

The genus *Wahlenbergia*, (Campanulaceae): the harebells of New Zealand.

Judith Petterson¹

Cheerful blue or white starry flowers waving in the long grass or from rock faces and cliffs; dainty short-stemmed bells in mountain herbfield, taller stems in tussock grassland or shade; glossy turf-forming mats with sessile upturned flowers on Westland beaches; or squat, thick-leaved rosettes with scented flowers on Marlborough screes—the harebells of New Zealand are charming members of the native flora, occupying many different habitats in nature, and easily cultivated in the rockery or scree garden.

The leaves are sweet and palatable to grazing animals, so they no longer occur in nature where sheep and goats can get to them. Beware of slugs and snails mowing off your garden treasures.

In the Asia-Pacific region, *Wahlenbergia* has about 26 species in Australia and ten species in New Zealand, one in Japan, and several more (which need taxonomic revision) in Asia, northern India, New Guinea highlands, and other volcanic Pacific islands. Four different chromosome counts have been published in various parts of this region, all multiples of 9.

There are about 60 species recognised in Africa, all with diploid chromosome counts of 14, 16 or 18 (multiples of 7, 8 or 9), while multiples of 11 are recorded in the three species found in the Juan Fernandez islands, off the coast of Chile. There are eight *Wahlenbergia* species in South America, but as far as I know these are not yet counted.

Wahlenbergia in New Zealand falls naturally into two main classes:

1. The Radicate or Tap-rooted group of the lowlands, with tall, slender, branching, leafy stems each tipped with a single flower, and $2n = 54$ or $2n = 72$ chromosomes;
2. The Rhizomatous group, usually with rosulate tufts of leaves at ground level, each tuft with a single nodding bell-shaped flower on a short naked scape. These have $2n = 36$.

The Radicates have a life span up to four years, while the Rhizomatous species have an indefinite life-span, and are known to have remained 40 years or more in cultivation.

Chromosome counts have clarified relationships in two difficult cases. For example, *Wahlenbergia matthewsii*, unique with its erect leafy stems, subshrubby habit, and large, long-stemmed, bell-shaped flowers, was found to

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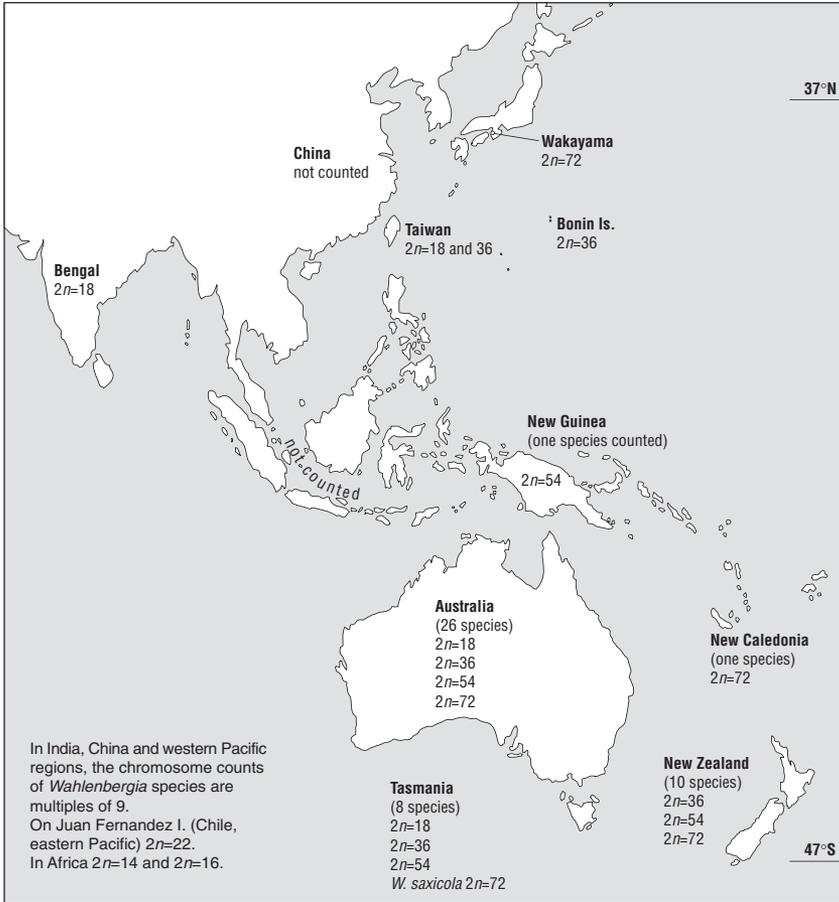


Fig. 1: Map of the Asia-Pacific region showing published diploid chromosome counts completed up to 1995.

have $2n = 36$, so belongs to the Rhizomatous group, even though it has a sturdy taproot and only limited rhizome growth.

The second example, *Wahlenbergia vernicosa* Petterson (1997), a recently recognised Radicate species in northern New Zealand is the only New Zealand native species with $2n = 54$ chromosomes. This chromosome number is found also in five species in Australia and one species in the New Guinea highlands.

W. vernicosa has recently been recognised by P.J.de Lange near sea-level at Anson Bay, Norfolk Island, and on the coast in Tasmania and Chatham Islands. It should be sought for in other Pacific Islands north of New Zealand. It may prove to be conspecific with *W. insulae-howei* Lothian (Smith 1992, pp 122–24)

on Lord Howe Island, judging by dried specimens in WELT and WELTU, but I have not seen this alive, nor have any chromosome counts been made. If confirmed conspecific the older name would take priority.

P.J. de Lange prefers to call this species *W. littoricola* Smith (1992), but I am not convinced, as the habitat and foliage as described by Smith (pp 140–41) are at odds, *W. littoricola* being mainly an inland forest/ scrub/ heath species with alternate leaves, and its living flower is similar to our *W. violacea* (see below), bright blue and shortly campanulate. I have seen it alive. *Wahlenbergia vernicosa* is coastal with mainly opposite, strongly toothed fleshy leaves and pale blue or white campanulate flowers. I have it naturalised all over my garden at Waikanae beach.

The growth forms found in New Zealand species, together with their chromosome counts are shown in Fig. 2.

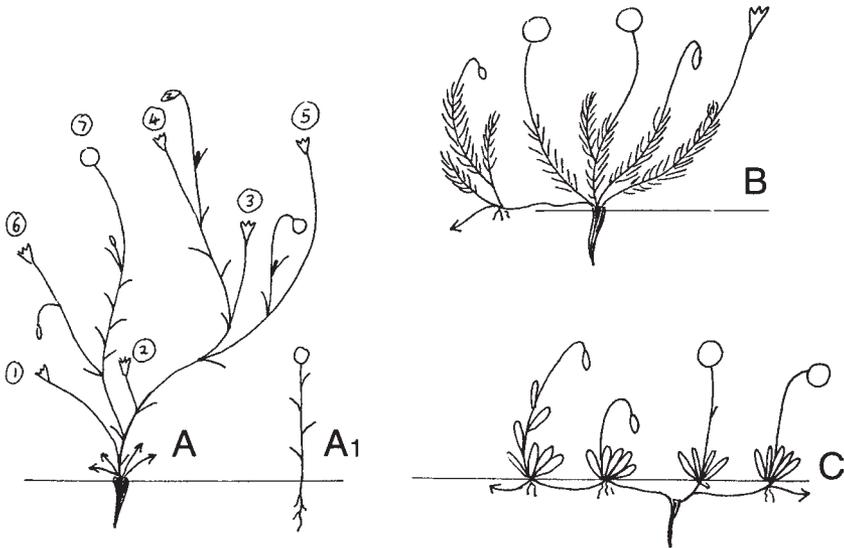


Fig. 2. Growth forms and associated chromosome counts found in New Zealand *Wahlenbergia*: A ($2n = 72$; $2n = 54$), Radicate: branching leafy stems with flowers numbered in order of age; A1, false annual; B ($2n = 36$), sub-shrubby *W. matthewsii*; C ($2n = 36$), Rhizomatous: the seedling starts with a taproot, and develops rhizomes which bear leafy tufts at their tips; each tuft produces a flower.

Since the habit and foliage are very similar within the groups, floral characters, both shape and colour, are most useful for separating *Wahlenbergia* species. Dried specimens often look alike, and should always have flower shape and colour noted before pressing.

The corolla shapes: A, B, C, in Radicate species, and D, E, F in Rhizomatous species are shown in Fig. 3.

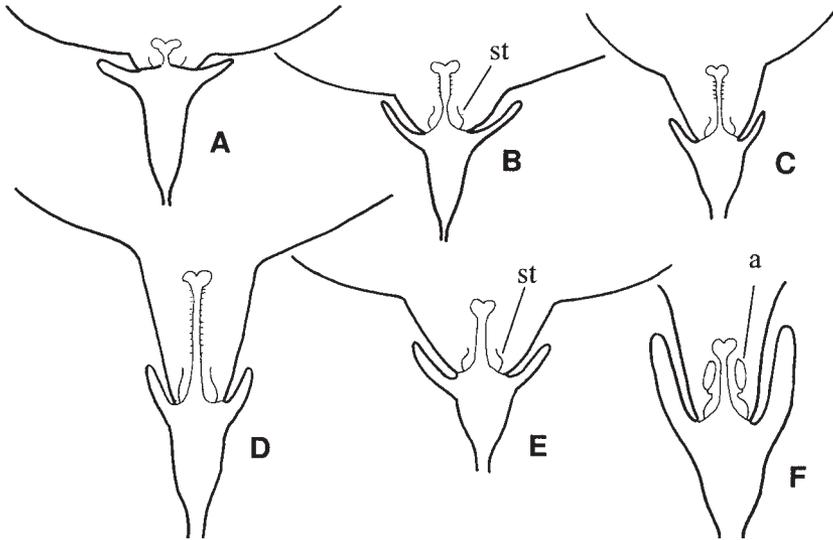


Fig. 3. Corolla shapes in New Zealand *Wahlenbergia*:

A, “rotate” with short style thickened immediately below stigma (*W. ramosa*, *W. rupestris* and *W. akaroa*, also *W. marginata* of Japan).

B, “shortly campanulate” with style thickened in upper half (*W. violacea* ($2n = 72$) in N.Z. and *W. littoricola* ($2n = 54$) in Australia).

C, “campanulate” with style slightly thickened in upper part (*W. vernicosa* of N.Z., also *W. gracilis* of New Caledonia and Norfolk Island.)

D, “Deeply campanulate” with straight slender style (*W. albomarginata* and its subspecies, also in *W. matthewsii*).

E, “Broadly campanulate” with straight style (*W. pygmaea* and its subspecies, also *W. congesta*).

F, “Funnel-form” with straight style (*W. cartilaginea*, *W. congesta* subsp. *haastii*).

The shape of the style is correlated with the shape of the corolla, e.g. a rotate corolla always has a short, thick-topped style, while a deeply campanulate corolla has a long slender style. Campanulate or shortly campanulate corollas have a slender style thickened in the top half. Styles show up well in dried specimens, and are useful for deducing the shape of a corolla which may have been damaged in pressing.

Flowers are here called “compact” if the petals are broad and touch or overlap at the side margins, and “starry” if the petals are elliptic and separate at the sides.

SYNOPSIS OF SPECIES ENDEMIC OR INDIGENOUS TO NEW ZEALAND

Radicale species

Flowers rotate:

- Pure white, inland, “starry” 3. *W. rupestris*
- Palest lilac, coastal, “compact” 2. *W. ramosa*
- Large pale blue-violet or white, coastal, “compact” 4. *W. akaroa*

Flowers shortly campanulate:

- Bright blue-violet, calyx lobes erect, “compact” 1. *W. violacea*

Flowers campanulate:

- Pale blue, lilac, or white, calyx lobes spreading or recurved, “starry” 5. *W. vernicosa*

Rhizomatous species

Linear leaves crowded on ascending branches 6. *W. matthewsii*

Leaves in separate radical, rosulate tufts:

- Capsules cylindrical or barrel-shaped:
 - Flower deeply campanulate, “starry” 7. *W. albomarginata*
 - Flower broadly campanulate, “compact” 8. *W. pygmaea*
- Capsules small, round, with minute lobes:
 - Flower sessile, coastal plant, “compact” 9. *W. congesta*
 - Flower “starry” subsp. *haastii*
- Capsule large, rounded, with very large thick lobes:
 - Leaves large and thick, scree plant 10. *W. cartilaginea*

The various features of the New Zealand species compared with those of *W. gracilis* of Norfolk Island and New Caledonia are shown in Fig 4.

THE RADICATE SPECIES

Four of the five New Zealand species have $2n = 72$, and are obviously related to *W. gracilis* of New Caledonia and *W. marginata* of Japan, although speciation has occurred here bringing differences in flower colour and corolla shape.

I will first discuss *W. gracilis* and *W. marginata*, and their relationship to *W. violacea* of New Zealand. Fig. 5 compares the floral features of these three related species, which all have blue-violet flowers.

<i>Wahlenbergia</i> species in NZ & NC																								
DIAGNOSTIC CRITERIA																								
Country of origin	vernicosa		gracilis		violacea		ramosa		rupestris		"colensoi"		matthewsii		cartilaginea		congesta		albomarginata olivina laxa flexilis decora		pygmaea "Egmont" "Ruahine" "Taranua"			
Root system	T A P		R O O T E D		R O O T E D		R O O T E D		R O O T E D		R O O T E D		R H I Z O M A T O U S		R H I Z O M A T O U S		R H I Z O M A T O U S		R H I Z O M A T O U S		(NI)			
Chromosomes	2n = 54		2n = 72		2n = 36		2n = 36																	
Growth habit	T A L L		A N D		A N D		A N D		B R A N C H I N G		B R A N C H I N G		B R A N C H I N G		B R A N C H I N G		B R A N C H I N G		B R A N C H I N G		T U F F E D			
Leaf arrangement	Some op- posite		A L T E R N A T E		A L T E R N A T E		A L T E R N A T E		A L T E R N A T E		A L T E R N A T E		A L T E R N A T E		A L T E R N A T E		A L T E R N A T E		A L T E R N A T E		R O S U L A T E			
Basal leaf shape	Lanceolate to oblanceolate		to spatulate, variable		Ovate to obovate-spathulate																			
Corolla shape and relative size																								
Corolla tube length : breadth (mm)	4 : 4		2 : 1		2 : 4		2 : 4		1 : 5		1 : 2		8 : 5		5 : 5		3 : 4		7 : 4		7 : 7			
Flower colour	lilac, blue or white		blue		blue		lilac		white		white		blue-white		lilac		blue-white		blue and white		blue and white			
Ripe capsule and calyx lobes × 1																								

Fig. 4. Comparison of New Zealand species of *Wahlenbergia*. (*W. akaroa* is omitted, but has a similar profile to *W. rupestris*).

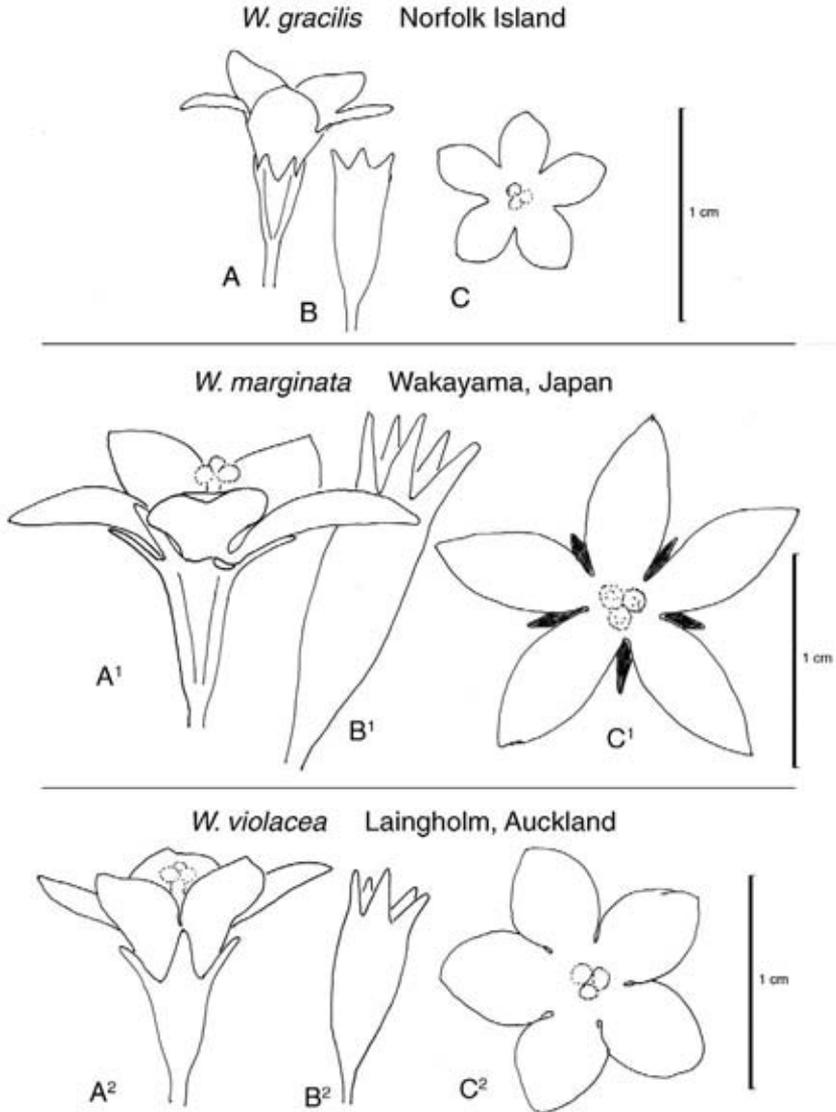


Fig. 5. Comparison of *W. gracilis*, *W. marginata* and *W. violacea*, the three species with blue-violet flowers and $2n = 72$:

W. gracilis, A, campanulate flower, with long corolla tube and short calyx lobes; B, small capsule; C, corolla showing short oblong petals. [New Caledonia and Norfolk Island.]

W. marginata, A¹, rotate flower, with short corolla tube and long calyx lobes; B¹, large capsule; C¹, corolla with long elliptic petals and calyx lobes showing between the petals. [Japan.]

W. violacea, A², shortly campanulate flower with medium corolla tube, and medium calyx lobes; B², capsule; C², corolla with broadly ovate petals overlapping. [New Zealand.]

1. *Wahlenbergia gracilis* Forster

This name was commonly used for all radicate species in New Zealand and Australia from Forster 1786 to Smith 1992. It is now restricted to the species originally collected by Johann and Georg Forster and by William Anderson in 1774 in the hills above Balade in northwest New Caledonia, during Cook's second voyage to the Pacific. The original specimens are in the herbaria at Kew, The Natural History (British) Museum, Paris and Goettingen, East Germany. (Petterson 1997, pp 63–68).

I obtained seed from New Caledonia many years ago and cultivated this species for five consecutive years and several generations in a glasshouse. It has consistently small, pale blue-violet campanulate flowers 4–10 mm diameter and 5–6 mm long. The corolla lobes are 1 mm long, and the calyx lobes very small and slender, 0.5 mm long. These dimensions match those of the original specimen collected by William Anderson in the Natural History Museum, London, as carefully measured for me by W.T. Stearn, the curator.

W. gracilis is the only known species native to the highlands of New Caledonia. Chromosome counts were made, $2n = 72$ (Petterson et al 1995). I saw the same species recently in the National Park of Norfolk Island. It is reported also from Lord Howe Island (Green 1994). Sets of my recent specimens are in the Herbaria at MPN, CHR, AK, and WELT.

2. *Wahlenbergia marginata* Thunberg

This was first collected by Carl Peter Thunberg in the Hakone Mountains between Nagoya and Tokyo, in 1776. A foreign visitor in Japan at that time was treated with great suspicion, and never allowed to go anywhere without a large escort of Japanese interpreters, guards and carriers who were not permitted to fraternise with the visitor. Imagine Dr Thunberg taking the opportunity to scuttle, coat-tails flapping, ahead of his retinue of minders when the steepness of the road caused the travellers to descend from the palanquin and travel by foot. "I gained time to gather a great many of the most curious and scarcest plants, which had just begun to flower, and which I put into my handkerchief" (Thunberg's diary, 1795). Thunberg's type specimen of *Wahlenbergia marginata* in Uppsala Herbarium must have been collected under these conditions as it looks as though it had withered before pressing.

Recent specimens which I raised to flowering in 1994 from seed sent from two sites in Honshu, Japan, had bright blue-violet, rotate "starry" flowers with 7–15 mm long elliptic petals cut almost to the base. The sepals were 4–5 mm long and slender, and appeared between the petals in face view, a feature not seen in any New Zealand species, but reported by Lothian (1947) for one taxon in Australia which may be the same species. The flowers were 15–25 mm diam in my glasshouse plants. The chromosome count was $2n = 72$ (Petterson et al 1995).

Sets of my specimens are in the herbaria at MPN, CHR, AK, and WELT.

The name *W. marginata* has been applied in the past to all *Wahlenbergia* species in the north Pacific, but some of these have different chromosome counts and are probably different species. For example Ono & Masuda (1981) reported $2n = 36$ in the Bonin Islands, while Hsu (1967, 1968) found $2n = 18$ and 36 in Taiwan. Further taxonomic research is needed there.

Species of New Zealand

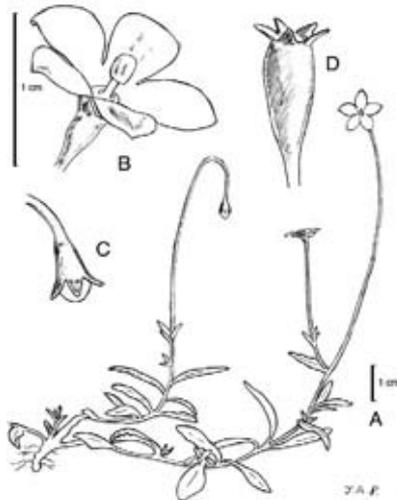
1. *Wahlenbergia violacea* Petterson 1997

This is the New Zealand “common blue” known informally for many years as *W. marginata* var. *australis* (E.D. Hatch, 1952; W.B. Sykes 1988). It is found naturally in most hilly places in New Zealand where sheep and goats are excluded, and is often regarded as a weed in gardens in its natural areas, because it is a coloniser of disturbed ground. Because Hatch’s name did not comply with the ICBN regulations I was advised that it could not be used, and I had to provide the plant with a new name. *W. violacea* differs from both *W. gracilis* and *W. marginata* in having shortly campanulate flowers with broadly ovate ‘compact’ petals. The flowers are usually 12–15 mm diam. The sepals are about 3–4 mm long, that is longer than those of *W. gracilis*, shorter than those of *W. marginata*. In young shoots the lower leaves are usually opposite. This contrasts with *W. gracilis* and *W. marginata*, which have alternate leaves.

2. *Wahlenbergia ramosa* G. Simpson

This modest species has palest lilac to off-white, “compact”, rotate flowers, usually 10–15 mm diam., sometimes larger. It is found in coastal, rocky places from Wellington’s Pukerua Bay to Cape Palliser, and also in the Marlborough Sounds. It is often found within reach of salt spray, when it has stiff bristly stems and leaves. In sheltered places the plants may grow lush and lax. Herbarium specimens indicate that it may also be found at East Cape and Otago Peninsula. All leaves are alternate.

Fig. 6. *Wahlenbergia ramosa*, Pukerua Bay. A, habit; B, rotate, broad-petalled flower; C young bud with short, wide calyx lobes; D, capsule.



3. *Wahlenbergia rupestris* G.Simpson

This species has pure white “starry” rotate flowers, ranging from 10–25 cm diameter. It is found inland in river gorges and terraces from the Rangitikei and Manawatu Rivers (central North Island) to Central Otago (South Island) and from the lowlands to 2000 ft. Very large-flowered forms are found in sheltered sites in the Manawatu Gorge. George Simpson named the species from smaller-flowered specimens in Central Otago. It is abundant in fenced reserves on Banks Peninsula. All leaves are alternate.

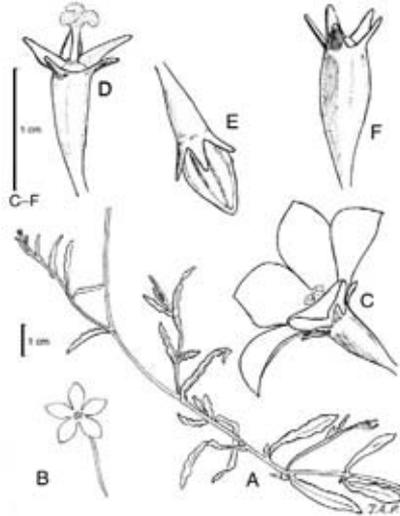
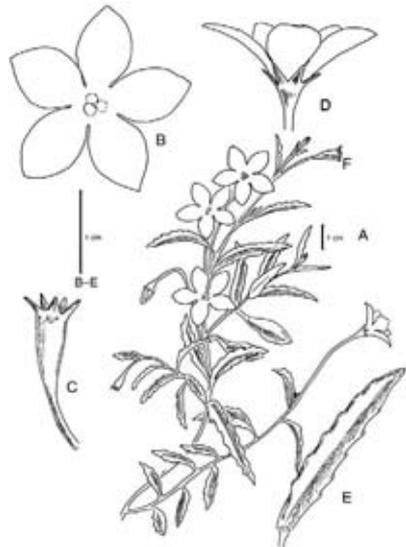


Fig. 7. *Wahlenbergia rupestris*, Manawatu Gorge. A, habit; B, rotate “starry” flower; C, flower; D, dissected flower showing short style and open stigma; E, bud with narrow calyx lobes; F, capsule.

4. *Wahlenbergia akaroa* Petterson 1997.

This species has very large, pale blue-violet or white rotate “compact” flowers, 20–30 mm diameter, with broad elliptic petals. It has more nectar than other species, and is very attractive to insects. Hoverflies, honey bees and bumblebees visit the flowers in my garden, whereas the other species are mainly self-pollinated and don’t attract insects to the same extent. The leaves and stems are somewhat fleshy and brittle, compared with other species, and seedlings look and taste like young lettuce. The leaves are alternate, usually large and regularly serrate, unlike the other species described above.



The earliest specimens in CHR Herbarium were collected in April 1983 by M.D. Stolp and M.J.A. Simpson, and the following year by H.D. Wilson, on the coastal basalt cliffs on Banks

Fig. 8. *Wahlenbergia akaroa*, Banks Peninsula. A, habit; B, rotate, broad-petalled flower; C, young capsule; D, flower in profile; E leaf.

Peninsula, from Akaroa Heads to Hickory Bay. It is greedily eaten by sheep, and is now found only in reserves. I believe it would be less rare if sheep were excluded from more of the eastern and northern cliff-tops of Banks Peninsula. *W. akaroa* is well-known to Christchurch gardeners under the informal names *Wahlenbergia* “Banks Peninsula” or “Akaroa Heads”. (Wilson 1987, p.8).

Hybridism

Both *W. violacea* and *W. rupestris* are far more common on Banks Peninsula than is *W. akaroa*. Hybrids between these occur in swarms on some roadsides and tracks, e.g. Long Bay Road and Godley Head Track. In the hybrid plants flower colour varies from lilac to pale blue, and flower size from 10–20 mm diameter. *W. akaroa* may have originated as a hybrid but is a vigorous stable form, with larger flowers and the characteristic fleshy leaves and stems. Some specimens have large white flowers. *W. akaroa* hybridises with other $2n = 72$ species in cultivation, giving further colour variation in the progeny. All the



Fig. 9. Comparison of (clockwise from top left) *W. ramosa*, *W. rupestris*, *W. akaroa* and *W. violacea*, all $\times 3$. Photos: G.B. Petterson from cultivated plants.

above species have a life-span of four years in cultivation, and chromosome count of $2n = 72$.

5. *Wahlenbergia vernicosa* Petterson 1997

This is a coastal subtropical species with $2n = 54$. It is found in northern New Zealand from the Three Kings Islands to Mayor Island, mainly on the east coast. I am grateful to P.J. de Lange, E.K. Cameron, and C.C. Ogle for specimens which they collected on Surville Cliffs and several offshore islets in the Hauraki Gulf and gave to me for cultivation.

This species was first collected by Banks and Solander in the Hauraki Gulf and/or Bay of Islands in 1769 (Kew specimens in WELT, photo in Petterson 1953), and by J.D. Hooker “95 New Zealand. Rocks near the sea, Bay of Islands Aug. 1841” (a Kew specimen, photo in Petterson 1953).

It was probably common in Northland in the early days of settlement, but succumbed to sheep and goats and other civilising factors. It is now largely confined to off-shore islets and reserves. The juvenile leaves are opposite, and in older plants the lower leaves are in 2–5 opposite pairs. Leaves may be broad, serrate and very glossy (as if varnished, hence *vernicosa*) in coastal habitats, or narrow, entire and dull in poor dry scrubland. The flowers are erect or nodding bells, 12–18 mm diameter, and may be pale clear blue, palest lilac or pure white in different plants (see fig. 20, p. 35). Some small islets have only one colour form (fide P.J. de Lange).

W. vernicosa makes a great garden plant, a mound of entangled brittle stems covered in glossy leaves, with dozens of short-stemmed bell-flowers hovering above. Useful diagnostic features are:

- (1) 2–5 pairs of opposite leaves on each stem,
- (2) the calyx lobes spread out horizontally in the ripening fruit, then curl back. In dried specimens the calyx lobes appear twisted or curly, and this is a useful feature for baffled botanists.
- (3) The life-span is 2 years. The stems become thickened and brittle, the leaves sparse, and the roots ropy and tangled, in moribund plants in their second year.

Fig 10. *Wahlenbergia vernicosa*, Three Kings Islands. A, habit; B, campanulate flower; C, C1, capsule with radiating calyx lobes; D, upper leaf; E lower leaf.



Note on habitat effects

In all these five Radicate species the first flowers in spring are the largest. Late autumn flowers on the same plants can be tiny (down to 2–3 mm diameter) when the store of nutrition is being used up by the ripening capsules. Also false annuals are found in all these species in dry conditions, when the young seedlings have “bolted” into flower and fruit because of lack of nourishment. Where there is plenty of rich soil all species become lush and leafy with larger flowers.

Note on *Wahlenbergia colensoi* N.E. Brown

The tiny specimens on which this dubious species is based were collected by William Colenso in six different sites from the Bay of Islands to Hawke’s Bay and the Wairarapa, over seven years from 1841 to 1848. Colenso sent them to W.J. Hooker, Director of the Herbarium at Kew, with numbered notes and labels for every collection (Pettersen 1997, pp. 72–5). Colenso’s notes on these *Wahlenbergia* specimens indicate that he thought them to be a new species, not *W. gracilis*. It seems to me that if Colenso thought of *W. gracilis* as blue-flowered, then these specimens would be white or pale-flowered. He selected tiny starved specimens, thinking the small size was significant. Judging by the localities given, (Bay of Islands, Hawke’s Bay coast, northern Wairarapa) I believe they are samples of *W. vernicosa*, *W. ramosa*, and *W. rupestris*, respectively. The Bay of Islands specimens have opposite leaves, the others have alternate leaves. They look alike because they are mostly bolted seedlings of similar age (less than 3 months). Colenso noted tiny 3-petalled flowers in the Wairarapa collection, and labelled it “*W. trifida*”. But 3-petalled flowers are quite common in starved plants.

These Colenso specimens were all mounted nine years later on three sheets at Kew, presumably by J.D. Hooker whose stamp “Herbarium Hookerianum 1867” is on each sheet. In most cases the provenance is not given, and perhaps the younger Hooker did not know of the letters from Colenso to his father. In 1913, forty-seven years later, N.E. Brown found the mounted specimens and published the name *W. colensoi* for them. This name has been a puzzle to New Zealand botanists ever since that time, and many, including myself, placed any *Wahlenbergia* with small white flowers and spindly growth in *W. colensoi*.

My recent cultivation experiments have proved to my satisfaction that seedling *Wahlenbergia* of any radicate species, growing in dry, crowded conditions in sand, will take on the appearance of “*W. colensoi*”, while its siblings grown in better soil conditions, will develop normally. The name *W. colensoi* is therefore discarded as a *nomen dubium*, since the specimens on which it is based are dwarfed specimens of several radicate species.

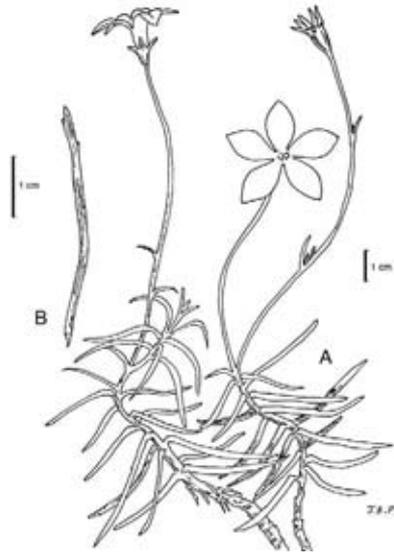
THE RHIZOMATOUS SPECIES

6. *W. matthewsii* Cockayne 1915

This lime-loving endemic species has a peculiar distribution, being found on marble at Gorge Creek, Takaka Valley, Golden Bay, and also near the Kaikoura coast of the South Island, where it grows on the fine-grained pink and white limestone known locally as “Wharanui stone”. The pretty little stone church at Keckerangu is built of this stone, which occurs from Keckerangu to the Waima (Ure) River. There are many endemic plants in this area, including *W. matthewsii*, which is to be found on the banks and upper reaches of the Waima (Ure) River.

In the garden, *W. matthewsii* grows readily from seed, forming a neat little soft shrublet with large pale-blue or lilac flowers held aloft on long stalks. The crowded narrow-linear leaves clothing the stems are unique to this species, and the large (3 cm diameter) bell-flowers make it a desirable rockery plant. It seeds freely in cultivation, and in suitable conditions sends out short rhizomes which develop into daughter plants surrounding the parent.

Fig. 11. *Wahlenbergia matthewsii*, Isolation Creek, Waima R., Marlborough. A, habit with leafy stems and large deeply campanulate flowers; B, leaf.



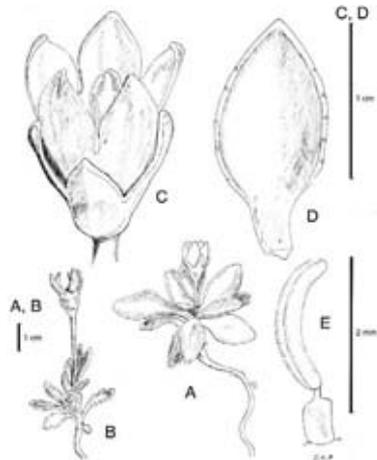
7. *W. cartilaginea* J.D.Hooker 1876

This is another Range-Restricted endemic species found only in the greywacke sandstone mountains of the Inland Kaikoura Range, where the climate is dry and the mountain slopes shatter and slide down in running slips. This most remarkable plant was discovered by Captain Rough, Andrew Sinclair and Henry Travers in the screes of the inland Kaikoura Range in the early days of exploration, and named by J.D. Hooker in 1867. It has rosettes of thick, cartilaginous, oblong to ovate leaves, short thick flower stalks, and massive calyx lobes protecting the delicate, pale pink funnel-shaped flowers.

Every exposed part of this little plant is thick and stiff and cartilaginous, so that it can survive the heat of the day, the bitter cold at night, the wind-blown sand on the surface, and the constantly moving substrate. The slender roots go down two metres or more to find cool water beneath the scree, and the slender branching rhizomes grow up to the surface where each produces a tuft

of small thick leaves. These surface rosettes show by their colour the extent of each plant, some plants having glaucous leaves, others yellowish grey. The flowers are sweetly scented, and are probably pollinated by the black scree butterfly, or by tussock moths. I would like to know what the pollinators are, if anyone has seen them. The seeds germinate readily after several months in the freezer, so that we were able to get chromosome counts from the seedlings, but they must have a scree-garden and winter cold to survive in the lowlands. Fig. 12 shows two whole rosettes, one in flower, the other with a maturing capsule, brought down from Mt Te Rako by J. Forbes in 1951.

Fig. 12. *Wahlenbergia cartilaginea*, Mt Terako, North Canterbury. A, habit in flower; B, habit in fruit; C, flower; D, leaf; E, stamen and filament.



8. *Wahlenbergia congesta* (Cheeseman) N.E. Brown 1913

This charming little mat-plant has bright green compact mats of short glossy leaves, short-stemmed wide-open waxy-white or blue-tinted flowers, and perfectly round capsules like little mung beans. This species is found only on the West and South Coast of the South Island on storm-swept rocky promontories from Puponga in the north to Invercargill in the south. Many of these promontories are rough, grey, layered limestone, like the Punakaiki Pancake Rocks and Cape Foulwind but the southern sites near Invercargill are granite or gneiss.

Subspecies *haastii* has tiny funnel-shaped flowers and capsules half the size of normal *W. congesta*. It is found halfway down the West Coast near the Haast River, where a beach called Ship's Creek has sparkling mica schist sand which has come down from the

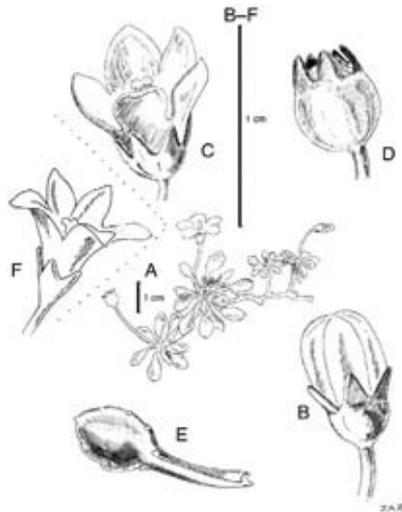


Fig. 13. *Wahlenbergia congesta*, Cape Foulwind. A, habit; B, bud, showing short calyx lobes and rounded ovary; C, flower; D, ripe capsule; E, leaf; F, flower of subsp. *haastii*, cult. from Ship's Creek beach north of Haast River.

hinterland. The plants of subsp. *haastii* form extensive mats several metres across, half-buried in the shifting sand. In the garden, on gravel, it makes a compact glossy green mat with small sessile white flowers and dark green capsules no bigger than mustard seeds. At present the range of this subspecies is not known, and further searching of the beaches north and south of Ship's Creek is recommended.

W. albomarginata W.J.Hooker 1852

This is the common mountain-grassland harebell of the Eastern South Island. It has characteristic smooth-margined, spoon-shaped or narrow-elliptic leaves, the margins sometimes thickened and white in dry conditions. The flowers are deeply campanulate, about 15–20 mm diameter. J.C. Bidwill visited “the mountains at the head of the Wairau valley” for one month in March 1848. He was the first European explorer to see the subalpine flora of the South Island, and he sent 90 species new to science to W.J. Hooker at Kew. Among these were the first specimens of southern hemisphere subalpine *Wahlenbergia*.

Hooker named it *W. albomarginata* because of the white-margined leaves in Bidwill's specimens. It makes a charming rock garden plant with its erect naked flower stalks and slender bell-flowers, which vary from pale blue to white in different populations. Several subspecies have been separated on leaf shape, geological substrate, and geography; all have the long slender corolla of *W. albomarginata*:

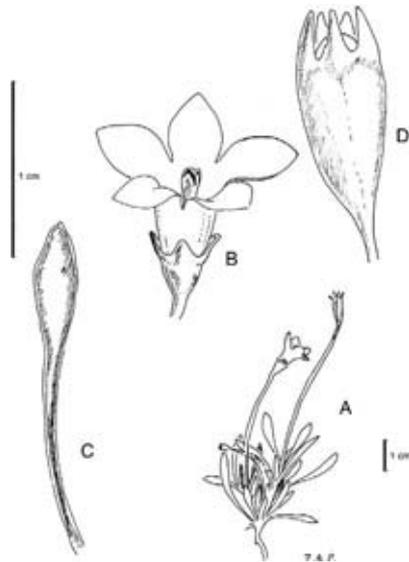


Fig. 14. *Wahlenbergia albomarginata* from Fox Peak, Canterbury. A, habit; B, flower; C, leaf; D, capsule.

(1) Subspecies *laxa* (G.Simpson) Petterson

This has dentate-undulate leaf margins and larger flowers, up to 30 mm diameter. It is found in valleys and lake margins in the high rainfall Nelson ranges west of the Wairau Valley, also at Arthur's Pass and possibly Fiordland.

(2) Subspecies *flexilis* (Petrie) Petterson

This has ovate, entire leaves on the beach at Flaxbourne River Mouth, but also becomes drawn-up in scrub, and carries its rosulate tufts of leaves up the elongating stem. Donald Petrie and Bernard Aston first found it in 1915 in small gullies and valleys in the inner Clarence Basin, and thought it worthy of being a species. George Simpson found it on the Rag Saddle and cultivated it

for some years. He gave living, flowering specimens to me, and I duly named it *W. simpsonii*. (Allan 1961). Petrie's name has priority. The inner Clarence basin is completely changed by grazing and flooding, and subsp. *flexilis* now survives only on or near the beach at Flaxbourne River mouth and appears to be confined to Kaikoura limestone.

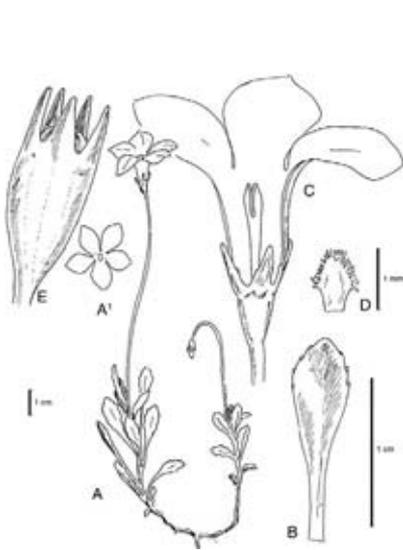


Fig. 15. *Wahlenbergia albomarginata* subspecies *laxa*, Arthur's Pass, Southern Alps. A, habit; A' corolla; B, leaf; C, flower dissected to show long corolla tube; D, staminal filament; E, capsule.



Fig. 16. *Wahlenbergia albomarginata* subspecies *flexilis*, Flaxbourne, Marlborough. A, habit (drawn-up shade form); B, bud; C, flower; D, capsule; E1 bract; E 2 rosette leaf.

(3) Subspecies *olivina* Petterson

This is confined to serpentine in the Mineral belt extending from Dun Mountain to near Lake Rotoiti. Its leaves are dark green, bristly above and often purple beneath.



Fig. 17. *Wahlenbergia albomarginata* subspecies *olivina*, Dun Mountain, Nelson. A, habit; B, leaf; C, flower.

(4) Subspecies *decora* Petterson

With fragrant blue flowers, this is found in the high peaks of Nelson Lakes National Park, at 5000-6000 ft. This form needs further study in cultivation to determine its status. Specimens in CHR collected by M.J.A. Simpson and A.P. Druce in Nelson Lakes N.P., and specimens in OTA collected by Alan Mark and others in the Humbolt Range and other Fiordland and Southland ranges, indicate a distinctive high-altitude taxon with short-stemmed large flowers, giving every indication of a beautiful rock-garden treasure.

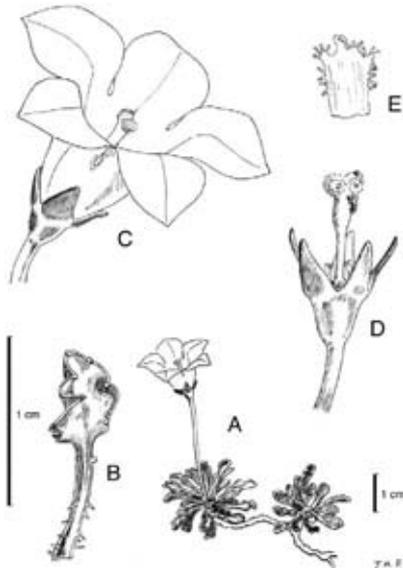
10 *W. pygmaea* Colenso

William Colenso, who tramped all over the North Island during the 1840s as part of his missionary work for the CMS, found this plant on the bleak windswept tops of the Ruahine range. In contrast to the slender bells of *W. albomarginata* and its allies in the South Island, the North Island *W. pygmaea* has much wider bell flowers. It is a charming rockery plant with its large, broad bells and neat rosettes of glossy red-edged leaves.

W. pygmaea can be found above the treeline on all the volcanoes of the Central North Island and most of the emergent peaks of the other ranges. It is also found at a low altitude in the Rangipo desert, whose forests were destroyed 2000 years ago by the eruptions which formed Lake Taupo. This “desert” is an area of subalpine tussock-grassland and scrub, at a forest altitude, where grow many herbaceous species which are usually found at much higher altitudes.

Each isolated mountain has its own unique variety of *W. pygmaea*, differing mainly in foliage characters. In cultivation they can be recognised by the leaves when growing side by side. Of these I have named only two subspecies:

Fig. 18. *Wahlenbergia pygmaea*, Kaimanawa Range. A, habit; B, leaf; C, broad-tubed flower; D, dissected flower showing style and open stigma; E staminal filament.



(1) Subspecies *tararua* Petterson

Found only on Mt Holdsworth and Mt Mitre in the Tararua Range, this has large opaque white flowers. The leaves are serrate and flat, dark green, forming neat rosettes. It was collected by A.P. Druce and cultivated by him for at least 40 years. I had the same clone in cultivation about 10 years, propagated by

cuttings from the original, and I gave most of my plants to Percy's Reserve, Petone. It flowers well but sets no seed. Further collections from the original sites are needed both to preserve this species in cultivation, and to find fertile forms.

(2) Subspecies *drucei* Petterson

This is found only on Mt Egmont, and has pale-blue and creamy-white striped flowers. The leaves are bright green and crimped at the margins. It is one of the best garden species, because it is self-fertile and produces flowers and seed generously. I collected cuttings from 14 well separated sites on Mt Egmont, and kept careful records of the resulting plants. All proved to be the same taxon, varying only slightly in flower colour.

It is named for the late A.P. (Tony) Druce who had it in cultivation for many years. Tony collected hundreds of different plant species all over New Zealand. He maintained most of them in cultivation for several decades. He was well known for his generous willingness to share information and living plants with anyone who would take care of them. Many of his living plants are now in cultivation at Percy's Reserve, Petone (Wellington), and in the garden of Arnold Dench, Newlands, Wellington.

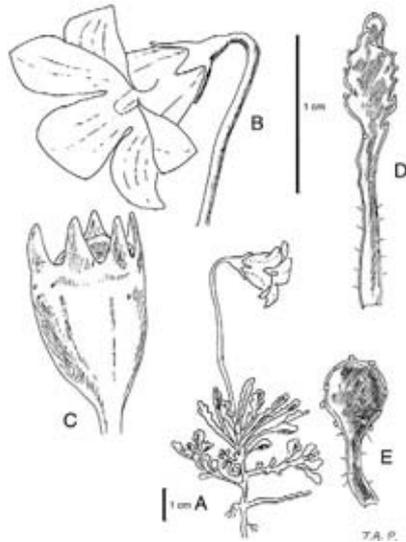


Fig. 19. *Wahlenbergia pygmaea* subspecies *drucei*, Mt Egmont. A, habit; B, flower; C, capsule; D, old leaf; E, young leaf.

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Fig. 20. *Wahlenbergia vernicosa*. Photo: David Gregorie from a cultivated plant from "Great King", Three Kings Islands, collected by Tony Silbery.