaveolens* are likely to be misdetermined for *N. maritima*.

A third candidate for an early Victorian occurrence of *N. maritima* exists which is reliably determined and carries an old, but undated and unattributed label stating 'growing near Mitcham'. This has been interpreted as being of Victorian origin and was originally included on the MEL specimen database (MELISR) as such. It is however much more likely that the Mitcham referred to is the town at the foot of the Adelaide Hills in South Australia, near to where several specimens of the species are held in the Adelaide herbarium (AD) and visible on Australia's Virtual Herbarium (AVH 2017).

More recent collections have maintained the belief that *N. maritima* is a member of the Victorian flora, and have raised some conservation concerns about

the species in the state. Again, Studley Park features: a collection (*R.W. Robinson s.n.*, March 1987, MEL 1553801) that includes the note (as *N. maritima*) 'First relocated by Willis in 1980 ...' (although Willis's collection is now, and was regarded by him then, as *N. suaveolens*). The Robinson specimen was redetermined by David Symon (author of the *Flora of Australia* account, Symon 1982) as *N. suaveolens* in 1987. A 1989 collection from Gunnamatta on the Mornington Peninsula, tentatively identified as *N. maritima* (*Westaway 604*, 24 Jan. 1989, MEL 694538) was redetermined by Jeff Jeanes (author of the *Flora of Victoria* account, Jeanes 1999) as *N. suaveolens* in 1996. Both these specimens are of plants that are moderately pubescent in some parts, but considerably less pubescent than any reliably determined examples of *N. maritima* at MEL.

Despite these redeterminations, some authorities have sometimes continued to regard the occurrences in the Gunnamatta-Cape Schanck area as important, disjunct populations of *N. maritima*.

## Materials and methods

In 2015, acting under the auspices of the Victorian Conservation Seedbank (at the Royal Botanic Gardens Victoria), I was commissioned to make a conservation seed collection of what local authorities were regarding as *Nicotiana maritima* from near Cape Schanck, essentially the same population as *Westaway 604* noted above. I took the opportunity to reassess the identification of plants in this population by growing a cohort of seedlings and comparing them to authentic *N. maritima* grown under the same conditions.

Seed of genuine *N. maritima* of South Australian origin was sourced from the South Australian Seedbank, from plants collected on the Fleurieu Peninsula (*M.K. Jones 140 & D. Duval*, AD 187318).

Fifteen plants of both species were grown adjacently in open, uniform conditions at the Melbourne Gardens nursery (Royal Botanic Gardens Victoria), and their development compared to maturity. Both seedlots produced uniform progeny. At all stages, plants of *N. maritima* were distinctly more pubescent than those of *N. suaveolens*. Interestingly, although the lower stems of Cape Schanck plants were noticeably pubescent when collected in the field, nursery-grown progeny were only weakly pubescent, suggesting that density

**Table 1.** Morphological observations of *Nicotiana maritima* and *Nicotiana* 'Cape Schanck'

Character	<i>Nicotiana maritima</i>	<i>Nicotiana</i> 'Cape Schanck'
<b>Habit (Fig. 2)</b>	Loosely rosetted (early growth); cauline leaves abundant, more or less regularly arranged along stems and extending into inflorescence	Strongly rosetted (early growth); cauline leaves few, or restricted to near base of plant and often clustered, not extending into inflorescences
<b>Indumentum (vegetative surfaces, Figs 3,4)</b>	Villous to pubescent throughout; leaf abaxial surface with 5–c. 20 hairs per sq. mm	Glabrous, glabrescent, sometimes pubescent, then usually only on lower stem and abaxial surface of leaves; leaf abaxial surface with 0–2 hairs per sq. mm
<b>Leaf shape (Fig. 5)</b>	Spathulate or ovate to broad-ovate and tapered abruptly to a distinct winged, petiole-like base, up to as long as the expanded upper part, usually shortly decurrent along stem	Ovate, tapered more or less evenly to base, sessile or with a short, unwinged petiole, not or barely decurrent along stem
<b>Leaf margin (Fig. 5)</b>	Strongly and more or less evenly undulate	Plane or weakly and irregularly undulate
<b>Leaf lamina 3D (Fig. 5)</b>	Lamina usually 'puckered'	Lamina plane
<b>Calyx length</b>	(6–)9–12(–16) mm	(8–)9–14(–26) mm
<b>Corolla length</b>	(13–)15–19(–30) mm	(17–)22–35(–55) mm
<b>Corolla/calyx ratio</b>	1.5–2	2.5–3.5
<b>Corolla tube shape (Fig. 1)</b>	Cylindric, shortly expanded then contracted just below limb	Cylindric to elongate-obconical, neither expanded nor contracted below limb
<b>Corolla colour (Fig. 1)</b>	Pale yellowish, tinged purple	Cream to white, tinged green
<b>Limb diameter</b>	(7.5–)11–20(–24) mm	(14–)22–28(–44) mm
<b>Limb dissection (Fig. 5)</b>	Lobes distinctly notched apically, free for c. half diameter of limb	Lobes barely notched apically, free for distinctly less than half diameter of limb

of indumentum is at least partly under environmental control in this population.

While the density of indumentum is persuasive, the indumentum type of both species is essentially the same: a mixture of long, simple, multicellular, eglandular hairs and short, multicellular, gland-tipped hairs, some of which are larger and have the lower cells distinctly inflated. The latter type, with inflated basal cells, tend to be restricted to the pedicels and calyces of both species. The various hair types are well illustrated in Marks et al. (2011), figs 7, 8.

As mentioned above, current keys including *N. maritima* and *N. suaveolens* focus on differences of indumentum. Having plants *in vivo* at all stages of development enabled close comparison of features and offered the opportunity to establish more critical bases for their distinction.

## Results

Measurements and observations from the living plants are given in Table 1. Bracketed values for calyx and corolla length and limb diameter were the extremes for those features as reported in accounts of the genus in Australia (Wheeler 1935; Horton 1981; Symon 1982).

Vouchers for each seedlot are: *Nicotiana maritima* — N.G. Walsh 8477 (MEL 2404759, MEL 2404760, MEL 2404761); *N. 'Cape Schanck'* — N.G. Walsh 8476 (MEL 2404757, MEL 2404758).

In re-examining the various published accounts (Wheeler 1935; Horton 1981; Symon 1982; Jeanes 1999) in light of these observations, it is clear that the Cape Schanck plants conform to *N. suaveolens*, as redeterminations at MEL had suggested. Further, the detailed account of Wheeler (1935) in particular, was shown to be very perceptive, describing all of the differences noted in Table 1, although not drawing particular attention to them as discriminatory features. Subsequent accounts were less detailed. Wheeler's key to species separated *N. maritima* from *N. suaveolens* by the shorter corolla and the smaller corolla-calyx ratio with no mention of indumentum, in contrast to the more recent treatments. The reliance on indumentum in these three recent treatments seems to be cause for the confusion around the identification of the Studley Park and Cape Schanck populations.

To the key characters employed by Wheeler, I would recommend adding, as a decisive feature, the shape of the corolla tube just below the limb (Fig. 1) and arrangement of the corolla lobes of the limb (Fig. 1).

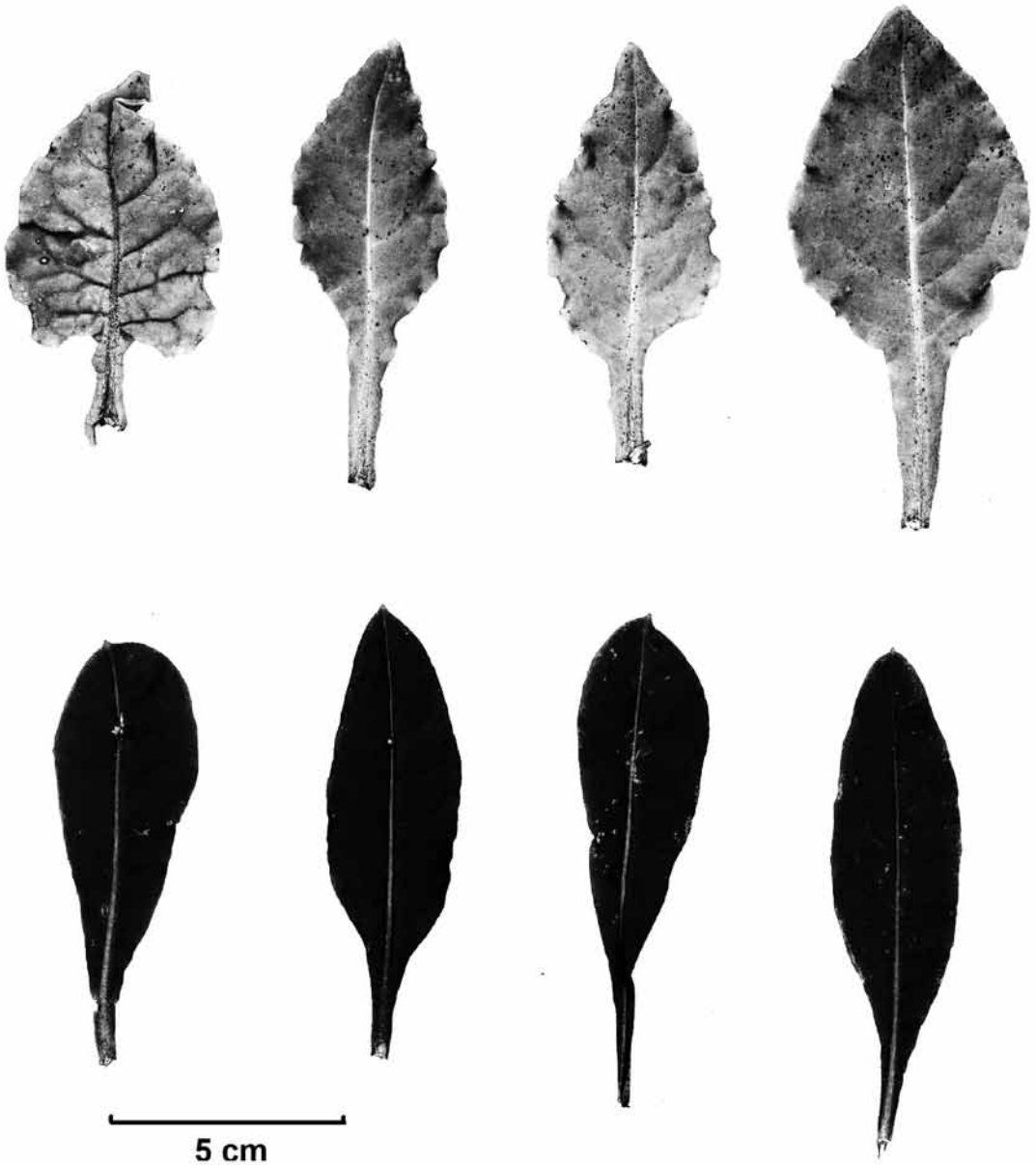


**Figure 2.** Habits of plants at first flowering. *N. maritima* at left and *N. 'Cape Schanck'* at right. Cultivated, RBGV Melbourne nursery.



**Figure 3.** Leaf bases and lower stem indumentum; *N. maritima*. Note dense indumentum, sub-auriculate leaf bases and winged petioles. Cultivated, RBGV Melbourne nursery.

**Figure 4.** Leaf bases and lower stem indumentum; *N. 'Cape Schanck'*. Note sparse indumentum, tapered leaf bases and naked petioles. Cultivated, RBGV Melbourne nursery.



**Figure 5.** Silhouettes of leaves of *N. maritima* (above) and *N. 'Cape Schanck'* (below). The 'puckered' nature of the leaves of *N. maritima* is evident. From plants cultivated at RBGV Melbourne nursery.

The latter feature is reinforced in the treatment by Marks et al. (2011, fig. 4d). While the corolla features may be difficult to observe on herbarium specimens, they are usually perceptible, and very obvious in living specimens, although young buds of *N. suaveolens* may give the impression of a slight contraction below the limb – this is an artifact of pressing and drying that I have replicated with flowers from the nursery-grown plants. The ring of anthers at this stage is just below the limb (yet to expand) and causes a slight bulge when pressed. Flowers of *N. suaveolens* pressed at anthesis do not show this feature, while those of *N. maritima* clearly do. The different habits and leaf shapes are also strong supporting characters if/when floral characters are not available (Figs 2–5). As in previous studies, I could not find convincing and consistent differences in seed shape, size or ornamentation – features that are often diagnostic amongst Australian species.

## Conclusion

Despite various references to *Nicotiana maritima* being (or having been) a member of the Victorian flora, I believe each piece of evidence for this is to be mistaken, either through mixing or misinterpretation of herbarium specimen labels, or through misidentification as a result of contemporary keys to identification relying on relatively weak characters for discerning *N. maritima* from its near relatives.

Unlike recently published keys and accounts, future keys that include both species should focus more on features of the corolla and foliage than on the density of indumentum.

## Acknowledgements

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