

Supplement to
**Eagle's Complete
Trees and Shrubs
of New Zealand**
Additional Notes

Audrey Eagle



Botanical Society of Otago

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Note: Citations and abbreviations are provided (unless otherwise noted) in Eagle, A. (2006) Eagle's Complete Trees and Shrubs of New Zealand. Te Papa Press, Wellington.

Abbreviations

aff.	with affinity to
agg.	aggregate
Ch	Chatham Island(s)
cv	cultivar
f.	forma
Is	Islands
K	Kermadec Islands
NZ	New Zealand
N (I)	North Island
N.	North
S (I)	South Island
S.	South
sp.	species (singular)
spp.	species (plural)
ssp.	subspecies
St (I)	Stewart Island
TK	Three Kings Islands
var.	variety

Cover illustration: *Olearia albida* var. *angulata*

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Introduction

The Botanical Society of Otago is delighted to have assisted Society member Audrey Eagle with publication of this supplement to her magnificent artistic volumes. At the outset it was apparent that this was no ordinary collection of facts and figures. Instead it represents insights and contributions by some of New Zealand's most sagacious botanical observers, and includes material hitherto unpublished. With this in mind the Society was eager to ensure this valuable resource was made readily accessible to the wider botanical community. I hope you share our enthusiasm for it.

John Barkla
Chairman
Botanical Society of Otago

Foreword

Since 1967 I have been gathering comments and observations of botanical interest from numerous sources, and from many NZ botanists, including Colin Ogle, Peter Heenan, Neil Simpson, Brian Molloy, Helen & Tony Druce, Mike Bayly, Alison Kellow, and Eric Godley. These include interesting and useful information not necessarily apparent in the paintings such as important comparative differences between similar species, taxonomic notes, conservation status, threats, special features, breeding systems, regional variation (morphology, colour, etc), historical information, discoverers, cultural uses and values, hybridism, cultivation, phenology (flowering times etc), ecological notes, and much else. All this text has been updated and expanded.

The design for *Eagle's Complete Trees & Shrubs of New Zealand* incorporates the illustration on one page and the text on the opposite page. Everyone will agree that this layout is an advantage over that of the previous books where the illustrations were in the front section of the book and the text at the back. It was found by the new book's designer that on pages with multiple illustrations that it was impossible to include comments as well as the descriptions on the opposite page, therefore the comments had to be removed.

Shannel Courtney, DOC, Nelson inspired the concept of a Supplement containing all the additional information. Allison Knight, editor of the Newsletter of The Botanical Society of Otago carried forward this idea and Claire Murdoch, Publishing Manager of Te Papa Press, helped facilitate it. I am delighted and very grateful that the President of the Botanical Society of Otago, John Barkla and the committee were enthusiastic about the publication of the Supplement.

Shelley Hill of Dunedin extracted and collated the information from my original manuscript. Some of the comments having been taken out of context required editing for consistency, amongst other things. I am most grateful to Mike Thorsen of the Botanical Society who undertook the editing assignment, with excellent results. I also wish to thank John Barkla for his overall view and comments on the draft copy.

I wish to express my appreciation and gratitude to the four organizations that have generously provided funds towards the cost of the Supplement: Wellington and Nelson Botanical Societies and the Waikato and Dunedin Branches of the Royal Forest & Bird Protection Society.

I am thrilled that these hard-won and informative extra notes will not be lost to the botanical community, which has been so supportive of my work.

Audrey Eagle
2006

Page	Name	Additional Notes
VOLUME I		
2	<i>Dacrycarpus dacrydioides</i>	When Captain Cook sailed to the head of the Firth of Thames he was amazed when he saw the size of the kahikatea on the Hauraki Plains and the magnificence of those forests.
8	<i>Podocarpus totara</i> var. <i>totara</i>	This was the most prized tree of the Maori, holding the place of highest honour in their lore and legend.
8	<i>P. totara</i> var. <i>waihoensis</i>	“Although this variety originated via hybridisation between <i>P. acutifolius</i> x <i>P. totara</i> it is now a stable entity. The leaves are halfway between the two species, not as wide as those of <i>P. totara</i> or as narrow as those of <i>P. acutifolius</i> . The bark is also intermediate between that of <i>P. totara</i> (thick) and of <i>P. acutifolius</i> (thin). It is of a smaller stature and more bushy than <i>P. totara</i> ” (P Wardle & BPJ Molloy pers. comm.).
12	<i>P. hallii</i>	Also known as <i>P. cunninghamii</i> .
14	<i>P. nivalis</i>	Was first collected on Mt Tongariro by JC Bidwill.
16	<i>Halocarpus kirkii</i>	First collected by Colenso in 1841.
18	<i>H. bidwillii</i>	The flowering specimens were collected from a predominantly male tree that had a few female flowers on the lower branches. This is one of the many plants found by Bidwill, who was the first European botanist to examine the mountain vegetation of New Zealand. His specimens of bog pine were gathered in the Nelson area.
20	<i>H. biformis</i>	All parts of the plant are resinous. According to Kirk, shepherds used to extract tar from its branches. It has been called tarwood. First collected in Dusky Sound by Menzies in 1791.
22	<i>Dacrydium cupressinum</i>	Rimu was noted during Cook's first expedition, and was later used in his second and third voyages to brew “spruce beer”. The graceful weeping habit and conical shape of a young rimu makes it one of the easiest trees to recognise. In open places this condition is persistent for many years, in dense stands the crown is small and round.
24	<i>Lepidothamnus intermedius</i>	First recorded by Kirk in 1867 on Mt Hiraikimata, Great Barrier I.
26	<i>L. laxifolius</i>	Is generally considered to be the world's smallest naturally occurring conifer.
28	<i>Manoao colensoi</i>	Also known as <i>Lagarostrobos colensoi</i> .
30	<i>Phyllocladus toatoa</i>	A very distinct species forming handsome tapering trees. Although it is very local in its distribution it is surprising that it had escaped the notice of European botanists until 1865.

- 32 *Phyllocladus trichomanoides* (i)
(*P. trichomanoides* s.s.) First collected in 1826 by Allan Cunningham.
- 34 *P. trichomanoides* (ii) This is the only New Zealand conifer known to be confined to ultramafic rock.
- 36 *P. alpinus* (i)
(*P. alpinus* s.s.) Mountain toatoa was first noted by Bidwill on Tongariro.
- 38 *P. alpinus* (ii) “This form and *P. alpinus* (i) occur together in many areas, e.g., NW Nelson. In the Coromandel and Kaimai Ranges *P. alpinus* (i) is absent, in the Tararua Ranges *P. alpinus* (i) is absent from the area where *P. alpinus* (ii) grows. It is not known yet if they hybridise” (AP Druce pers. comm.). “The male branchlet came from plants growing with *Gabnia pauciflora*, *Hebe* species, *Lepidothamnus laxifolius* and *Halocarpus biformis* in an ultramafic shrub-tussock association. The small branchlet (lower left) came from plants growing with *Halocarpus biformis*, *Leptospermum scoparium* and *Pseudopanax crassifolius* in moist forest” (Cathy Jones pers. comm.).
- 42 *Libocedrus plumosa* When fully grown a kawaka is a noble sight with a tall, straight, naked trunk and the crown retaining its conical outline. First noted by Richard Cunningham in the Bay of Islands.
- 44 ARAUCARIACEAE The monkey puzzle tree (*Araucaria araucana*), the Norfolk Island pine (*Araucaria heterophylla*) and the wollemi pine (*Wollemia nobilis*) belong to this family.
- 44 AGATHIS The genus is an old lineage. Fossils suggest it was a major element in the temperate rainforest that covered much of Gondwana around 120 million years ago.
- 44 *Agathis australis* Marion du Fresne, when visiting the Bay of Islands in 1772, was the first European to definitely record the species. The tree has a high resin content in all its parts; this is the well known kauri gum. In young trees, known as kauri rickers, the crown is narrowly conical; mature trees have a flat-topped head of great branches with a spread of up to 30 m diam. This is the largest and most famous of New Zealand's timber trees. Its majestic size and huge columnar trunks with little or no taper make the kauri an awe-inspiring sight.
- 46 *Pseudowintera colorata* It often forms thickets after the forest has been destroyed because it is unpalatable to browsing mammals that eat out other regeneration like *Coprosma grandifolia*, *Aristotelia serrata* and *Pseudopanax arboreus*.
- 48 *P. traversii* Small-leaved horopito was first collected by HH Travers in 1882 in the hills behind Collingwood.
- P. insperata* *P. insperata* was described too late for illustration. The following description is from PB Heenan & PJ de Lange (2006) *Pseudowintera insperata* (Winteraceae), an overlooked and rare new species from northern New Zealand. *New Zealand Journal of*

Botany 44: 89-98): “*Pseudowintera insperata* is described as the fourth species of the New Zealand endemic genus *Pseudowintera*. It is distinguished from the other three species of *Pseudowintera* by a combination of characters, including being a small tree with an upright habit, by the broadly ovate to broadly elliptic leaves that are glossy and without blemishes and blotches, having a conspicuous pale cream to yellow-green midvein, ciliate inflorescence bracts, an entire cupule, and black fruit. *P. insperata* is known with certainty from ... the vicinity of Whangarei, Northland, where it is a canopy emergent of the scrubby and windshorn forest that grows on skeletal soils and boulder fall at the base of volcanic rock tors. ... Shrub to tree 7 m high, ... lamina 35-110 x 18-45 mm ... The epithet *insperata* refers to the unexpected discovery and recognition of the species”.

- 50 **LAURACEAE** The bay tree (*Lauris nobilis*) is a member of this family.
- 50 *Beilschmiedia tarairi* A handsome tree with a distinctive appearance due to the tall, straight trunk and bold foliage. In taraire forest the ground is thickly strewn with dry brown leaves. First specimens collected by Allan Cunningham, who found it on the banks of rivers in the Bay of Islands in 1826.
- 52 *B. tawa* The native pigeon (*Hemiphaga novaeseelandiae*) is needed to disperse the seeds of this tree and those of taraire.
- 54 *B. tawaroa* “...differs from *B. tawa* ... by its broad crowned habit and its larger, broader, elliptic, dark green leaves” (Wright 1984). However, de Lange & Cameron (1999, and other authors cited therein) do not accept this as a good species. In their view the chief distinguishing character of the species - leaf size - is inconsistent. They cite instances where large-leaved forms of *B. tawa* occur well outside the accepted range of *B. tawaroa* s.s., and further observed that neither fruit nor wood characters distinguish the species from *B. tawa*. They also noted the erratic - with respect to leaf size - behaviour of *B. tawaroa* trees on some islands, and that the ecological distinctions as cited by Wright (1984) have, with further field work, been shown to be largely unfounded. On the basis of this information they recommend, that, pending further study, *B. tawaroa* should be treated merely as a large-leaved form of *B. tawa*.
- 56 *Litsea calicaris* Found by Banks and Solander in the Bay of Islands in 1769. Over the greater part of its natural range it occurs sparingly as single trees or in small groves. Near Rotorua and Kawhia it may be the commonest tree after tawa (*Beilschmiedia tawa*).
- 60 *Hedycarya arborea* First collected by Banks and Solander at Anaura Bay, near Gisborne, in 1769. The fruit, together with those of *Beilschmiedia tawa* and *B. tarairi*, are a favourite food of the native pigeon (*Hemiphaga novaeseelandiae*).
- 60 *H. aff. arborea* (from northern offshore islands) The largest-leaved *Hedycarya* measured on Aorangi by PJ de Lange and EK Cameron had a leaf blade of 16.8 x 10 cm. They wrote: “Although the foliage of Three Kings *Hedycarya* is

distinctly and uniformly larger, on Poor Knights, the pattern is complicated by the occurrence of intermediates and plants which foliage dimensions the same as that usually seen in *H. arborea* s.s.” (de Lange & Cameron 1999).

- 66 *Clematis forsteri* (i) *C. forsteri* has glabrous branchlets and leaflets that distinguish it from *C. foetida*, which has young branchlets and unfolding leaves densely covered in yellow hairs. *C. forsteri* is distinguished from *C. petriei* in having both adaxial and abaxial sepal surfaces moderately to densely hairy; rarely glabrous on adaxial surface; achenes light brown to dark brown, rarely red-brown, with sparse covering of simple hairs. Floral bracts linear to elliptic, apex acute to obtuse. Flower scent spicy” (Heenan & Cartman 2000). The leaves of juvenile plants differ greatly from those of *C. foetida* and *C. paniculata*, in which the leaves are variously dissected and lobed. All plants of this species have a similar spicy smell. Leaves very variable throughout. Flowers very pale green, never white.
- 68 *C. forsteri* (ii) “There is a big variation in both size and shape of leaflets from one area to another and sometimes in the same area eg. Cobb Valley and Kaikoura Coast” (J Cartman pers. comm.) (Five variations illustrated.). The Castle Hill plants were growing amongst limestone tors and climbing on *Aristolelia fruticosa* var. *rigidula* and *Discaria toumatou* (matagouri). It appears that the pink blush at the base of the sepals is not present on *Clematis forsteri* (iii).
- 70 *C. forsteri* (iii) “The leaves are more congested in the wild, they tend to spread out more in cultivation” (J Cartman pers. comm.).
- 70 *C. forsteri* (iv) Hybrids occur in areas where it grows with *C. afoliata* (J Cartman pers. comm.).
- 70 *C. forsteri* (v) “Plants on which *C. forsteri* is based were collected by the Forsters in 1773 and almost certainly came from Queen Charlotte Sound. These Cook Strait plants were formerly given the illegitimate name *C. bookeriana*. The type specimen of *C. forsteri* was located by PB Heenan in the late 1990’s” (J Cartman pers. comm.).
- 72 *C. petriei* “*Clematis petriei* is distinguished from *C. forsteri* by a number of characters. ...The most notable are that the achenes and adaxial surface of the sepals are glabrous, whereas in *C. forsteri* they are hairy. The flowers of *C. petriei* have a very distinctive fruity scent” (Heenan & Cartman 2000). Unlike *C. forsteri*, *C. petriei* is not a very variable plant, and it never has the pinkish colour at the base of the sepals that is usually present on those of *C. forsteri* (ii).
- 74 *C. foetida* First recorded by Raoul from near Akaroa about 1840.
- 76 *C. marmoraria* This interesting little plant was discovered in 1970 by BV Sneddon who writes: “*Clematis marmoraria* is very distinct and unlikely to be confused with any other species of *Clematis* in New Zealand. It is also unlike any species occurring in

Australia - *Clematis marmoraria* differs from other New Zealand species in its rupestral alpine habitat; the low, suckering, essentially non-lianoid habit with short, erect stems and crowded leaves in full light; the non-twining petioles and petiolules; the uniquely dissected leaflets; and the solitary flowers with obovate sepals”.

- 80 *Clematis marata* This plant was first collected on Banks Peninsula by JB Armstrong and described by him in 1881. In about 1950 HG Gilpin found a few plants on Banks Peninsula in one locality only. In 1980 he told J Cartman, who then visited the area and found a few plants of both sexes. *Clematis marata* is similar to *C. quadribraeteolata* and is often confused with it. The latter has brownish-purple flowers, usually two from a node but occasionally three. The leaflets are simple, they seldom have lobes, and are glabrous or with very few hairs. It is sparingly branched and except when in seed is a much less obvious plant than the more leafy *C. marata*. In the Craigieburn area the two species flower six weeks apart, *C. quadribraeteolata* flowering in late October and *C. marata* in early December. Most of the above information has been supplied by J Cartman. It has not been possible to find the meaning of the word *marata*. In Armstrong's description he stated “...forming dense interlaced masses among scrub”. One meaning of the Latin *marita* is “of plants, tied or trained together”. This may be the word Armstrong was thinking of and possibly there was a misprint.
- 82 *C. quadribraeteolata* First collected by William Colenso in 1847 on the banks of the Lake Rotoatara, near Te Aute. This lake is not shown on modern maps, it has been drained and is now farmland.
- 86 *Ascarina lucida*
var. *lanceolata* The specimen illustrated was dioecious. Compared with *A. lucida* var. *lucida*, *A. lucida* var. *lanceolata* has more closely packed flowers and fruit on spikes that are shorter and more compactly arranged. The leaves, although variable in both varieties, tend to be narrower with a more acute tip and slightly larger. The branchlets are of a green hue, whereas in *A. lucida* var. *lucida* the flowers are openly spaced on widespread spikes and the branchlets are a dark purple.
- 88 PIPERACEAE *Piper* species are used for making common domestic pepper. Leaves of *Piper betle* are chewed with betel nut (*Areca catechu*) extensively in the East. *Macropiper methysticum* is used to prepare the intoxicating drink, kava.
- 88 *Macropiper melchior* *M. melchior* lacks the peppery taste characteristic of *M. excelsum* and its allies.
- 90 *M. excelsum*
ssp. *excelsum* Leaves aromatic and peppery to the taste. Caterpillars of a large Geometrid moth, *Cleora scriptaria*, are particularly partial to this species. In the author's New Plymouth garden a tree of this species, with numerous holes in virtually every leaf, was growing 7 m from *M. excelsum* ssp. *peltatum* f. *peltatum* which had only a few leaves with holes and next to which was *M. melchior*, the leaves of which were without holes.

- 92 *M. excelsum*
ssp. *psittacorum* “The foliage of this species tears easily and has a weakly peppery, somewhat oily flavour” (Gardner 1997). “True *M. excelsum* ssp. *psittacorum* is scarce in cultivation within New Zealand, it is very cold sensitive and has proved difficult to maintain in Auckland gardens” (PJ de Lange pers. comm.). A fruiting spike collapsed to a pulp during transit from Raoul Island, so the illustration was drawn from a photograph and measurements taken by CJ West while she was on Raoul Island.
- 94 *M. excelsum*
ssp. *peltatum* f. *peltatum* Flowers over a long period, mature fruit and newly developing flower buds can be found on the same branchlet. “A popular *Macropiper* cultivar that has been widely planted in northern New Zealand gardens during the last 20 or so years belongs to ssp. *peltatum*. PJ de Lange examined the plants of Aorangi Island (Poor Knights Islands) and suggests ‘that the widely planted clone may be an ecotype from rather open sites on rhyolitic talus’” (Gardner 1997). The material illustrated has presumably come from cloned plants. “The foliage of *M. excelsum* ssp. *peltatum* f. *peltatum* is less susceptible to insect attack than *M. excelsum* ssp. *excelsum*. For this reason, this form has become popular in cultivation, where it is often erroneously sold as *M. excelsum* var. *majus*, var. *psittacorum* or, more recently, ssp. *psittacorum*. Unlike true *M. excelsum* ssp. *psittacorum*, ssp. *peltatum* f. *peltatum* is more cold tolerant; it may be distinguished from that subspecies by its much thicker, hot peppery tasting foliage. Both on *M. excelsum* ssp. *peltatum* f. *peltatum* and on f. *delangei* peltate leaves can be hard to find but are common on juveniles, or on shaded or reversion shoots on mature plants” (PJ de Lange pers. comm.).
- 96 *M. excelsum*
ssp. *peltatum* f. *delangei* *Macropiper excelsum* ssp. *peltatum* f. *delangei* differs from f. *peltatum* in the much thicker, more consistently peltate and extremely hot-peppery tasting foliage. When described by Gardner (1997) fruiting material had not been seen, the seeds illustrated here from North East Island material differ markedly from f. *peltatum*. This plant was first recognised as being a distinctive form of *M. excelsum* ssp. *peltatum* by PJ de Lange in 1991.
- 96 *Melicytus* aff. *ramiflorus* First found by PJ de Lange in October 1991 on Great Island (Manawa Tawhi). “Closely related to *M. ramiflorus* but differing from it in possessing smaller leaves, flowers and fruits. On Great Island and in Northland it is sympatric with *M. ramiflorus*. Wild plants were first noted as distinct because their small leaves and stature closely resembled coastal milk tree (*Streblus banksii*)” (PJ de Lange pers. comm.).
- 104 *M. micranthus* The pale marking at the base of the leaf distinguishes this plant from *Raukawa anomalus* which has a similar sized and shaped leaf, but has a dark spot at the base of the leaf.
- 106 *M. obovatus* First collected by T Kirk on limestone rocks between Takaka and Riwaka in 1885. The coastal non-calcareous plant is *M. aff. obovatus* (i) from Cook Strait.
- 108 *M. aff. obovatus* (i) Often grows with *M. crassifolius* but is distinguished by the

- larger leaves, the flowers being twice as large and, where not exposed to strong winds, it has a more open type of growth.
- 110 *Melicytus* aff. *obovatus* (ii) *M. obovatus* (ii) when compared with *M. obovatus* is typically single trunked, attains a greater height and the leaves are longer, narrower in proportion to length and more pointed, and the flowers and fruit slightly larger.
- 112 *M.* aff. *obovatus* (iii) Was first recognised as being different from *M. obovatus* by AP Druce.
- 112 *M.* aff. *novae-zelandiae* Is sympatric with *M. aff. obovatus* (i) throughout its range in the South Island and was first recognised as being different from *M. novae-zelandiae* by SP Courtney.
- 114 *M. drucei* This species was first recorded by AP Druce, "...who discovered it during his botanical explorations of the Egmont region" (Molloy & Clarkson 1996).
- 114 *M. crassifolius* Can appear very similar to *M. alpinus* but the latter is more divaricating and spiny. The spiny appearance is attributed to the leaves developing below the branchlet tips, i.e. tips leafless unlike *M. crassifolius*. They are separate species as they grow in close association but remain distinct.
- 116 *M.* aff. *crassifolius* First recorded by AP Druce as being distinct from *M. crassifolius*.
- 116 *M. alpinus* Young plants rarely seen.
- 118 *M.* aff. *alpinus* (i) A similar looking plant to *M. alpinus*, which has hermaphrodite flowers.
- 118 *M.* aff. *alpinus* (ii) First recorded by AP Druce.
- 120 *M.* aff. *alpinus* (iii) "The lobes or teeth on the leaves are a distinguishing feature of this *Melicytus*" (BPJ Molloy pers. comm.). In 1994 BPJ Molloy found this plant at Waipapa Bay and recognised it as distinctive. The plants were growing in Cemetery Bush Reserve on the seaward side of this important small remnant of eastern S.I. native coastal forest 8 km south west of Clarence.
- 120 *M.* aff. *alpinus* (iv) Originally collected from Lake Lyndon by W Brockie and cultivated at Landcare Research, Lincoln, Canterbury.
- 124 *M.* aff. *alpinus* (vi) "This small shrub is distinguished from *M. alpinus*, with which it may be found growing, by its prostrate habit and narrower leaves" (AP Druce pers. comm.). Specimen illustrated collected by AP Druce from Matiri Range.
- 126 *M.* aff. *alpinus* (vii) Young plants rarely seen. *M. aff. alpinus* (vii) forms upright bushes up to 2.4 m in height, branching shoots point in all directions and adult plants have wider, thicker leaves than those of *M. alpinus*. The latter is a low-growing shrub up to 50 cm in height, usually less, with spiny shoots that mostly point in one direction (AP Druce pers. comm.). Specimens (A-D)

collected by AP Druce and BPJ Molloy in 1993.

126 *M. flexuosus*

Seedling leaves often light salmony-pink; they can be confused with another plant sometimes found growing in the same area, *Aristotelia fruticosa*, which has darker red juvenile leaves. "Its seedlings also resemble those of some unrelated small-leaved, divaricate, shrubby species of *Pittosporum*, especially *P. anomalum*, and of some *Pseudopanax* species..." (Molloy & Druce 1994).

Distribution of the species of *Melicytus*

<i>M. ramiflorus</i>	K., T.K., N., S., St.	Throughout
<i>M. aff. ramiflorus</i>	T.K., N.	Great Is; Northland south to Ngunguru
<i>M. novae-zelandiae</i> s.s.	T.K., N.	From near North Cape to 38°, mainly on coastal islands
<i>M. micranthus</i>	N., S.	From 35° southwards
<i>M. macrophyllus</i>	N.	From Kaitaia (lat. 35°) to 37°
<i>M. lanceolatus</i>	N., S., St.	From 35° 30' southwards
<i>M. flexuosus</i>	N., S., St.	Volcanic Plateau: Pureora to Taihape; throughout South Island
<i>M. drucei</i>	N.	Egmont National Park
<i>M. crassifolius</i>	N., S.	Wairarapa, Kapiti I., both shores of Cook Strait; coastal NW Nelson to Kaikoura Peninsula
<i>M. alpinus</i>	N., S.	Wairarapa, Nelson and east of the Southern Alps
<i>M. aff. novae-zelandiae</i>	N., S.	N.I.: Kapiti I.; Marlborough Sounds: outer western Sounds islands; Stephens, Rangitotos and Trios Is.
<i>M. aff. obovatus</i> (i)	N., S.	Coastal Wellington, Cook Strait Islands, D'Urville and Arapawa Is., Marlborough Sounds
<i>M. aff. obovatus</i> (ii)	S.	NW Nelson: Mt Burnett
<i>M. obovatus</i>	S.	Nelson region
<i>M. aff. obovatus</i> (iii)	S.	NW Nelson: Mt. Owen and Mt. Arthur
<i>M. aff. alpinus</i> (ii)	S.	North Marlborough: Tinline Valley
<i>M. aff. alpinus</i> (iii)	S.	Nelson, Marlborough and Canterbury.
<i>M. aff. crassifolius</i>	S.	South Marlborough; inland Canterbury.
<i>M. chathamicus</i>	Ch.	Chatham Islands
<i>M. aff. alpinus</i> (i)	S.	Inland Canterbury and Otago.

- | | | | |
|-----|---|----|---|
| | <i>M. aff. alpinus</i> (v) | S. | Marlborough, Canterbury |
| | <i>M. aff. alpinus</i> (vi) | S. | Mountains of Nelson, Marlborough, Canterbury;
Southland: Eyre Mts. |
| | <i>M. aff. alpinus</i> (iv) | S. | Canterbury: Lake Lyndon |
| | <i>M. aff. alpinus</i> (vii) | S. | NW Nelson, S. Nelson, W. Marlborough, inland
Canterbury |
| 128 | <i>Tetragonia tetragonioides</i> | | This plant and the closely related <i>T. implexicoma</i> , like scurvy grass (<i>Lepidium oleraceum</i>) and wild celery (<i>Apium prostratum</i>), was cooked with peas and broth or used as salad on Captain Cook's ships when in New Zealand waters. "It was introduced into Kew Gardens in 1772, but the first account of it as a vegetable worthy of cultivation was published by Count D'Auraches in the <i>Annales d'Agriculture</i> for 1809" (Laing and Blackwell 1964). This is the species most commonly used as a vegetable but <i>T. implexicoma</i> is also eaten. |
| 130 | <i>T. implexicoma</i> | | Coastal in both rocky and sandy places. Occasionally found inland often on limestone bluffs. This and the previous plant are sometimes confused but <i>T. implexicoma</i> has distinctive red fruit without "horns" and a more soapy flavour. An exceptionally large plant was found by W Martin at Tomahawk Lagoon, near Dunedin, with stems measuring c. 12 m long sprawling through and over a patch of local scrub (Martin 1961). This plant was first collected by Banks and Solander in Queen Charlotte Sound in 1769. A very small-leaved form is confined to the Three Kings Islands, and may prove to be distinct (PJ de Lange pers. comm.). |
| 130 | <i>Muehlenbeckia ephedroides</i> | | Hooker (1864) wrote of this plant: "A remarkable species resembling rushes scattered on the ground". From this appearance comes its specific name, <i>Ephedra</i> , the shrubby horsetail, a plant with rush-like branchlets. |
| 132 | <i>M. australis</i> | | Grows in degraded native forest, especially on the margins, and also on exotic trees and can completely smother all other growth. It seems particularly troublesome in the south of the South Island, e.g., Timaru and Dunedin areas. |
| 134 | <i>M. axillaris</i> | | Seldom rises much above the ground; occasionally it can be a straggling shrub. |
| 134 | <i>M. astonii</i> | | Lowland coastal shrubland, on dry, often stony river terraces, coastal flats and hill slopes. A threatened species. |
| 136 | <i>M.</i> sp. (from Ch. Is. and Northland) | | The stigma of this species is different from that of others in the NZ genus in that it is brush-like and not three-lobed. The achene of this plant and that of <i>M. australis</i> are also different from those of other NZ species in that they are propeller-shaped. |
| 138 | <i>M. complexa</i> (ii)
("offshore islands agg.") | | With regard to stem hair investiture this <i>Muehlenbeckia</i> is very variable; in the southern part of its range it grades into <i>M. complexa</i> (i) (<i>M. complexa</i> s.s.). |

- 138 *Atriplex cinerea* Of the New Zealand *Atriplex* species only *A. cinerea* is woody (PJ de Lange pers. comm.). Female flowers occasionally found within the lower leaf axils of male plants. Known in Australia and New Zealand as grey salt bush, it is a common plant of boulder banks, estuaries and sandy beaches in mainland Australia and Tasmania. First recorded by Hooker in 1853, it had been treated as naturalized by Webb et al. (1988), but recently de Lange et al. (1998) reviewed the evidence and concluded it must be indigenous. Now extinct over most of its range in NZ (SP Courtney pers. comm.).
- 140 *Fuchsia excorticata* The red flowering stage dissuades rather than attracts birds (LA Sessions 2001). This tree is the largest *Fuchsia* in the world. It is an early coloniser in regenerating areas.
- 144 *F. procumbens* “On beach terraces, banks, small gullies and creek beds behind the beach and at base of pohutukawa trees (*Metrosideros excelsa*). It also grows in coastal forest, estuary margins and scrubland, preferring dampness or some shelter. Many of the sites *F. procumbens* grow in are weedy and it scrambles through grasses, e.g., kikuyu (*Pennisetum clandestinum*) and gorse (*Ulex europaeus*) often with umbrella sedge (*Cyperus ustulatus*), raupo (*Typha orientalis*), and flax (*Phormium tenax*)” (LJ Forester pers. comm.). First collected by Richard Cunningham between Whangaroa and the Bay of Islands in 1834. For further details of the natural populations of *Fuchsia procumbens* see Godley & Reynolds (1998).
- 146 *Pisonia brunoniana* The fruiting calyx secretes a very viscid substance and this attracts many insects and these in turn attract birds, the smaller ones such as fantails (*Rhipidura fuliginosa*) and silveryeyes (*Zosterops lateralis*) often being unable to free themselves. Larger birds may help with seed dispersal. Due to its viscid fruits, and the unfortunate tendency of small birds to get caught up in these, it has been much maligned by the press in recent years. However, in the past, when NZ was rodent free, *Pisonia* would have been more common as the viscid fruits are suited to long distance dispersal by large sea-going birds such as petrels, gannets, and shearwaters. The loss of these birds from mainland and rodent infested islands has been a prime factor in the decline of *Pisonia* (PJ de Lange pers. comm.). This species is also known from other Pacific Islands, Australia, Norfolk Island, Lord Howe I, Hawai’i (Sykes 1987).
- 148 **PIMELEA** When not in flower or fruit some species of *Pimelea* may be mistaken for a *Hebe*. The inner bark of *Pimelea* in some species is very tough, mucilaginous and hard to break.
- 148 *Pimelia longifolia* (i)
(*P. longifolia* s.s.) First collected by Banks and Solander at Tolaga Bay during Cook's first voyage.
- 150 *P. longifolia* (ii) AP Druce recognised these plants as being another form of *P. longifolia*.
- 152 *P.* sp. (i) (from Turakina) Also found on mudstone talus at base of Wanganui cliffs. Now extinct over large parts of its range. “First recognised as

- distinct by AP Druce at Turakina Beach, and is now extinct at that site. It grows naturally in a very restricted area near Himatangi, on private land planted in pines. A small area of plants was established on District Council land near Tangimoana in 1995 using stock from Himatangi” (CC Ogle pers. comm.). Plants appear to flower over a long period, January to May, and seedlings appear freely in suitable habitat.
- 152 *Pimelea* sp. (ii) (from Pisa Range) In January on Mt Cardrona only one pink-flowered plant was seen amongst the many white-flowered plants examined and only one plant had fruit, with just two drupes attached.
- 152 *P. aff. tomentosa* (i) (from Three Kings) “A cliff dweller, usually found amongst *Hebe insularis*, *Poa anceps* and *Davallia tasmanii* on steep basalt cliffs in full sun. On Great Island it is also an opportunist plant of temporarily bare ground locally across the Island. It is sympatric with *P. tomentosa* and plants of the highly variable *P. urvilleana* complex” (PJ de Lange pers. comm.).
- 152 *P. aff. tomentosa* (ii) (from Surville Cliffs) “*P. aff. tomentosa* (ii) is closely allied to *P. aff. tomentosa* (i) and really only differing from it by its smaller leaves, flowers and overall stature. Though hard to strike from cuttings it will grow happily off ultramafic soils. On Surville Cliffs it is sympatric with plants of the *P. urvilleana* complex, and putative hybrids have been found” (PJ de Lange pers. comm.). The distinctiveness of the above two plant forms was first recognised by PJ de Lange in 1980.
- 154 *P. aridula* *P. aridula* (iii) (from S. Marlborough), a similar looking plant, has red drupes whereas *P. aridula* has dry fruit.
- 154 *P. aff. aridula* (i) (from Moawhango) On the older leaves the hairs on the under surface were yellow, those on the upper surface remained white. This plant was first recorded by AP Druce in January 1950.
- 154 *P. aff. aridula* (ii) (from Pipinui Point) On the specimens seen, the female plants were more closely branched and the leaves were closer together, slightly broader and more densely hairy than those of the male plant. On live specimens the leaves appeared to be white-tipped because of the length and density of marginal hairs at the apex.
- 156 *P. aff. aridula* (iv) (from Te Mata Peak) Flowers and ripe fruit were on the plant at the same time. In cultivation it is a low-growing and larger plant covering up to 1 m diam. AP Druce recognised this plant as a different form of *P. aridula*. Now seriously at risk of becoming extinct in the wild.
- 158 *P. aff. aridula* (v) (from Maungaharuru) After visiting Mount Taraponui in the Maungaharuru Range in 1979, AP Druce wrote: “Both green and reddish plants were intermixed and cascading down limestone cliffs in dense masses a metre or more in diameter. Over a large area of the mountainside this *Pimelea* formed the main feature of the vegetation and was quite spectacular”. “I believe its abundance was encouraged by goats (which don’t eat it). On a visit to the area in 1989, both *Pimelea* and goats were abundant. Most plants were compact bushes” (CC Ogle pers. comm.).

- 158 *Pimelea* sp. (iii) (from eastern S.I.) The flowering specimen with new shoots in the axils of the leaves was not the common form. On the numerous plants looked at, most were without shoots. It can be confused with *Hebe pimeleoides* when not in flower. “Plants vary, many having slightly glaucous leaves, while adjacent plants appear greener” (AP Druce pers. comm.).
- 160 *P. microphylla* Common on Volcanic Plateau, local in Kaimanawa and Kaweka Ranges.
- 160 *P. gnidia* (i) & (ii) *Gnidia* is presumed to be from Gnidios (now Knidos), a town in Asia Minor where a kind of daphne grew (Smith 1972), or (according to Plowdon 1972) *Gnidia* is the old Greek name for laurel. In Greek mythology, Daphne, daughter of Perseus, was turned into a laurel tree to escape the attentions of Apollo.
- 162 *P. prostrata*
(*P. prostrata* agg.) Grows amongst loose stones or shingle, on boulder terraces, on rocks, in pumice on the Volcanic Plateau, and in open grassland. A good coloniser in the open places in which it grows, it propagates itself by layering as well as flowering and fruiting prolifically over a long period.
- 162 *P. sericeovillosa* (ii) Deflation surfaces of high terraces and moraines between 800–850 m in Cobb Valley and also on Bryant Range (deflation: The removal of rocks and soil from a surface by wind action). This plant has larger leaves, flowers and fruit than those of *P. sericeovillosa*. The sexual expression of the flowers is a matter of conjecture by the author. The relationship of the ultramafic (D’Urville I. and Bryant Range) population to the Cobb population isn’t well understood and they may be two separate taxa (SP Courtney pers. comm.).
- 164 *P. tomentosa* Is easily grown in cultivation and seeds readily.
- 164 *P. buxifolia* Collected by Dieffenbach c. 1839. On Mt Ruapehu in some areas *P. buxifolia* is abundant and when massed with blossom, mostly pink, it is very attractive. In this locality when not in flower the quadrifarious leaves make it hard to distinguish from some of the nearby *Hebe* plants.
- 164 *P. arenaria* (i)
(*P. arenaria* s.s.) “*Pimelea arenaria* was collected during Cook’s first visit in 1769 by Banks and Solander at Tolaga Bay, and later on at Mercury Bay. ... According to Colenso, the Maori formerly used the inner bark of the branches for preparing cloth-like strips for fastening up their hair, a practice which has long since ceased. The white, fleshy berries were also collected and used for food” (Cheeseman 1914).
- 164 *P. arenaria* (ii) First recognised as distinct by PJ de Lange in 1991. Now extinct in Canterbury.
- 166 *P. traversii* Philipson and Hearn (1962) speak highly of this plant for its abundance of flowers and for its symmetrical, hebe-like leaves. Of its habit they write: “In nature it frequently endures very

- austere conditions on windswept, barren crags when it may grow into wizened and tortured bushes. But in sheltered places it forms an erect shrub with regular branches fanning outwards to form a very tidy bush”.
- 168 *Pimelea* sp. (iv) (from Mt Manaia) A low shrub of andesite rock tors distinguished from all other allied *Pimelea* by the prominent hairs on the leaf midrib.
- 168 *P. poppelwellii* Grows on Garvie, Hector, Eyre, Old Man and Umbrella Mountains. The distinctive splitting of the bark and the subsequent grooves on the young branchlet also occurs on *P. crosby-smithiana* (see illustrations). This feature has not been seen by the author in other *Pimelea* species.
- 170 *P. crosby-smithiana* It has a delightful perfume, rather like the scent of wallflowers (*Cheiranthus*). Fruit not seen by author.
- 170 *P. urvilleana* The exact application of the name *P. urvilleana* is uncertain and will be until the type is critically examined. The author has therefore conservatively painted an example of the form most commonly attributed to this species by botanists.
- 170 *P. lyallii* This plant collects sand around it as it grows, forming small mounds, as *P. arenaria* does in other coastal areas. Plants growing on Native Island at the entrance to Paterson Inlet are mainly glabrous on the under surface.
- 172 *Toronía toru* First collected by Allan Cunningham in 1826 near the shore of the Bay of Islands.
- 174 *Knightia excelsa* Young trees have a symmetrical conical shape similar to that of a kauri ricker. The flowers have a complicated method of preventing self-fertilization in which the anthers open and deposit their pollen on the thickened upper portion of the style, but at this stage the stigma is immature and not receptive to the pollen. Tui (*Prosthemadera novaeseelandiae*) and bellbirds (*Anthornis melanura*) come for the abundant nectar at the base of the flower and transfer the pollen from the style to older flowers. On these older flowers the anthers and perianth have curled up in a tight spiral at the base of the styles, leaving a brush of long styles. The stigmas on these styles become smeared with pollen from the bird's feathers thus ensuring cross-fertilization. Hinau (*Elaeocarpus dentatus*) has similar shaped thin juvenile leaves but the leaves are smooth and the stem tip (leaf bud) is silvery, silky hairy.
- 176 **CORIARIA** “Each flower first passes through a female stage, characterised by the protruding reddish styles, and this is followed by a male stage when the anthers mature and shed their pollen. This sequence is called protogyny (as distinct from protandry when anthers mature first) and means that each flower has little chance of pollination by its own pollen. However, self-pollination of the plant is not prevented because the older flowers in the male stage at the base of the raceme can pollinate the younger flowers higher up the raceme, which are

- in the female stage” (EJ Godley pers. comm.). The root nodules on *C. arborea* are perennial and can reach tennis ball size. The species colonise free-draining soils and often dominate communities along river beds, on shingle slides and on eroded surfaces. All except *C. arborea* have branched rhizomes. *C. arborea* does not die back to the rhizome in winter.
- 176 *Coriaria arborea* *C. arborea* var. *kermadecensis* is endemic to Raoul Island in the Kermadec Is. It differs from var. *arborea* by the leaves being smaller, 5–6.5 x 2–3 cm, shorter pedicels and by the achene ornamentation. It has not been illustrated.
- 180 *C. kingiana* *C. kingiana* is distinct from all but *C. pottsiana* by its reddish-purple mottled leaves with undulating margins. From *C. pottsiana* it can be easily separated by its larger overall size and chromosome number (PJ de Lange pers. comm.).
- 184 *C.* sp. (from Rimutaka & Stewart I.) A plant of riverbeds, screes, talus slopes, dune shrubland and open sandy and rocky ground on the coast and beaches. On the Rimutaka Range it is mostly between 600 and 750 m, on very steep rocky faces, and in shrubland on the steep valley sides. “It also grows on dunes east of Cape Palliser” (S. P. Courtney pers. comm.). This *Coriaria* was found by J Campbell on the Rimutaka Range and later found by HD Wilson on Stewart Island. It is a uniform plant; hybrid origin seems to be ruled out by the absence of one or both possible parent species from the known range and by its chromosome number. “This plant has affinities with *C. plumosa* and *C. pteridioides*” (AP Druce pers. comm.).
N: Ngapotiki Fan, Rimutaka Range, Wellington; St: Mason Bay and Ruggedy Beach only known localities.
- 186 *C. pottsiana* Norman Potts, who discovered this species, grew plants from seed and they came true (*Bull. Well. Bot. Soc.* 6:10 1943). Potts was closely associated with Hukutaia Domain for 54 years. It was there that he grew many native plants including *C. pottsiana*.
- 192 **PITTOSPORUM** “Sexual expression. Our knowledge is quite fragmentary, and the subject deserves detailed study for each species. How far the different sexual states are correlated with different developments of the inflorescence as a whole, and how far the development has been towards complete dioeciousness, for example, remains uncertain” (Allan 1961). In the larger-leaved species in this genus leaf sizes are often very variable, to include this variation the size range given has been taken from Allan (1961).
- 192 *Pittosporum huttonianum* As the capsules develop the stalks grow longer and the bracts fall.
- 194 *P. kirkii* Recorded by Kirk on Great Barrier Island in 1867.
- 196 *P. ralphii* “Closely allied to *P. crassifolium*, but the leaves [of *P. ralphii*] are much larger, oblong, not gradually narrowed into the petiole, and the margins are flat, not recurved, while the capsules are smaller” (Cheeseman 1914).

- 198 *Pittosporum serpentinum* Initially treated as a ssp. of *P. ellipticum*, de Lange (1998) stated that this ultramafic rock endemic differs from that species by the low shrub habit, dark orange-brown, copious and persistent indumentum of all young parts, smaller leaves, and by the smaller, bivalved, globose capsules. It was first collected from Surville Cliffs by Phyllis Hynes in 1959. Recently, adding to these distinctions the ssp. was elevated to the rank of species because of its consistently fewer seeds, and distinct seed morphology (de Lange 2003).
- 198 *P. fairchildii* Locally common on all the main Three Kings Islands from sea level to the highest points. The glabrous leaves are a feature distinguishing it from karo (*P. crassifolium*), which always has a thick covering of hairs on the under surface of the leaves. Collected by Cheeseman in 1888. This species is marked out also by its distinctive fruits. These mature yellow-green on the tree, and do not open, falling off the tree, where as they rot the seed is dispersed. These features suggest that *P. fairchildii* fruit was adapted to bird dispersal, possibly by pigeons (*Hemiphaga novaeseelandiae*) that although not known naturally on the islands now, were almost certainly there in the past.
- 200 *P. dallii* *P. dallii* is the only New Zealand species to have regularly serrated leaves. FC Corlett, who cultivated these plants in Hamilton, said he had found that the serrations in cultivated plants are very infrequent. This is a beautiful tree seriously threatened by browsing animals such as deer and goats.
- 204 *P. eugenioides* In open situations of re-growth forest and in garden cultivation it is a handsome round-topped tree, branching openly with age. Although all flowers in this genus are scented, those of tarata are pleasant and all pervading. The capsules are much smaller than those of the other tree species in the genus. This is the largest of the New Zealand species of *Pittosporum*.
- 206 *P. tenuifolium*
(*P. tenuifolium*
ssp. *tenuifolium*) The flower scent is more obvious on a mild, damp evening. *P. tenuifolium* is the type for the genus, and was first collected by Banks and Solander in 1769. Many garden cultivars have been developed from this hardy and attractive tree.
- 208 *P. colensoi*
(*P. tenuifolium* ssp. *colensoi*) In the western Waikato, around Waitomo, this subspecies grades into *P. buttonianum*.
- 210 *P. crassifolium* Karo is able to withstand very strong winds and salt spray without damage to the leaves as evidenced by plants on Moturoa Island, New Plymouth. The karo retained their leaves and they remained green after Cyclone Bola whereas another coastal plant, taupata (*Coprosma repens*), had lost most of its leaves and the few remaining were brown and shrivelled after the same cyclone (CC Ogle pers. comm.).
- 212 *P. aff. crassifolium* Grows amongst Kermadec pohutukawa (*Metrosideros kermadecensis*) and ngaio (*Myoporum kermadecense*). Generally uncommon but now spreading following rat eradication in 2002. When leaves were pulled off stems a distinctive and consistent leaf scar was revealed. A consensus decided the

- flower's perfume was of a pleasant musky-citrus smell. The plant illustrated was from the Auckland Regional Botanic Gardens and tended to have more rounded leaf tips than material seen later, direct from Raoul Island. Previously confused with *P. crassifolium*, but differing from that species by its leaf shape, hair investiture, and subtle floral and capsule details.
- 214 *Pittosporum turneri* In some areas adult plants are often hard to find but juveniles are not uncommon. This is a threatened species at risk from browsing animals such as possum and deer.
- 218 *P. patulum* A threatened species, mainly through browse by deer, goats and possum.
- 218 *P. anomalum* Found by RM Laing at Arthur's Pass in 1935.
- 220 *P. obcordatum* "A feature of all *P. obcordatum* sites is an abundance of shrubs and trees with divaricating forms, ... sites are on river flats and toeslopes, but do not extend up the hills. ... sites are periodically flooded and some in sheltered valleys are subject to frost in winter and drought and high temperatures in summer. ... This plant grows where there are open gaps in forest canopy, treeland and scrub. ... Plants from Kaitaia have a greater hairiness of young leaves and branchlets and a larger leaf size" (BD & BR Clarkson 1994).
 Leaves have a distinct juvenile form, both in shape and colour, looking somewhat similar to those of a seedling lancewood (*Pseudopanax crassifolius*). The leaf size decreases with the latitude south, the smallest leaves being on Fiordland plants. The flowers have a strong fragrance.
 This plant was originally recorded from Akaroa by Raoul in 1840. In spite of extensive searches on Banks Peninsula by HD Wilson and others it has not been found there in recent times. At one time it was believed to be extinct in Northland. In 1991 it was discovered in two sites, near Kaitaia and near Whangarei, both sites are protected. Although this is an uncommon and threatened plant new sites are still being found.
 "Despite the apparent distinctiveness of the Kaitaia plants (which have been treated as var. *kaitaiensis*) their distinguished characters (larger leaf size, overall greater hair investiture and other minor flower and fruit characters), were found to grade into the more usual form further south. For this reason var. *kaitaiensis* has not been maintained" (BD & BR Clarkson pers comm.).
- 222 *P. virgatum* The leaves in the juvenile and semi-adult stages of the plant are quite different from those in the adult tree. Cheeseman (1925) wrote: "The mature stage, which is usually entire, is seldom attained until the tree has flowered for some years".
- 224 *P. divaricatum* The texture of the capsule is less walnut-like than that of *P. rigidum*.
- 224 *P. pimeleoides*
 ssp. *majus* It has also been known as *P. michiei* after Ross Michie, a botanist who contributed to the knowledge of the Northland

flora. Other reports of this plant from Whangaroa Harbour involve wide-leaved forms of ssp. *pimeleoides*.

- 226 *Pittosporum pimeleoides* ssp. *pimeleoides* Usually found on ridges with kauri (*Agathis australis*) and tanekaha (*Phyllocladus trichomanoides*) but sometimes by streamsides. It is quite unlike all other NZ species in the genus. It can be confused with young plants of kanuka (*Kunzea*) being similar in size, shape and arrangement of the leaves, but the leaves of *P. pimeleoides* are not aromatic when crushed.
- 228 *P. crassicaule* In general appearance the adult plant of *P. crassicaule* is similar to *P. anomalum*, but the flowers of *P. anomalum* are yellow and the capsules have a papery endocarp surrounding the seeds. It is much closer to *P. rigidum* which differs in being less divaricating and in having larger leaves. Regarded by some botanists as a variety of *P. rigidum*.
- 228 *P. rigidum* var. *rigidum* The juvenile leaves are similar to those of *P. crassicaule* but less fern-like and not so deeply lobed. Distribution in South Island uncertain.
- 228 *P. rigidum* var. *majus* Although the size of the leaves are in the lower range, the plant illustrated fits this description. It was collected by AP Druce from Mount Holdsworth (February). Some botanists suggest that: "*P. rigidum* var. *majus* is a shade form of *P. rigidum*" (Cooper 1956).

Distribution of the species of *Pittosporum*

<i>P. aff. crassifolium</i>	K.	Raoul I.
<i>P. fairchildii</i>	T.K.	Great, North East, West and South West Islands
<i>P. pimeleoides</i> ssp. <i>majus</i>	N.	Surville Cliffs
<i>P. serpentinum</i>	N.	Surville Cliffs
<i>P. crassifolium</i>	N.	N. Cape to N. Taranaki and Poverty Bay
<i>P. umbellatum</i>	N.	N. Cape to Lat 39°
<i>P. eugeniooides</i>	N., S.	Throughout
<i>P. tenuifolium</i>	N., S.	Throughout
<i>P. colensoi</i>	N., S., St.	Throughout, mainly in the west
<i>P. cornifolium</i>	N., S.	N. Cape to nr. Greymouth and S. Marlborough
<i>P. pimeleoides</i> ssp. <i>pimeleoides</i>	N.	Northland: Kaitaia to Hokianga and nr. Whangarei
<i>P. ellipticum</i>	N.	Kaitaia to Raukumara Ra. and Waikato

<i>P. kirkii</i>	N.	Kaitaia to Mt Egmont/Taranaki and Ruapehu
<i>P. obcordatum</i>	N., S.	(B) Nr. Kaitaia and Whangarei; (A) nr. Taihape; eastern N.I.; Catlins, nr. Winton, nr. Clifton, and eastern Fiordland
<i>P. virgatum</i>	N.	Northland, Gt. Barrier I., Coromandel Peninsula
<i>P. buttonianum</i>	N.	Gt. and Lt. Barrier Is., Coromandel Peninsula and W. Waikato
<i>P. ralphii</i>	N.	E. Cape to Wairarapa; Patea and Whanganui Rivers
<i>P. divaricatum</i>	N., S.	Te Urewera and Central N.I. mts. southwards, mainly in the east
<i>P. rigidum</i> var. <i>rigidum</i>	N., S.	Raukumara Ra. southwards (absent from Taranaki/Egmont and central N.I.); S.I.: N. Marlborough uncertain.
<i>P. turneri</i>	N.	Hauhangaroa, Waimarino, Ahimanawa and NW Ruahine Ranges (previously nr. Taumaraunui and Pureora)
<i>P. anomalum</i>	N., S.	Central N.I. mts., Nelson, Marlborough and Canterbury
<i>P. rigidum</i> var. <i>majus</i>	N.	Tararua Ra.
<i>P. dallii</i>	S.	NW Nelson mts.
<i>P. patulum</i>	S.	Nelson, W. Marlborough; Canterbury and NW Otago: headwaters of Waitaki and Clutha Rivers
<i>P. crassicaule</i>	S.	Throughout, in the west
230 <i>Passiflora tetrandra</i>		Collected by Banks and Solander in 1769.

232 *Leptospermum scoparium* (i)
(*L. scoparium* var. *scoparium*)

This is one of the most abundant and variable of NZ shrubs. At high altitudes it is dwarfed almost to a cushion plant. Some of the different wild forms may be worthy of some taxonomic rank. "Outside New Zealand this species (or at least forms loosely allied to it) is found in south eastern Australia and Tasmania. It was also collected once in 1899 from Rarotonga Island (Cook Islands) by Thomas Cheeseman (AK 74313-16) in an apparently natural habitat. There have been no further collections from the Cook Islands, and so the occurrence remains a biogeographic anomaly" (PJ de Lange pers. comm.).

The antiseptic qualities of the manuka oil and the honey from this plant make it commercially important. Manuka is also very important horticulturally as many attractive colourful garden forms have been developed. Together with kanuka, (*Kunzea* spp.), it is a natural nursery crop for regenerating forest. Manuka was first described from New Zealand specimens collected by the Forsters. As a species it is highly variable and a number of varieties have been distinguished in the past both for New Zealand and Australia. In New Zealand

only one of these var. *incanum*, [which is illustrated as *L. scoparium* (ii)] was upheld by Allan (1961). “Irrespective of Allan’s conservative view, there is a wealth of ecological, morphological, cytological, and biochemical evidence to support the reinstatement of some of these, as well as the recognition of additional forms. To that information can be added recent molecular data obtained from DNA sequences which also suggests that the current circumscription of *L. scoparium* will need refinement. In Australia *L. scoparium* is also rather variable and there are doubts as to whether these plants are truly the same as the New Zealand *L. scoparium*” (PJ de Lange pers. comm.).

232 ***L. scoparium*** (ii)
(*L. scoparium* var. *incanum*)

“Very common in mobile sand dunes, in associated moist depressions, sandy soils, and both sand and clay podzols. Also commonly seen on peat and seasonally saturated gumland gley soils. Very rarely associated with kauri (*Agathis australis*) forest. Scarce on Three Kings Islands. Abundant from Te Pahi to southern Aupouri Peninsula and Ahipara Gumlands. From there sporadic south to the Hokianga Harbour in the west and at least the Whangaroa Harbour in the east. On the coastal headlands of Te Pahi, Mt Camel, Karikari Peninsula and along the southern portion of its range it is widely sympatric with several other variants of *L. scoparium*. Apparently endemic” (PJ de Lange pers. comm.).

Perhaps the most distinctive of the named variants of *Leptospermum scoparium* in New Zealand, and the only one accepted without dispute by Allan (1961). Readily distinguished from other New Zealand *L. scoparium* forms by the erect habit, with very hairy branchlets, young foliage and flower buds, dark green cartilaginous leaves, and by the usually pink flowers. In addition to these characters this variety is further distinguished by differences in the recent molecular data obtained from DNA sequences. *L. scoparium* var. *incanum* was first recognised as distinct by Leonard Cockayne who described it formally in 1917. Much of the information for this description supplied by PJ de Lange.

234 **KUNZEA**

The following comments on this genus have been written by PJ de Lange. There is good evidence that the New Zealand *K. ericoides* agg., in addition to the two species and two varieties already described, may comprise a further seven entities, two of which are illustrated and described here. Due to recent human-induced disturbance of the habitats these *Kunzea* variants occupy, hybridism can often blur their distinction.

234 ***Kunzea sinclairii***

Past records from the Three Kings and Poor Knights Is, are based on other unrelated *Kunzea* spp., while other reported records from Kawau Island and the Coromandel are based on creeping, silvery-hairy forms of *Leptospermum scoparium*. A very distinctive species which in its typical state is a prostrate shrub, with wide, silky, silvery-grey leaves and conspicuous large flowers. Very occasionally, such as in regenerating forest, *K. sinclairii* can form a small tree up to 5 m tall.

- 234 *Kunzea ericoides* var. *linearis* A very distinctive variety. The type collection was made by Thomas Kirk from Ahatawapa Pa, Waitemata Harbour, in the 1860s. All current Auckland occurrences of var. *linearis* are unusual because plants grow on clay soils, mainly in the vicinity of old pa sites, and also because they are well separated from the other northern populations. Possibly these disjunct Auckland occurrences stem from an accidental naturalisation of var. *linearis* by Maori, and/or early European settlers who freely used “tea-tree” wood and branches for firewood, windshelters and roof thatching, bringing in material from far afield for this purpose.
- 236 *K. aff. ericoides* (B) (common) A distinctive form previously confused with *K. ericoides* var. *ericoides* but easily distinguished from that species and other variants by the bark tearing in very long strips, lack of secondary peeling, conspicuous branchlet hairs, hair type, the (generally) broader dark green leaves, larger flowers, with markedly more stamens, larger capsules, and by consistent chemical and molecular differences. Although leaf size diminishes within the inland North Island part of its range, the bark, branchlet hairs and stamen numbers readily separate this variant from other *Kunzea* spp. The South Island occurrences at Banks Peninsula, Dunedin, Westport and Hokitika may stem from the accidental or deliberate introduction of this species, which was used for firewood and thatch by Maori and/or early settlers. The natural distribution of this form is being further disturbed by its widespread use in plantings throughout New Zealand. This *Kunzea* is the tallest tree in the genus.
- 238 *K. ericoides* var. *microflora* A distinctive but much misunderstood plant of the geothermal habitats within the Taupo Volcanic Zone. This variety exhibits a range of marked genotypes ranging from prostrate shrubs near active fumaroles to multi-trunked trees in low forest abutting active geothermal sites. Despite this variation, these forms are all unified by their distinctive flaking bark, numerous fine rather brittle branchlets, patent branchlet hairs, small leaves, low stamen number, chemical and molecular pattern, and generally by the late winter to early summer flowering time. Plants from Whale (Motuhora) Island are very long, linear-leaved and may not be this variety.
- 238 *K. ericoides* var. *ericoides* Originally described as *Leptospermum ericoides* from specimens gathered by the French from the Astrolabe Passage (Abel Tasman coastline) in the 1820s. In 1983 the species was transferred to *Kunzea* by Australian botanist Joy Thompson, who included several other Australian *Kunzea* of the same complex within *K. ericoides*. As part of a wider, ongoing revision of the genus in 1989, Australian botanist Hellmut Toelken recognised that *K. ericoides* is a New Zealand endemic.
- 238 *K. aff. ericoides* (A) (from Kaihoka) First recognised as distinct by Dr Hellmut Toelken in 1989. This form, though closely allied to *K. aff. ericoides* (B), differs in its distinctive juvenile form - which often freely flowers - by the more conspicuously hairy branchlets, leaf hairs being aligned in two rows, smaller broader obovate leaves, by the smaller (often absent) connective gland between the lobes of

the anthers, and by consistent chemical and molecular differences. However, in parts of its range it is difficult to separate from *K. aff. erivoides* (B) with which it freely hybridises.

240 ***METROSIDEROS***

“There are 2 main sub-genera, *Metrosideros* with about 24 species, including the 4 tree species in New Zealand, and sub-genus *Mearnsia* which includes the vine species in New Zealand plus *M. parkinsonii*” (JW Dawson pers. comm.). It is exotic in Australia.

240 ***Metrosideros excelsa***

The abundance of the pohutukawa's red flowers makes it one of the most spectacular trees of the New Zealand flora. The author estimated the 10 m high tree, next to her garden on the Otago Peninsula, shed 127 million seeds. Many of the minute seeds, 3 x 0.3 mm, were eaten by redpolls (*Carduelis flammea*). Specimens of pohutukawa were first collected by Banks and Solander in 1769.

242 ***M. kermadecensis***

“Older trees vary greatly in size and form, ranging from wind-trimmed gnarled shrubs on the coast to the large and often multiple-trunked giants up to c. 30 m high and c. 20 m across at higher altitudes. Such large trees tend to have twisted trunks and on some of the ridge tops hurricanes have blown them over, but they have continued growing to form a complex system of stems and roots with abundant pendulous tufts of aerial roots” (Sykes 1977). This species has smaller leaves with more rounded apices and smaller flowers than pohutukawa (*Metrosideros excelsa*). In cultivation in New Zealand the occasional flower can be found almost throughout the year. Most of the year there will be some flowers on some trees but there is never a blaze of colour as on pohutukawa or southern rata.

Metrosideros trees are wonderfully adaptable, this species being the most prolific tree on Raoul Island of the subtropical Kermadec Islands, and another southern rata (*M. umbellata*), being the dominant tree on the wind-blown subantarctic Auckland Islands.

242 ***M. bartlettii***

It seems incredible that a tree of this size should have escaped observation until 1977 when John Bartlett, who was studying a remnant of bush at Te Pahi, found one very large tree; on subsequent visits he had found two smaller trees. Additional trees were discovered by Peter Anderson in 1985, then by Peter de Lange and others in 1991/2. There are now 33 trees known. These are scattered over three populations—Radar Bush, Kohuronaki and Unuwahao (which is the largest population). The species is still at high risk from wild cattle, horses, pigs and especially possum. The loss of nectar feeding birds has reduced outcrossing so the species is also suffering from inbreeding depression. The Unuwahao population—25 of the trees—is on private Maori land (Wahi tapu). The species is listed as nationally critical. Much of the above information supplied by PJ de Lange. Named by Dawson (1985). “This tree has a rounded, symmetrical crown and an extremely characteristic white, slightly spongy bark” (JK Bartlett pers. comm.).

- 244 *Metrosideros robusta* One tree recorded by Kirk in his *Forest Flora of New Zealand* (1889) measured upwards of 7 m in diam. The tree usually starts from a windblown seed lodging in humus formed by the decaying leaves of a high-growing epiphyte. From there it sends roots down the supporting tree to the ground. These roots finally join together to form an irregular trunk that may outlive the supporting tree. Trees that start from the ground have normal trunks; these may be short or tall, with few or many branches.
- The pattern of the veins on the under surface of the leaves distinguishes northern rata from southern rata. Generally in southern rata only the main veins are seen, whereas in northern rata copious net veins are visible. There is also a difference in the leaf tips, the slight notch being characteristic of northern rata. When massed with red flowers rata is one of the glories of the forest.
- 246 *M. umbellata* Kirk (1889) describes the southern rata as follows: “The colony (sic) has few more magnificent sights to offer than a mountain-slope covered with this species from its base to nearly 4,000 feet above sea level, when the brilliant scarlet flowers are lighted up by the morning sun. It is only to be seen in its full beauty in such localities as the lower part of the Otira, the deep sounds of the South Island, and on Stewart Island”.
- 248 *M. parkinsonii* Reported by WS Hayward, but made known by HH Travers, from plants on the mountains behind Collingwood about 1882. This is a very attractive plant with its bright flowers, and a surprising one too, in that it grows in two widely separated areas of the country. Leaf surfaces are usually deformed and discoloured red by scale insect damage.
- 250 *M. carminea* Cheeseman (1914) describes the species thus: “when seen in full bloom, is probably the most brilliant of the species. The flowers are a much brighter crimson than those of the northern rata and pohutukawa and are so abundantly produced as almost to conceal the leaves. When climbing up the trunk of a rimu or other tall forest tree, and laden with flowers, it presents the appearance of a veritable pillar of flame, and such specimens are often conspicuous from afar”.
- 252 *M. albiflora* Was first collected at Mercury Bay during Cook's first voyage in 1769.
- 256 *M. diffusa* In the genus *Metrosideros*, it is only in New Zealand that some of the species are climbing plants, and, of these, this plant is the most common. It does not push up to the top of a tree but surrounds the trunk with its many branches and builds up, clinging by means of aerial roots as it goes.
- 258 *M. colensoi* The leaf-covered branches hang in curtains of a metre or more in depth from cliff faces and trees. This pendent habit, the pubescent branchlets and young leaves, and the more pointed leaves distinguish this species from *M. diffusa*. “However, in their juvenile stages the two species are difficult to separate when both are almost glabrous” (CC Ogle pers. comm.).

- 262 *Syzygium maire* The flowers lose their petals soon after opening. They also fade within an hour of being picked. For these reasons the flowers were drawn and painted beside the tree from which they were collected. This was the only specimen that had flowers that had to be illustrated in the field out of all those in the book.
- 264 *Lophomyrtus bullata* This is an attractive plant mainly because of its glossy puckered leaves which in exposed positions are often reddish-tinged. It often hybridises with *L. obcordata* where the two meet in the wild.
- 266 *L. obcordata* Prefers alluvial and riparian habitats, base-rich substrates (limestone, volcanic) and schist soils.
- 270 *Elaeocarpus dentatus* Rare hybrids are known between hinau and pokaka. Rewarewa (*Knightsia excelsa*) has similar looking juvenile leaves but they are harsh to the touch and the stem tip (leaf buds) are red-brown and velvety.
- 272 *E. hookerianus* A canopy tree, pokaka passes through a juvenile stage where growth is columnar and branches are twisted and interlaced.
- 274 *Aristotelia serrata* In bush clearings the makomako is often one of the first trees to come up, frequently forming thickets. First collected by Banks and Solander in 1769.
- 276 *A. fruticosa* (i)
(*A. fruticosa* var. *microphylla*) Hybrids are found between *A. fruticosa* and *A. serrata*.
- 278 *A. fruticosa* (ii)
(*A. fruticosa* var. *rigidula*) It is a most unusual feature in New Zealand trees and shrubs for anthers to have hairs. Seedling to juvenile leaves are extremely variable. The seedling leaves looked similar to those of juvenile pokaka, *Elaeocarpus hookerianus*. Adult leaves in this variety also appear to be variable, the Roaring Meg specimen had glossy leaves, while a red margin and irregular edge were inconspicuous.
- 278 *A. fruticosa* (iii)
(*A. fruticosa* var. *suberecta*) “At this stage it is unclear what *A. fruticosa* var. *fruticosa* is” (AP Druce pers. comm.). So the author has illustrated examples of named varieties and given their distribution. Until the type of *A. fruticosa* var. *fruticosa* is located it remains uncertain which of these later named varieties will be synonymised with the type species. This specimen was supplied by the late AP Druce from a cultivated plant as *A. fruticosa* var. *suberecta*. Unfortunately any further information regarding the plant is unobtainable.
- 280 *Entelea arborescens* This is a fast-growing, short-lived tree. The wood is extremely light, being lighter than cork. “A single tree can produce a million seeds in one season; seeds are shed almost continuously, and may remain viable on the ground for years, even surviving fire” (Moore & Irwin 1978). First collected by Banks and Solander near Gisborne in 1769. Readily eaten by animals and now uncommon in many places. The large, bright green leaves and masses of flowers make this a very attractive plant. Buoyant wood used by Maori as net floats. Maybe introduced by Maori in southern part of range.

- 282 *Plagianthus regius* (i)
(*P. regius* s.s.) Uncommon in extreme northern part of its range.
- 284 *Plagianthus regius* (ii)
(*P. chathamicus*) Upon receiving and nearly discarding what appeared to be very immature buds, the author looked at them through the microscope and was amazed to find open flowers not much more than 1 mm in diam. Perhaps the economy of size compensated for the lavish number of flowers produced, there being *c.* 300 on the panicle illustrated.
- 286 *P. divaricatus* This plant and the mangrove (*Avicennia marina* ssp. *australasica*) are the only New Zealand shrubs or trees that can survive with their roots in brackish water. There is such a great difference between the adult plants of *P. divaricatus* and *P. regius* (i), and also between their habitat requirements, that it is interesting to find that in a few localities where they meet, hybrid forms occur. Collected by Banks and Solander on their first day ashore in New Zealand, 9 October 1769.
- 288 *Hoheria populnea* Exact southern limits obscured by naturalisation from garden plantings.
- 290 *H. sexstylosa* The leaves feel rough to the touch due to short stiff hairs. In recent years the specific status of *H. sexstylosa* has been questioned. However, it is a distinct species, which appears to have arisen through hybridisation with *H. angustifolia* and *H. populnea* (PJ de Lange pers. comm.). In the northern Waikato it is sympatric with *H. populnea*.
- 292 *H. sexstylosa* var. *ovata*
(*H. ovata*) With the exception of the mountain ribbonwood species pair *H. glabrata* and *H. hyallii*, and *H. sp.*, this species is the earliest to flower. Specimens may be seen flowering in late December, peaking in January.
- 294 *H. equitum* “It is not actually known from Hen Island, but only from three of the Chickens: Marotere, Whatapuke and Maitaha” (PJ de Lange pers. comm.). This species was first recognised as distinct by WRB Oliver (Allan 1961) who gathered specimens from the Aorangi Island, Poor Knights Island group in 1934. Though closely allied to *H. populnea* it has uniformly green leaves (the undersides are never tinged pink or purple as is common in *H. populnea*), which are broader, more finely toothed to almost entire, and the flowers are usually much smaller. It is one of the fastest growing native trees; cultivated plants raised from seed can flower within 2 years. *H. populnea* and *H. equitum* occur together on the Chicken Islands where there is evidence of hybridism between the two.
- 294 *H. sp.* (from Tararua & Arapawa I.) Hairs on abaxial leaf are a diagnostic character of this species. Although similar in appearance to *H. sexstylosa*, it remains distinct where the two grow in the same area (Tararua Range). It flowers in mid-summer whereas *H. populnea* and *H. sexstylosa* flower in early autumn. It grows in wet areas from lowlands up to the tree line, though primarily an upland species of regenerating forest in recently disturbed habitats, e.g., slip scars and slumps. Occasionally found on riverbanks in the lowlands

and in forest on mountains. This plant was first collected by Zotov, Elder and Beddie (1938) in the Tararua Range. Morphologically it appears to have arisen through hybridisation between *H. angustifolia* and *H. sextylosa* (PJ de Lange pers. comm.).

296 *Hoheria glabrata*

Has been informally treated as a variety of *H. lyallii*. This is because it was believed that they grade into each other. Generally *H. glabrata* grows in the wet west and *H. lyallii* in the dry east. Recently closer inspection and molecular studies have shown that this species is distinct from *H. lyallii*. Where the two species co-exist in Central Otago and N.W. Nelson they hybridise. They may also hybridise with *H. angustifolia*. Hybrids between *H. glabrata* and *H. populnea* have been collected from Taranaki (Heenan et al. 2005). *H. glabrata* and *H. lyallii* are closely related species. They have seed characteristics that distinguish them from other species of *Hoheria*. “*H. glabrata* and *H. lyallii* are further distinguished by the seed usually separating from the mericarp at maturity and deciduous leaves. Whereas the other species of *Hoheria* have seed that does not separate from the mericarp at maturity and the leaves are evergreen” (Heenan et al. 2005). When in full flower this tree is especially beautiful; it resembles a white flowering cherry tree.

298 *H. lyallii*

The leaf shape, size and density of hairs varies according to habitat. The shade form of *H. lyallii* has larger leaves and fewer hairs and the characteristic truncate leaf base. “Hair density is much higher in populations that occur in the more exposed habitats” Heenan et al. (2005). As well as hybridising with *H. glabrata*, hybrids occur between *H. lyallii* and *H. angustifolia*. The paper by Heenan et al. (2005) has been consulted for this description and that of *H. glabrata*.

300 *H. angustifolia*

Sporadic in the N, known from scattered sites north of Dargaville (Manganui River), and near Waitomo, then apparently absent until just north of Taihape and Mataroa. Common in the Wairarapa, scattered in northern S. and more common further south. Hybrids of this species have been recorded with *H. sextylosa* and *H. populnea* in N and *H. ovata* and *H. lyallii* in S.

302 **HIBISCUS**

The genus reaches the world southern limit in northern New Zealand. The status of *Hibiscus trionum* is less clear. At least one form found here may be indigenous, possibly even endemic (PJ de Lange & L Craven pers. comm.), while another (illustrated here) seems to be a very old introduction. *H. diversifolius* is a shrub-like perennial and therefore included with the trees and shrubs. Although *H. trionum* is a herb, it was felt that the two *Hibiscus* species should be illustrated together. They are both very attractive plants, now widely grown, mainly in northern New Zealand but also elsewhere in suitable frost-free sheltered sites. Both species are now scarce in the wild, and threatened with extinction.

302 *Hibiscus diversifolius*

Occurs in sandy places on coast and in raupo (*Typha orientalis*) swamps, slow-flowing stream sides, and coastal scrub on

serpentinite rock. Now scarce and seriously threatened by browsing animals such as horses, cattle, sheep, goats and pigs. Though this species has been considered by some to be introduced, there is an unusual, possibly endemic prostrate form apparently restricted to the serpentinite rocks of the Surville Cliffs. Furthermore, there is a pollen record, probably of this species, obtained from a 2,000-year-old peat core taken from near Mt Wellington, Auckland (R Newnham pers. comm.). The species is native to the eastern Australian coastline, Norfolk Island and other easterly islands of the Pacific, so its natural presence in New Zealand would not be unusual.

304 *Hibiscus trionum*

Scarce and threatened by weed invasion and browsing animals. The smaller-flowered form, lacking the basal blotch is now at serious risk of extinction. The distributions of both colour forms have become confused through the indiscriminate planting of the form illustrated here, which freely naturalises. Both forms can hybridise in cultivation, and their progeny is fully fertile (PJ de Lange pers. comm.).

306 *Homalanthus polyandrus*

Formerly on the brink of extinction, the species is now locally common and widely scattered across Raoul, where it is found mainly in the wetter forest, as a result of the successful wild goat eradication. WR Sykes (1969) wrote: "Plants of this genus are fairly commonly cultivated in many of the warmer parts of New Zealand and are generally referred to as *H. polyandrus*, but every one which has been examined belonged to *H. populifolius*, sometimes known as the Queensland poplar". Subsequently, *H. polyandrus* has been found in cultivation around Auckland (Gardner 1999). Unlike the weedy *H. populifolius*, *H. polyandrus* is very cold-sensitive, and has proved difficult to maintain in cultivation in all except the warmest of garden situations.

The flowers and fruit provide good distinguishing characters between the two species. In *H. polyandrus* the female flower has three style arms, the male flower on 10 cm long spikes is of 30 or more densely packed stamens and the fruit, which when mature is reddish, has no glaucous bloom and splits into three valves. In *H. populifolius*, the female flower has two style arms, the male flower has four to ten loosely packed stamens and the fruit, which is glaucous, splits into two valves. There is another feature concerning the difference between the two species, and which is the basis for putting the species into different sections of the genus. This is the fact that in the Kermadec plant the male flowers have only one large sepal around them, whereas in the Queensland plant there are two, one on either side of the stamen mass (WR Sykes pers. comm.).

308 *Ackama rosifolia*

Locally common in the wetter, kauri-dominated forests of Northland but absent from Kaitaia north. This species is the type of the genus. It was first collected by Allan Cunningham in the Hokianga district in 1826. Cunningham coined the name "Ackama" as a Latin equivalent of the tree's common Maori name "Makamaka". This is a species of disturbed forest habitats, and is perhaps most common where old logging

- roads, tracks and paths have been. Often grows with the commoner *Weinmannia silvicola* with which it is easily confused. The leaflets of *W. silvicola* are without domatia.
- 310 *Ackama nubicola* This amazing new discovery was made by KA Riddell in February 2000 and the tree was subsequently described by de Lange et al. (2002). KA Riddell was inspecting an area of private land for possible inclusion in the Waima Forest Reserve by the Department of Conservation when she noticed this new tree species. Upwards of 500 trees and juveniles have been discovered in just the single location. In comparison with *A. rosifolia*, the new species has larger leaflets and fewer of them, in both the juvenile and adult stages and much smaller, vestigial domatia which are not always present. The stipules of adult foliage are much larger, entire, glabrous and butter yellow. The immature fruit are cream-coloured and the mature fruit have a deciduous style remnant. *A. rosifolia* has smaller more numerous leaflets with conspicuous domatia, and smaller, green, toothed stipules. The immature fruit are pink and mature fruit have persistent styles. The inflorescence shows no major difference but in *A. nubicola* it is slightly pinker, the flowers somewhat smaller and possibly more densely clustered.
- 314 *Weinmannia silvicola*
var. *silvicola* “In the absence of flowers, this plant (towai) can be confused with makamaka (*Ackama rosifolia*). Towai has bluntly serrate leaflets which lack domatia, makamaka leaflets are sharply serrate and the undersides possess distinctive domatia. The leaf stalk of towai is flat on the upper surface between the leaflets; this is more pronounced near the terminal leaflet where it has the appearance of being winged. The leaf stalk of makamaka is rounded and has no winged appearance” (SP Courtney pers. comm.).
- 316 *W. silvicola* var. *betulina* The distinction of this variety from var. *silvicola* is particularly difficult, and has been the main factor driving the view that *W. silvicola* is indistinguishable from *W. racemosa* (Gardner 1999). In this regard it is notable that Hopkins (1998) provides no comment on the status of var. *betulina*.
- 318 *Quintinia serrata* *Q. acutifolia* and *Q. elliptica* have been included in *Q. serrata* in this publication. The leaves of Northland populations are consistently narrower than those further south.
- 320 *Ixerba brexioides* First collected and later described by Allan Cunningham from specimens gathered at Whangaroa in 1828. *Ixerba* has now been placed within its own family, making it our only endemic New Zealand flowering plant family. The flowers produce an excellent honey.
- 322 *Carpodetus serratus* In the N this tree often has holes in the trunk which have usually been made by the caterpillar of the large ghost or puriri moth (*Aenetus virescens*). A weta (*Hemideina thoracica*) will sometimes take up residence in these holes and from this the tree has acquired its Maori name, which means many weta holes. First collected by Banks and Solander at Totaranui, Queen Charlotte Sound in 1769.

- 324 ***Rubus cissoides*** (i)
(*R. cissoides* s.s.) The leaves vary in width, gradually integrating with the form *R. cissoides* (iv) (from Central N).
- 326 ***R. cissoides*** (ii) (from Dart Valley) This specimen was collected by AP Druce and NC Simpson in 1992 near the track to Chinamans Bluff in the Dart Valley.
- 328 ***R. cissoides*** (iv) (from Central N) Widespread and common in all forest types. Most common in beech (*Nothofagus*) forests and secondary/regenerating forests. In taller podocarp forests it tends to be on forest edges and in canopy gaps. First recognised as a different form of *R. cissoides* by AP Druce.
- 330 ***R. australis*** Grows in lowland forests in wetter areas, especially where the ground is swampy.
- 334 ***R. schmidelioides*** (ii)
(*R. schmidelioides* var. *subpauperatus*) Differs from *R. schmidelioides* (i) (*R. schmidelioides* var. *schmidelioides*) in that it is of smaller stature, has a greater number of prickles, narrower leaves and more compact panicles (Allan 1961).
- 336 ***R. schmidelioides*** (iii)
(from N.W. Nelson) “It appears to be the dominant *Rubus* in the N.W. Nelson area” (AP Druce pers. comm.).
- 338 ***R. squarrosus*** Local in the northern part of its range. In the S absent from N.W. Nelson and North Marlborough, and local in eastern Nelson. More common in the drier eastern parts of South Marlborough, Canterbury and Otago.
- 340 ***R. parvus*** First collected by James Hector near Lake Brunner in 1873. Cheeseman (1914) wrote of this plant: “The leaves are remarkable for their fine bronzy to bronzy-purple coloration, which gives the plant quite an attractive appearance - in fact, it might almost be called a decorative plant. The fruit is larger than in any other New Zealand species, being sometimes quite an inch in length, resembling large raspberries”. The fruit can be eaten, but are tasteless.
- 342 **CLIANTHUS** Formerly a genus of two species, one in Australia the other in New Zealand, recent research has shown that the Australian species is a *Swainsona*. Subsequent study has shown that there are two cryptic species in New Zealand. Interpreting distribution is complicated as the species were cultivated by Maori.
- 342 ***Clianthus puniceus*** Currently it seems that this species might have been naturally confined to Northland and Auckland. At present the only known extant population is found on a small island in the Kaipara Harbour, and even then that island was once a pa, so the plants there might have been planted.
Compared with *C. maximus*, *C. puniceus* is a smaller shrub with darker green, dull and slightly smaller leaflets and, on the under surface of the leaflets, the hairs are mostly short and fine. Flower colour slightly different as illustrated; dark blotch at base of standard striped with white. The calyx lobes are shorter and somewhat broader. Whereas *C. maximus* is a larger shrub, has bright green, shiny and larger leaflets with mostly

- coarser and longer hairs on the under surface. Flowers with no white stripes on dark blotch at base.
- 342 *Clianthus maximus* Formerly present on Great Barrier Island, and possibly near Thames. It is currently known with certainty only from the eastern North Island at several sites near Lake Waikaremoana, Hawke's Bay and on parts of the East Coast north of Gisborne (Heenan 2000).
- 344 **SOPHORA** Banks and Solander took seeds of both *S. microphylla* and *S. tetraptera* to England in 1791, these becoming the first New Zealand plants to be grown in European gardens. "The demonstration in 2001 that NZ has eight *Sophora* species instead of three or four, mostly with overlapping natural distributions, has conservation implications. Concern has been expressed regarding the serious damage being inflicted by inappropriate plantings on the wild gene pools. Many local authority and residential plantings using this horticultural resource are inadvertently mixing species distributions, and as these plantings mature the risk of hybridism with natural populations of the different species of *Sophora* increases. ... The value of using local genetic material for such plantings cannot be overstated". Paper consulted for this genus and, unless otherwise stated, quotations from Heenan et al. (2001).
- 344 *Sophora godleyi* It grows as a fair-sized tree with spreading branches and spreading to drooping branchlets. But it can be a low wide-branching tree on cliffs, dunes and other open sites. The tree has a greyish appearance compared with the greener *S. microphylla* where the two grow together, e.g., around Taihape. This tree has larger leaflets on juvenile plants but it has no divaricating stage. Primarily a species of papa mudstone cliffs within river gorges, it has also been found within dune forest near Bulls. *S. godleyi*, *S. microphylla* and *S. tetraptera* overlap in their distributions south of Taihape.
- 346 *S. microphylla* "Branches weeping, or spreading and ascending". It is relatively uncommon in parts of the northern North Island where it is sympatric with *S. godleyi*, *S. chathamica* and *S. tetraptera*, but is sympatric with *S. tetraptera* from southern Hawke's Bay to Cook Strait. It does not naturally occur within the range of *S. molloyi* in Marlborough Sounds.
 "The copious nectar of *S. microphylla* is attractive to honey bees, but causes narcosis, and the bees die from exposure outside the hives (Clinch et al. 1972). Tui [*Prosthemadera novaeseelandia*] are also apparently subject to kowhai nectar narcosis but they regularly frequent the flowers" (Connor 1977). Toxicity of nectar from some trees was high and from others apparently nil; and those trees secreting toxic nectar appeared to do so from year to year.
- 348 *S. longicarinata* The specimen illustrated had every calyx split in two places. The author has not seen this on other *Sophora* species.
- 350 *S. fulvida* Occurs at numerous sites throughout the Waitakere Ranges, and in Northland it is locally common on Maunganui Bluff,

Bream Head, and near Mt Manaia. In the plant illustrated the two petals comprising the keel curved horizontally outwards as the flower matured. The author has not observed this feature in other *Sophora* species. In the early stages of development the standard can be a paler yellow. The single leaf, with larger leaflets, was on the same branch as the main illustration.

352 *Sophora tetraptera*

This colourful tree produces large quantities of nectar and attracts tui (*Prosthemadera novaeseelandiae*), bellbirds (*Anthornis melanura*) and silvereyes (*Zosterops lateralis*). These birds act as pollinating agents. Pigeons (*Hemiphaga novaeseelandiae*) feed on the leaves and the flowers, as they do for all species of kowhai. It is a popular garden tree. It does not have a divaricating form.

354 *S. chathamica*

This species may be recognised by the lack of a divaricating juvenile stage, by the adult leaves deltoid in outline, with the leaflets overlapping. As an adult, *S. chathamica* is usually a multi-trunked tree, with the branches arising from the base and with the apices never pendulous. "After *S. molloyi*, this species is the first *Sophora* to flower, starting in August and peaking in September" (PJ de Lange pers. comm.). Disjunct between Waihi and Porirua.

354 *S. molloyi*

The juvenile form is not divaricating. Favoured habitats include cliff, talus, and active alluvial fans in extremely exposed locations where drought, salt burn, and severe wind damage are significant constraints on plant growth and diversity. Although growing in association with many other plants, it is not uncommon for *S. molloyi* to be the sole dominant shrub species on lichen covered or bare rock.

Occurring on Stephens I, D'Urville I, Rangitoto I, Chetwode Is, Titi I, Motuara I, Long I, Arapawa I, Kapiti I, and several headlands on the outer Marlborough Sounds mainland, e.g., Cape Jackson, Cape Lambert, and along the southern Wellington coast, e.g., Cape Palliser and Turakirae Head.

This species has the longest flowering time of any of the New Zealand species, plants may start flowering in April, peak in mid winter and can continue flowering until October. This plant, under the cultivar names 'Dragons Gold' and 'Early Gold', has become popular in cultivation over the last 20 years.

358 *CARMICHAELIA*

The genus *Carmichaelia* has closely related species with common characters but some of the characters (e.g., presence or absence of leaves, form of branchlets, etc.) of any given individual can be changed by environmental conditions. Plants which grow in dry exposed situations are leafless as adults and generally have erect, stiff and more or less rounded branchlets which carry out the functions of leaves. The vertical habit of the branchlets gives protection from the heat of the midday sun whilst shaded and sheltered forms, on the other hand, can have functional leaves and their branchlets elongated, thin and flattened.

Unless otherwise stated the author referred to Heenan (1995 & 1996). In many instances detailed descriptions of cladodes, inflorescence, pods and seeds have not been included as it was considered that the illustrations clearly depict these in

their natural size.

Over half of the species in this genus are nationally threatened mainly due to introduced browsing animals and weed competition.

- 358 *Carmichaelia muritai* Upper branches erect, lower ones pendulous, canopy compact. On deeply eroded cliffs of coarse outwash gravels, c. 40–300 m a.s.l. (Purdie 1985).
This seriously threatened species was originally discovered by a weed contractor, who recognised it as a native, rather than exotic broom, and so drew its attention to botanists (P Simpson pers. comm.). Initially it was known from just the one population of 28 trees on a cliff side near Clifford Bay, Marlborough (Purdie 1985). Subsequently two other populations have been found and a fourth established by the Department of Conservation near Marfell's Beach. Despite on-going management the species is still threatened by browsing animals, weed invasion, wind and storm damage. The specimens were supplied to the author by Andrew Purdie in 1984.
- 360 *C. glabrescens* Scattered on limestone and greywacke cliffs; less common on river terraces. When the graceful pendulous branches are covered in blossom and massed on cliffs, such as at Woodside Gorge, these plants are a splendid sight. The fruit is the most reliable feature for the identification of *C. glabrescens*, *C. torulosa* and *C. carmichaeliae* (see illustrations).
- 360 *C. torulosa* The pods and the slender growth are distinguishing features of this plant. The flowers differ from those of *C. glabrescens* and *C. carmichaeliae* in being smaller and lavender, not pink. In valleys from Amuri Range to Tara Haoa Range, especially South Canterbury.
- 362 *C. carmichaeliae* Sir David Monro found this plant on Christmas day 1853 on the banks of the Waihopai River, a tributary of the Wairau.
- 364 *C. stevensonii* Young plants are heavily browsed by wild animals and stock and, in some areas at least, the species has become scarce or locally extinct. Cheeseman (1925) wrote of this plant: "A very singular and beautiful plant, which should find its way into general cultivation". First recorded in 1900 by G Stevenson in the foothills of the Seaward Kaikoura Range, near the mouth of the Clarence River.
- 364 *C. crassicaulis* Coral broom was first collected by Sir Julius von Haast on Mt Torlesse in 1861. Plants are heavily browsed by wild animals and stock throughout its range.
- 366 *Corallospartium crassicaule*
var. *racemosum* Lindis Pass and near Lakes Wanaka, Hawea and Wakatipu. "A rather poorly understood plant, whose exact status remains uncertain. This is why it has not been formally transferred to *Carmichaelia*. Clearly it is similar to *Carmichaelia crassicaulis*, from which (in its typical form at least) it is distinguished by the stouter, upright, rigid shrub growth-form, more densely

- flowering habit, and blunt calyx lobes, and yellowish-purple flowers of *C. crassicaulis*” (PB Heenan pers. comm.).
- 366 *Carmichaelia compacta* It grows on dry schist hillslopes mainly in the Kawarau, Cromwell and upper Clutha Gorges.
- 368 *C. williamsii* This beautiful winter-flowering species is unique among the New Zealand *Carmichaelia* because it is predominantly bird-pollinated (Heenan & de Lange 1999). It is now seriously threatened with extinction in the majority of its known habitats, because sexual reproduction is limited through the lack of suitable bird-pollinators (bellbird and tui), and because it is browsed by sheep, goats, cattle, horses, rats, slugs and snails. Rats have been observed stripping foliage, ring-barking adults, eating developing seed pods and consuming seedlings. Large populations are now only known from the Poor Knights and Alderman Islands. Bishop Williams first collected this plant at Hicks Bay, East Cape prior to 1914 (Cheeseman 1914).
- 370 *C. australis* (i) The large, blackish pods illustrated are typical of those found on plants in South Westland and Fiordland.
- 370 *C. australis* (iii) The plant illustrated was growing in low forest near the treeline among kamahi (*Weinmannia racemosa*), leatherwood (*Olearia colensoi*), mountain horopito (*Pseudowintera colorata*) and mountain haumakaroa (*Raukawa simplex* var. *sinclairii*).
- 376 *C. australis* (v) Another variety of *C. australis*, *C. australis* var. “ovata”, similar to *C. australis* (v), is found in South Marlborough (not illustrated) where it is the common broom over much of S. Marlborough (SP Courtney pers. comm.). The habitat is “lowland to lower montane on alluvial ground, streamsides, grassland and shrubland” (Allan 1961).
- 380 *C. arborea* Between 1847–51, D Lyall, surgeon on the *Acheron*, made some important botanical collections in Fiordland, during one of which he found this plant.
- 380 *C. odorata* (i) It is known for its erect flowers and pods. The flowers illustrated probably drooped during transit.
- 382 *C. odorata* (ii) First collected by Colenso in 1843 between Wairoa and Lake Waikaremoana. The S populations were formerly known as *C. glabrata*.
- 384 *C. petriei* (ii & iii) In the semi-arid areas the cladodes are stouter yellow-green and the tips often yellow and more spinous than those in other areas. This plant is unfortunately often eaten nearly to the ground by grazing cattle, sheep and rabbits. W Martin (1961) wrote: “Perpetual or periodic drought, coupled with the influence of wind, will often stimulate the formation of spines, e.g., wild irishman [*Discaria toumatou*], *Melicytus*, or *Carmichaelia petriei*”. Simpson describes plants in shade as being “slender, tall and few flowered, and the pods are longer” (Allan 1961). The leaves of juvenile plants have minute, somewhat hairy leaflets. The adults are leafless, but Cockayne (1967) states that when

- leafless plants of this species were moved into a moist atmosphere they grew leaves.
- 386 *Carmichaelia curta* Most populations small and localised.
- 386 *C. juncea* Windswept sandstone conglomerate ledges, river bed gravels and, formerly, turfy edges of lakes and tarns with fluctuating water levels [extinct from this habitat type now]. Formerly, distribution extended to Hawke's Bay, South Marlborough (= *C. floribunda*), Canterbury (= *C. prona*), Otago (= *C. nigricans*) and Fiordland (= *C. lacustris*), but not known to have been common in any locality (Heenan 1995), and now extinct in these places. NW Nelson populations were formerly known as *C. fieldii*.
- 388 *C. kirkii* First recorded by JB Armstrong in 1881 on the present site of the city of Christchurch.
- 390 *C. appressa* (i)
(*C. appressa* s.s.) "It grows on gravelly sandy loam, stabilised sand dunes, and ridges of sand which represent the former shores of Lake Ellesmere. ... It does not occur on adjacent older soils with a developed top-soil or among grey scrub communities..." (Heenan 1996).
- 390 *C. appressa* (ii) This plant, and another similar low-growing sprawling plant confined to the coastal cliffs between the Rakaia and Rangitata Rivers (not illustrated), appear to be closely related to *C. appressa* (Heenan 1996). The specimen illustrated was grown by AP Druce.
- 392 *C. vexillata* "The specific epithet *vexillata* alludes to the standard, which is a diagnostic feature of this species; it is usually longer than the keel, and also longer than that of the closely related *C. monroi*" (Heenan 1995). *C. monroi* also differs in its calyx being hairy. In *C. vexillata* the yellow-red apex of the cladode can also be a diagnostic feature at certain times of the year.
- 394 *C. hollowayi* Simpson (1945) remarked: "A peculiar plant, first collected as a prostrate shrub from sandstone at Mt St Mary, Kurow, Waitaki Valley, by the Rev. JE Holloway, but young plants erect when propagated in his experimental garden at the Otago University Museum. Young erect plants are quite unlike the procumbent, leafless adult". Threatened by browsing animals and to a lesser extent by weeds, seedlings are virtually unknown, and as there are less than 200 adults plants now known from the wild, this species is considered to be at severe risk of extinction (de Lange et al. 2004).
- 394 *C. nana* (i) (*C. nana* s.s.) "This plant was [first collected] by Messrs. JD Enys and T Kirk, on the terraces of the Porter River, Waimakariri, in the Canterbury District" (Featon 1889). Formerly known as *C. enysii* var. *enysii*, after Enys.
- 394 *C. nana* (ii) *C. nana* (i) and *C. nana* (ii) are now regarded as one species as forms with wider cladodes and those with narrower cladodes can be found in both the N and the S localities. Formerly

known as *C. enysii* var. *orbiculata* (round, referring to the shape of the pods).

- 396 ***Carmichaelia uniflora*** (i) The width of the branchlets vary, the narrowest end of the range is illustrated as *C. uniflora* (ii). First "... found by JD Enys at Lochnavar, and in the Valley of the Poulter". "Lochnavar" is not listed in the *Gazetteer of New Zealand Place Names*; it may be Lochnivar Stream, Canterbury (Featon 1889).
(*C. uniflora* s.s.)

Distribution of the species of *Carmichaelia*

<i>C. australis</i> (iv)	N.	Northland, Coromandel to Taranaki
<i>C. williamsii</i>	N.	Poor Knights Is, Lt. Barrier I and mainly offshore islands and islets to mainland nr. E. Cape
<i>C. odorata</i> (ii)	N., S.	Central N.I. to N. Marlborough, E. Nelson and NW Nelson
<i>C. nana</i> (i)	N., S.	E. of Ruapehu, S. Marlborough, Canterbury and Otago
<i>C. nana</i> (ii)	N., S.	E. of Ruapehu, S. Marlborough, Canterbury and Otago
<i>C. australis</i> (iii)	N.	Mt Taranaki/Egmont and nearby Pouakai Ra.
<i>C. australis</i> (ii)	N.	Rotorua and E. Cape southwards
<i>C. australis</i> (i)	S.	Nelson, Marlborough, Canterbury, Westland. Mostly W. of Main Divide
<i>C. juncea</i>	S.	NW Nelson coast, S. Westland
<i>C. odorata</i> (i)	S.	Nelson, N. Canterbury and Westland
<i>C. uniflora</i> (i)	S.	Nelson, inland Canterbury, W. Otago, N. Southland
<i>C. corrugata</i>	S.	Marlborough to S. Otago
<i>C. muritai</i>	S.	S. Marlborough: Clifford Bay, N. Kaikoura
<i>C. carmichaeliae</i>	S.	Marlborough: Valleys of Wairau and Awatere Rivers
<i>C. glabrescens</i>	S.	Marlborough: Awatere V. south to Kowhai R.
<i>C. stevensonii</i>	S.	Marlborough: northern Seaward and Inland Kaikoura Ranges and Waihopai R.
<i>C. australis</i> (v)	S.	Marlborough: Inland Kaikoura Range
<i>C. vexillata</i>	S.	Marlborough, S. Canterbury and Central Otago
<i>C. astonii</i>	S.	Marlborough: Flaxbourne to Clarence Rivers
<i>C. monroi</i>	S.	Marlborough and Canterbury
<i>C. kirkii</i>	S.	Marlborough, Canterbury and Otago

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|------------------------------------|---------|---|
| <i>C. crassicaulis</i> | S. | Marlborough, Canterbury, Otago and N. Southland, 42° to 46° S |
| <i>C. australis</i> (vi) | S. | Canterbury: Lewis Pass to Waitaki R. |
| <i>C. torulosa</i> | S. | Canterbury foothills |
| <i>C. appressa</i> (i) | S. | Canterbury: Kaitorete Spit |
| <i>C. appressa</i> (ii) | S. | Canterbury: upper Rangitata River and its tributaries |
| <i>C. uniflora</i> (i) | S. | Canterbury: Waimakariri R., N. Otago |
| <i>C. petriei</i> (ii) & (iii) | S. | Canterbury to Central Otago |
| <i>C. arborea</i> | S. | Inland Canterbury and Westland, southwards to Fiordland, mostly W. of Southern Alps |
| <i>C. curta</i> | S. | Canterbury and N. Otago |
| <i>C. petriei</i> (i) | S. | Canterbury: Lower Waitaki Valley, Central Otago |
| <i>C. hollowayi</i> | S. | N. Otago |
| <i>C. compacta</i> | S. | Central Otago: Kawarau, Cromwell, and Upper Clutha Gorges |
| <i>C. petriei</i> (ii) | S., St. | Otago, Southland and Stewart I. |
| 398 NOTHOFAGUS | | New Zealand species all show some differences in their leaves between the juvenile and adult stages. These differences are more pronounced in <i>N. solandri</i> var. <i>solandri</i> and <i>N. solandri</i> var. <i>cliffortioides</i> . With the sole exception of <i>N. menziesii</i> all the other New Zealand species readily form hybrids. The beeches are the prime host of the beech mistletoe genera, <i>Alepis</i> and <i>Peraxilla</i> . |
| 398 <i>Nothofagus fusca</i> | | At certain times of the year some young leaves are a bright red. The wood of red beech is strong, compact and more durable than that of the other New Zealand beeches. Red beech and hard beech are not always easy to distinguish from each other. The following points are sufficient for the identification of the species: red beech leaves have three to four pairs of veins and sharp teeth with rather deep notches between them; hard beech leaves have five to six pairs of veins and rounded teeth with shallow notches between them. Also domatia are present on red beech leaves but not on those of hard beech. First collected by Banks and Solander in 1769. |
| 400 <i>N. truncata</i> | | In the S it reaches its southern limit at the Wairau catchment in the east and the Taramakau River in the west, with the exception of a small disjunct population near Haast. |
| 402 <i>N. menziesii</i> | | Frequently reduced to a shrub in subalpine areas. Host to <i>Cyttaria</i> , the yellow-coloured, round strawberry fungus, c. 2–3 cm diam., and also host to <i>Aceria waltheri</i> , a disease which deforms a group of branchlets into a twiggy mass, commonly called “witches broom”. |

- 404 *Nothofagus solandri* var. *solandri* Intermediate forms between this variety and *N. solandri* var. *cliffortioides* occur between North Canterbury and Southland and in the southern N.
- 406 *N. solandri* var. *cliffortioides* Often reduced to a shrub in subalpine areas. Descends to sea level in southern part of range. In many areas it forms the greater part of the subalpine forest. Where *N. solandri* var. *solandri* and *N. solandri* var. *cliffortioides* meet hybrids can be very common. Because of this, and their ecological distinctions, some botanists recognise var. *cliffortioides* as a species. First collected by A Menzies in Dusky Sound, 1791.
- 408 *Streblus smithii* The leaves can be very large; one leaf of 23.5 x 11.5 cm was measured by WRB Oliver (1948). When Cheeseman visited South West Island in 1889 he wrote of this plant "...particularly abundant, especially towards the summit of the island, forming a bush a few feet in height with flexuous and closely interlaced branches, and presenting a very different appearance from the tall, slender, sparingly branched form seen in the gullies of the Great King" (Oliver 1948). (Great King is Great Island.) Cheeseman first collected this plant on Great Island in 1887.
- 410 *S. banksii* This species passes through no juvenile twiggy stage.
- 412 *S. heterophyllus* A sweetish, milky juice is exuded when the bark is bruised or cut, and was used by the early colonists in tea in place of milk.
- 414 *Boehmeria australis* ssp. *dealbata* Very closely related to, and only doubtfully distinct from the Norfolk Island *B. australis* ssp. *australis* (de Lange et al. 2005). This shrub/tree was collected by Cheeseman in 1887 during the visit made to the Kermadec Islands by the New Zealand Government for the purpose of formally annexing the group to New Zealand. Cheeseman grew *B. australis* ssp. *dealbata* in his garden in Auckland and wrote of it: "Although the flowers are small and inconspicuous, and offer no attraction to the horticulturist, the plant is not without some value in the shrubbery. Its growth is rapid, it stands exposure well and it has a neat and compact mode of growth. In addition, the leaves are decidedly handsome from their conspicuous ribbing, and from the contrast between the hoary white of the under surface and the green and glabrous upper surface" (Cheeseman 1914). Although it was not uncommon at the time of Cheeseman's visit, WR Sykes observed in 1966 that the species is uncommon and is almost certainly eaten by goats. Since goats were eradicated in the 1990s this plant now (2004) has to contend with a proliferation of invading weed species, and it has remained scarce. Previously known as *B. australis* var. *dealbata* (de Lange et al. 2005).
- 416 *Urtica ferox* The stings of this species are very painful. Moderate to heavy stings will usually impart a persistent burning sensation lasting several days, and which in severe cases can cause temporary paralysis of the affected limb, unconsciousness, or even death.

- 418 *Corynocarpus laevigatus* In northern parts of its range also found in lowland forest further inland. Common in the N, not plentiful in the S except along the Kaikoura coast, parts of Marlborough Sounds and parts of NW Nelson coast. Coastal groves were planted and tended by Maori. This is probably a northern N, or even a northern offshore island species and most or all of the southern records, including those of the Chatham I, probably result from spread from cultivation. Karaka is one of New Zealand's few indigenous poisonous trees, the fresh seeds being highly toxic if consumed. Nevertheless the karaka seed was of great value to Maori for food, second only in importance to the kumara. Before storing, the seeds had to be prepared very carefully to remove all trace of poison. First collected by Banks and Solander at Poverty Bay in 1769.
- 420 *Pennantia baylisiana* This tree was originally described in its own genus *Plectomirtha* and placed within the Anacardiaceae by WRB Oliver. Subsequently the Dutch botanist Sleumer recognised the affinity of the genus with *Pennantia*, and placed the Three Kings tree with the Norfolk Island *Pennantia endlicheri*. This was the situation when I first illustrated the plant in 1975. Because the New Zealand tree was then not known to form fruit, I illustrated fruits from a Norfolk I. plant of *P. endlicheri*. Subsequently in 1977, Baylis showed that the Three Kings Island plant was distinct from *P. endlicheri*, making a combination for it in the genus as *P. baylisiana*. Additional work by Gardner & de Lange (2002) has upheld this decision, and the distinction is further supported by recent molecular analyses which place *P. baylisiana* as a sister to a species pair comprising *P. endlicheri* and *P. corymbosa* (Keeling et al. 2004). In exposed situations the leaf-blade recurves strongly, imparting a distinctive saddle-shape.
- In the wild, *P. baylisiana* is still known only from the single tree, and a cutting grown specimen planted near it by Baylis. In cultivation some cutting-grown specimens have been observed to set seed, and some of this has proved viable. Subsequently, seedlings of *P. baylisiana* are now known from cultivation, and, as recently as 2003, one has been found in the wild.
- 422 *P. corymbosa* The anthers of the female flower illustrated are probably non-functional. Kaikomako, along with mahoe (*Melicytus ramiflorus*), holds a special place in Maori mythology and culture as one of the trees in which the fires of Mahuika sought refuge from the rain called down to prevent his being burned to death. Accordingly, old time Maori used kaikomako and mahoe wood to make fire.
- 426 *Mida salicifolia* Branchlets when magnified show minute bubble-like pimples. Phillipson records *M. salicifolia* parasitic on roots of *Agathis australis*; he states: "It seems probable that *Mida* will ... parasitise a number of hosts" (Allan 1961). This species can be confused with white maire (*Nestegis lanceolata*), but in that species the branchlets are straight, the leaves are never wavy and are always opposite. First collected from Whangaroa and Bay of Islands by A Cunningham in 1826. Now becoming scarce on the mainland through possum browse.

- 428 **LORANTHACEAE** Cases of double parasitism are not uncommon; W Martin recorded *Tupeia* on *Ileostylus* and *Korthalsella* on *Ileostylus* on the same *Coprosma* shrub. The species of *Ileostylus*, *Tupeia*, *Alepis* and *Peraxilla* have virtually disappeared from many districts where they were formerly abundant, although since about 1990 there has been impressive recovery of mistletoes in some places where possums are heavily controlled or barred from reaching mistletoes in host trees.
- 430 *Korthalsella clavata* Common around Lake Wairarapa and on the South Wellington coast. S occurs in scattered localities throughout; N. Marlborough, S. Marlborough, N.W. Nelson, Canterbury, Otago, Southland, Westland.
- 432 **ILEOSTYLUS** “*Ileostylus* has now been confirmed using herbarium evidence as parasitising 130 different species, with unverified reports indicating the actual figure may be as high as 230” (PJ de Lange pers. comm.).
- 432 *Ileostylus micranthus* Attached to the host by a ball-like mass, in addition to this, *Ileostylus* develops suckers (haustoria) from a branch lying along the host.
- 434 **PERAXILLA** These species are primarily bird-pollinated, especially by tui (*Prosthemadera novaeseelandiae*) and bellbird (*Anthornis melanura*). Their flowers open readily when birds twist the yellow portion of the unopened flower bud. Flowers opened this way “explode” their pollen in a shower, coating visiting birds, and so enabling effective cross-pollination between adjacent flowers and plants.
- 434 *Peraxilla colensoi* Formerly widespread, it is becoming scarcer over time through the effects of possum browsing. Sometimes such a mass of this plant is growing on its host that a somber beech tree can appear as brilliant in colour as a rata.
- 436 *P. tetrapetala* Reported parasitising 17 species, including several instances of plants growing on *Peraxilla colensoi*. This mistletoe equals *P. colensoi* in splendour. Kirk paid it a tribute when he wrote: “No finer floral display can be seen in New Zealand than a gloomy forest of black beech lit up by immense masses of mistletoe flowers”. “The blossoms are sometimes so abundant as to hide the foliage of bushes 10 feet across. As the blossoms fall the whole ground is sprinkled with petals yellow at the base but shading gradually through orange and scarlet to crimson and even carmine at the tips” (Richards 1949).
- 438 *Alepis flavida* Unlike the other species, which have obscure veins on both leaf surfaces, this species usually has distinct veins on the lower surface. It is also further distinguished by its preference for parasitising the outer branches of mountain beech trees (*Nothofagus solandri* var. *cliffortioides*).
- 440 *Trilepidea adamsii* On 6 November 1954, MC Gudex, a distinguished Waikato botanist, showed the author *T. adamsii* and collected the

specimen from which this illustration was made. The specimen is now located in the Allan Herbarium, Landcare Research, Christchurch (No. CHR 250820); it is the last record of this plant being seen alive. In the 1980s the author searched the area from which she collected the specimen, as have BPJ Molloy (1970s) and PJ de Lange (1980s & 1990s), all without success. *Trilepidea* was apparently never common.

442 *Tupeia antarctica*

Also found commonly on several other hosts including *Coprosma* species, *Carpodetus*, *Olearia paniculata* and the introduced tree lucerne (*Chamaecytisus palmensis*). Unlike *Ileostylus*, *Alepis* and *Peraxilla* species, which fasten themselves by external haustoria at many points to the host, *Tupeia* has only one point of union via an internal haustoria. Cases of double parasitism have been frequently observed in connection with this mistletoe; *Ileostylus micranthus* and *Peraxilla tetrapetala* supporting *Tupeia*.

444 *Discaria toumatou*

Usually the dominant species of grey scrub communities of the eastern S, typically forming thickets; less common but often taller west of divide in S. In N it was found mainly on dunes and gravel river terraces, but is now reduced to only a few sites because of farming and forestry. The spines are so woody and hard that they were used by Maori for needles for tattooing. Dr Cockayne found that by keeping plants in a moist atmosphere the young spineless leafy stage is retained indefinitely. A distinctive prostrate form occurs on the various coastal boulder banks between Nelson and Cape Campbell.

446 **POMADERRIS**

In some species the sepals fall early. When petals absent the calyx lobes can look like petals. Flower buds appear in the autumn and are present through the winter. The outer bracts surrounding the buds usually fall early and for this reason were not seen and therefore not illustrated.

446 *Pomaderris apetala*
ssp. *maritima*

Known from two sites, one at Mokau and the other at the mouth of the Mohakatino River. Formerly known from Te Ahurei, Kawhia but said to have been eliminated from there by goats (Kirk 1899). A threatened species. Tainui was first collected by Sir James Hector of the Geological Survey Department near the south head of the Mokau River in 1878. Wardle (1991) considered the plant to be a recent arrival, restricted to the west coast accordingly. However, there are Oligocene-aged (c. 38 million year old) pollen records of this species associated with the Te Kuiti Group Limestones of the western King Country. "*Pomaderris aspera* of Tasmania and Victoria, Australia, a similar looking plant, can be mistaken for *P. apetala*. *P. aspera* has now become well established presumably from garden stock, in parts of the North, South and Stewart Islands. It was often sold in the past as *P. apetala* and planted in reserves (e.g., Bruce Park SR near Hunterville, where it is now spreading by seed). I have never seen a self-establishing seedling of *P. apetala* ssp. *maritima*, not even in the two natural areas with it" (Colin Ogle pers. comm.). Also consulted: Stephens (1995 & 1996).

- 448 *Pomaderris hamiltonii* The leaves are thinner and smoother than those of the other New Zealand *Pomaderris* species and the tapering at the tip and base of the leaf distinguishes it from *P. kumeraho*.
- 450 *P. kumeraho* The early settlers gave this plant the name “gumdiggers’ soap” because of the soap-like lather obtained from rubbing a handful of the flowers with water. The golden yellow blossoms almost completely cover the shrub, making its appearance striking and ornamental. Moore & Irwin (1978) writes in referring to the opening of the flowers: “The opening is worth watching; the spoon-shaped petal wraps round the young anther but suddenly the bent tip of the filament straightens and the anther flips through 180° to project far beyond the petal”.
- 454 *P. rugosa* Known from between Orewa and Silverdale (now scarce), Kawakawa Bay near Clevedon, Coromandel Peninsula, Mayor I, west coast of Firth of Thames and adjacent islets, Aotea and Kawhia Harbours.
- 456 *P. aff. phyllicifolia* New Zealand plants had been referred to as *P. phyllicifolia* var. *ericifolia* and *P. ericifolia*. However, the type of *P. ericifolia* comes from Tasmania, and is not the same as the New Zealand plant (PJ de Lange pers. comm.).
- 458 *P. phyllicifolia* Previously known as *P. phyllicifolia* var. *polifolia* and *P. polifolia*, with the type based on a gathering from Victoria, Australia. Plants answering to the description of these names have since been shown to be identical to the earlier named *P. phyllicifolia*. In New Zealand, RH Michie found plants near Te Kao that had leaves with a shiny, glabrous, or nearly glabrous upper surface growing with the hairy form. Past records of this species from David Rocks, Hauraki Gulf were based on a specimen originally collected from near Spirits Bay, and apparently mislabelled as to locality (PJ de Lange pers. comm.).
- 458 *P. prunifolia*
var. *edgerleyi* The first specimens of this plant that were sent to WJ Hooker at Kew had been collected by J Edgerley in 1850 (Cheeseman 1914). Also known as *P. edgerleyi*.
- 460 *Leionema nudum* Often grows in association with kauri (*Agathis australis*). First collected near Whangaroa in 1838 by Colenso.
- 462 *Melicope ternata* Growing especially in marginal forest and entirely coastal and very localised at the southern end of its range. Leaves aromatic when crushed. There is great variation in the size of the leaves, those growing in the north or on alluvial soil being much larger than those growing on clay or near Cook Strait. Some variation results from hybridism with *M. simplex*. First collected by Banks and Solander at Tolaga Bay in 1769.
- 464 *M. simplex* This is one of the divaricating shrubs that in the absence of flowers or fruit can so easily be confused with several others. Occasionally one will find on the adult plant a few of the trifoliolate leaves of the juvenile stage. The flattened, jointed leaf stalks, the oil glands in the leaves and the distinctive smell of the leaves when crushed are further points to look for.

Another small-leaved plant, *Myrsine divaricata*, also has glands but no obvious smell when crushed. Occasionally the hermaphrodite flowers do not expand and are self-fertilized; such flowers are termed cleistogamic.

- 466 *Dysoxylum spectabile* The leaf size varies according to habitat; in exposed coastal forest the leaflets will be smaller than those in sheltered areas. Leaflet sizes illustrated 5-10 x 3-5 cm, length of leaf including petiole 25 cm. "In the male flowers the pollen is available as soon as the flower opens. The female in contrast has anthers that never produce pollen. The male trees produce many, many more flowers per inflorescence and many more inflorescences on the tree" (J Braggins pers. comm.). The fruit takes about a year to ripen. Trees tend to fruit alternate years but sometimes there may be several years in succession of poor fruiting. It is often the dominant species of coastal forest, especially in the Cook Strait region. Although the tree is bitter and astringent, this unfortunately doesn't deter possums as they are particularly fond of the leaves, buds and fruit.
- 468 *ALECTRYON* The jet-black, shiny seeds set in brilliant scarlet arils present a most pleasing contrast; they take about a year to ripen and from the seeds Maori formerly extracted an anointing oil for personal grooming.
- 468 *Alectryon excelsus* ssp. *grandis* The panicles of *Alectryon excelsus* ssp. *grandis* are large but the individual flowers appeared to be the same size as those of ssp. *excelsus*, whereas the capsules of ssp. *grandis* were slightly larger and the leaflets very much larger.
- 472 *DODONAEA* The New Zealand species is also found on Norfolk I, in eastern Australia and beyond in tropics and subtropics.
- 472 *Dodonaea viscosa* ssp. *viscosa* On the Chatham Islands it may have been planted by Maori (BPJ Molloy pers. comm.). A purple-leaved form is widely grown in parks and gardens.
- 474 *Meryta sinclairii* This was one of New Zealand's rarest trees but fortunately because of its ornamental value it is now frequently cultivated in parks and gardens in the warmer parts of the country. Puka was first noted by Colenso who was shown a single tree that had been planted by Maori at Whangaruru Harbour, Northland. It has been suggested that it was introduced by Maori to the Hen and Chickens Is.
- 476 *Schefflera digitata* Can be confused with five-finger (*Pseudopanax arboreus*). Both have digitate leaves and often grow in the same locality. Pate has very finely serrate, thin leaflets, commonly seven to a leaf, while five-finger has thicker, coarsely serrate leaflets, most frequently five to a leaf.
- 478 *PSEUDOPANAX* Several of the species hybridise. Reversion shoots can occur, often after damage to the tree, and especially on *P. crassifolius*. All New Zealand species are susceptible to possum browse.

- 478 *Pseudopanax laetus* Frequently seen only on cliffs and as an epiphyte, beyond the reach of feral goats. *P. laetus*, although similar to five-finger (*P. arboreus*) can be distinguished by the larger size of the leaves, by the smaller leaf serrations, by the laxly drooping position of the leaves, and by the dark purple leaf stalks. Also occurs a little way inland from Wanganui.
- 480 *P. arboreus* This tree suffers severely from browsing by possums. They eat the lower 2 cm of the petiole, which has a flavour of carrots. The leaflets don't appear to be eaten. A small tree can be stripped of leaves in a night.
- 482 *P. kermadecensis* Usually growing in canopy gaps created by landslides and storm events and also on hilltops.
- 484 *P. colensoi* var. *colensoi* From Little Barrier I at lat. 36° 10' S to Otago Peninsula at lat 46° S. In the S, confined to the northern and eastern parts. Absent from most of the West Coast. Becoming rare in many areas as a result of the bark being eaten by deer and goats and browsing by these animals and possums. Now confined only to cliffs and to an epiphytic habit in many areas.
- 486 *P. colensoi* var. *ternatus* Collectively *P. colensoi* var. *fiordense* (original locality Secretary Island, Fiordland) and *P. colensoi* var. *ternatus* probably constitute a species distinct from *P. colensoi* (AP Druce pers. comm.) They remain morphologically distinct where they occur together, and there is little if any hybridisation between them. There is some evidence to suggest that var. *fiordense* (with usually five leaflets) forms a cline, grading into var. *ternatus* (with three leaflets) as one goes north. The plant illustrated was probably from N. Fiordland and is part of the suggested cline. "It does not look typical of *P. colensoi* var. *ternatus* from N.W. Nelson" (SP Courtney pers. comm.).
- 488 *P. colensoi* var. *fiordense* The petals of the female flowers fall very quickly after opening. This also applies to other species in the genus.
- 490 *P. lessonii* (i)
(*P. lessonii* s.s.) Often growing with pohutukawa (*Metrosideros excelsa*). Also naturalised from garden plants in many sites south of its natural range as far as Wellington and Nelson. Commonly hybridises with lancewood and some of the hybrids are popular garden plants and naturalise freely.
- 492 *P. lessonii* (ii) (from
Surville Cliffs) At North Cape it is very abundant on the cliffs, forming patches of dense scrub and, in a few places, in short forest in association with pohutukawa (*Metrosideros excelsa*). Similar plants occur at Te Huka Bay, near Tomakanga Pa, but these have longer leaflets and an even more lax habit. Although this plant appears to be very distinct, some cultivated plants have, over time, developed features more consistent with the normal range of variation exhibited by *P. lessonii* (i). In the experience of Colin Ogle & Shannel Courtney (pers. comms), both of whom had plants in cultivation for over ten years, it was found that the plants remained trifoliolate with the longer erect branches tending to fall over and root as they do in the wild at Te Huka and very distinct from *P. lessonii* (i).

- 494 *Pseudopanax gilliesii* Grows under kauri (*Agathis australis*), or puriri (*Vitex lucens*) and taraire (*Beilschmiedia tarairi*). Very localised. When fresh this is a distinctive species. However, dried specimens are not easily separated from some forms of *P. lessonii* and *P. discolor*, which may also have alternating whorls of trifoliolate and unifoliolate leaves. This has led to the erroneous view that this species is also on Little Barrier Island (see Cheeseman 1925). The specimens on which that record were based have turned out to be a mixture of *P. discolor* and *P. discolor* × *P. lessonii* specimens (PJ de Lange pers. comm.).
- 496 *P. macintyreii* Limestone five-finger is becoming scarce throughout much of its range due to its palatability to deer, goats and possums.
- 498 *P. discolor* First collected by Kirk on Great Barrier I in 1867.
- 500 *P. chathamicus* It was collected by Dieffenbach in 1840 and was one of the first plants to be collected from the Chatham Islands.
- 502 *P. crassifolius* Lancewood was collected during Cook's first voyage but because the juvenile and adult trees are so unlike Solander considered them to be separate species.
- 504 *P. ferox* Distribution sparse. In N known from Ahipara, Woodhill Forest, near Taihape, and the southern Rimutaka Range. In S more common but localised, occurring in widely scattered populations from Golden Bay and Marlborough Sounds to Southland. Often associated with base-rich rocks, such as basalt or limestone. Collected and described by J Buchanan when he found it in Otago in 1876.
- 506 *P. linearis* Descending to lowlands in the southern part of its range. First collected by D Lyall, the surgeon-naturalist to H.M.S. *Acheron*, who found it in Chalky Bay, on the south coast of Fiordland in 1848.

Distribution of the species of *Pseudopanax*

<i>P. kermadecensis</i>	K.
<i>P. lessonii</i>	T.K., N. Three Kings Is to Poverty Bay and N. Taranaki
<i>P. lessonii</i> (ii)	N. Surville Cliffs and Te Huka Bay, Te Paki
<i>P. crassifolius</i>	N., S., St. Throughout. Lower montane forest and scrubland
<i>P. arboreus</i>	N., S. Lowland forest southwards to lat. 46°. Mainly in E. in S.I.
<i>P. discolor</i>	N. Lat. 36° to 37° 30' S
<i>P. ferox</i>	N., S. Northland, Taihape and S. Rimutaka Ra., Nelson and Marlborough to Southland. Mainly in E. in S.I.
<i>P. gilliesii</i>	N. N. side of Whangaroa Harbour and Puketi Forest, west of Kerikeri

	<i>P. colensoi</i> var. <i>colensoi</i>	N., S.	Montane and subalpine forest and scrub from 36° to 46°
	<i>P. laetus</i>	N.	Coromandel Ra. and Raglan Harbour southwards to 39° 30'
	<i>P. colensoi</i> var. <i>ternatus</i>	S., St.	Throughout, except for driest parts of S. Marlborough, Canterbury and Otago
	<i>P. linearis</i>	S.	NW Nelson southwards, confined to the west
	<i>P. macintyreii</i>	S.	E. Nelson, NW Nelson to central Westland
	<i>P. colensoi</i> var. <i>fiordense</i>	S., St.	Fiordland and Southland
	<i>P. chathamicus</i>	Ch.	
508	RAUKAUA		On the leaflets there can be small 'toothlike' structures <i>c.</i> 1 mm long on the midrib, but in <i>R. anomalus</i> and <i>R. edgerleyi</i> they are also on veins near the margin. "It appears that these structures are part of the vein system, mainly occurring in juvenile foliage of these three related species" (Dakin 1975).
508	<i>Raukaua edgerleyi</i>		Raukawa was first collected by W Colenso and J Edgerley.
510	<i>R. simplex</i> var. <i>simplex</i>		Amongst the adult foliage occasionally trifoliolate leaves occur. In N restricted to the Central Volcanoes and nearby ranges.
512	<i>R. simplex</i> var. <i>sinclairii</i>		Flowers can be produced before the tree becomes completely trifoliolate. The leaves of <i>Raukaua simplex</i> var. <i>simplex</i> are usually unifoliolate in the adult stage. The fruit illustrated was white with purplish markings, not black as is the fruit of var. <i>simplex</i> .
514	<i>R. anomalus</i>		Plants growing in the open are low and interlacing, those in the forest are taller and more laxly branched. When plants beginning their lives in open habitats are later overshadowed by taller plants they can put up erect stems while still retaining the cushion-like form at the base of the plants. <i>R. anomalus</i> was first collected in swampy forest along the Waikato River by Colenso in 1842. Together with <i>R. anomalus</i> , there are a considerable number of divaricating shrubs that have similar looking, leaves sometimes making it hard to distinguish one from another. Some of these are <i>Melicytus micranthus</i> , <i>Streblus heterophyllus</i> , <i>Myrsine divaricata</i> , <i>Melicope simplex</i> and the juvenile form of <i>Pennantia corymbosa</i> . It is a curious fact that many of these plants, which belong to different families, have developed similar leaf size and shape and small unisexual flowers, and are also intermixed in special plant communities, alluvial soil along the banks of rivers being an important habitat.

Distribution of the species of *Raukaua*

<i>R. anomalus</i>	N., S., St.	N. Cape southwards, throughout
<i>R. edgerleyi</i>	N., S., St.	35° southwards

- R. simplex* var. *simplex* N., S., 35° southwards. In N.I. restricted to Central St., Ant. Volcanoes
- R. simplex* var. *sinclairii* N. 37° southwards
- 516 ***Corokia buddleioides***
var. ***buddleioides*** This species hybridises with the small-leaved divaricating species *C. cotoneaster*, which grows throughout the country. First collected by A Cunningham in the Bay of Islands district in 1826.
- 520 ***C. macrocarpa*** An important forest tree on the Chatham Islands. The abundant fruit are an important food for the parea or Chatham Island pigeon (*Hemiphaga chathamensis*).
- 522 ***C. cotoneaster*** (i)
(*C. cotoneaster* s.s.) In exposed situations it may be a low plant, 50 cm or less, but in sheltered situations it may grow into a pyramid-shaped bush. The leaves vary according to exposure and can be larger or very much smaller than those illustrated. The leaves of the young plants also vary, some being almost three-lobed, and this shape of leaf can occasionally be found on shaded plants. It grows from sea level to subalpine areas; along river flats, in rocky places and in shrubland. Cockayne (1928) records it as growing on the Mineral Belt, near Nelson, the volcanic rock of Banks Peninsula, and the dry mica-schist rocks of North Otago. Some of the different forms are illustrated. The flower petals are arranged symmetrically; this is not clear from the illustration of this plant.
- 522 ***C. cotoneaster*** (ii) (from Paritutu) Flowers and drupes are larger than those in other populations of *C. cotoneaster* in other parts of NZ and the drupes on the Paritutu plants are not red. Local, known from small widely scattered populations.
- 524 ***C. cotoneaster*** (iv) (from Clyde) Growing amongst matagouri (*Discaria toumatou*), *Aristotelia fruticosa* and *Coprosma propinqua*. "The cultivated plant illustrated was grown from seed in my sheltered Wanganui garden and was as divaricating as the plants growing in the wild" (CC Ogle pers. comm.).
- 524 ***C. cotoneaster*** (v) (from Surville Cliffs) Found elsewhere off the ultramafic rock at Te Pahi where it grades into the widespread form, *C. cotoneaster* (i). "*Corokia* is highly variable and other techniques such as molecular or chemotaxonomic will be needed to see if this variation can be taxonomically defined" (PJ de Lange pers. comm.).
- 526 ***Griselinia lucida*** The structure of the roots make it easy to distinguish the puka even when the leaves cannot be seen. Mostly throughout, often local; more common in N. In the S reaches its southern limit on Banks Peninsula on the east coast and Milford Sound on the west coast. Confined to coastal habitats in southern parts of its range. Specimens of this plant were obtained from Tolaga Bay by Banks and Solander in 1769, although the type specimen is from Queen Charlotte Sound.
- 528 ***G. littoralis*** It is unlike *G. lucida* in that the female flowers have petals and the leaves are not as large and glossy; nor is the leaf-blade so

unequal-sided - sometimes the sides are not unequal at all. While the French frigate *L'Aube* was at Akaroa in 1840, M Raoul, the medical officer, collected this plant. Probably because he found it near the shore he gave it the specific name of *littoralis*, which is misleading, as it is more typically associated with inland and montane forests.

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- 532 *Scandia rosifolia* (i) Being highly palatable to browsing animals, *S. rosifolia* is now scarce over large parts of its former range.
- 532 *S. rosifolia* (ii) Although when grown together each form breeds true, at Te Araroa, East Cape, there is a gradation between both forms.
- 534 *S. geniculata* “Adult exposed leaves are always unifoliolate, while leaves of seedlings show transitions from this to completely trifoliolate leaves ... shaded branches of adult plants may also bear trifoliolate leaves. In coastal and inland shrub associations the slender flexuous stems grow through a variety of shrub species, especially those of divaricating habit. The leaves and inflorescences are mostly borne among the exposed leaves of the supporting shrub. This plant grows in the outer Marlborough Sounds as far west as D’Urville I. Also inland from coastal sites to an altitude of 450 m” (Dawson 1967). *S. geniculata* is usually found in dryland associations.
- 536 **GAULTHERIA** Species in this genus frequently hybridise with each other where they meet in the wild.
- 536 *Gaultheria oppositifolia* Details of flower and seed capsule are not shown for this species because they appeared to be similar to those of *G. paniculata*.
- 538 *G. colensoi* This plant becomes more sprawling at higher altitudes. It does not have bristles as in *G. crassa*, a similar plant. Found in Central
Volcanoes, Kaimanawa Mountains, Kaweka Range, northern and central Ruahine Range.
- 538 *G. crassa* Like *G. colensoi*, it is much reduced at higher altitudes.
- 540 *G. parvula* Grows in damp sites on river flats, in tussock grassland and in bogs on mountains. It is hard to identify this plant when it is not in flower or fruit because the leaves are so small; but when it is in flower or fruit it is surprisingly eye-catching. The side view shows the stems spread out for clarity.
- 540 *G. nubicola* “Usually common in snow-bank depressions and on exposed sites in fell-field. It descends into the low-alpine zone only on highly exposed sites such as ridge crests where the tussock cover is usually short and thin” (Mark & Adams 1973). Mounts Mangaweka and Mangamahue, Ruahine Range. Not uncommon on South Island mountains.

- 542 *Gaultheria macrostigma* The flower shown enlarged is not typical of the species because the calyx has many more than the usual five lobes. Occasionally flowers have been found which have numerous petals. “Because it crosses with other species of *Gaultheria*, many populations of *G. macrostigma* show a range of leaf shapes and sometimes also of fruit colour. Only plants with narrow leaves and pink fruits are likely to be the true species” (Mark & Adams 1973).
- 544 *G. depressa* var. *depressa* Wet mountain areas, in tussock land, shrubland and sometimes in open, subalpine forest. *G. depressa* var. *novae-zealandiae* has narrower leaves, more pointed, more obviously toothed and usually without bristles when mature, it also grows into denser patches. The two varieties are sympatric in some localities where they remain morphologically distinct. For this, and other reasons, some botanists believe the 2 varieties are best regarded as separate species.
- 546 *Pentachondra pumila* The leaf shape varies from oblong to elliptic, the different forms sometimes being found on the same plant. Occasionally a coastal plant on old dunes. From Moehau and Raukumara Ranges southwards.
- 546 **LEUCOPOGON** Recent molecular based revisions have greatly reduced the numbers of species in the genus, recognising many segregate genera. As these changes are still to be consolidated an exact distribution for the genus, let alone a conspectus of the numbers within it would, at this stage be impractical (PJ de Lange pers. comm.).
- 546 *Leucopogon fraseri* A highly variable species. “Although there is partial resolution of three geographic ecotypes that we recognize in the field from coastal, lowland, and montane to subalpine areas, they demonstrate considerable intrapopulational [within a population] and interpopulational [between populations] variation for some characters. Consequently, the available evidence does not support taxonomic recognition of these ecotypes” (Dawson & Heenan 2004).
- 546 *L. nanum* “Growing in mountain basins on old glacial moraine or outwash surfaces, including those areas around kettles and lakes. In soils that are usually strongly leached” (BPJ Molloy pers. comm.). Molesworth (Acheron and Wairau Valleys), in the Hurunui, Waima, Rakaia and Ashburton Valleys, and in the Mackenzie Basin. Localised in S. Marlborough but common where it occurs, less common further south.
- 548 *L. fasciculatus* (i) (“northern”) The large-leaved juvenile distinguishes this form from *L. fasciculatus* (ii) (“southern”). The leaves on the branchlet illustrated are slightly broader than the typical northern form.
- 548 *L. fasciculatus* (ii) (“southern”) It is often associated with beech (*Nothofagus* spp.) forest. The flower appeared to be similar to that of *L. fasciculatus* (i) (“northern”), except for the ovary which was not round but compressed on the specimens viewed.

- 550 *Leucopogon xerampelinus* Grows amongst small trees and shrubs on an ultramafic rock plateau and on cliffs. *L. xerampelinus* and *L. fasciculatus* may be closely related. *L. xerampelinus* was formerly included in *L. parviflorus*. In comparing this plant with *L. parviflorus*, it has been stated of *L. xerampelinus* “The Surville Cliffs population consistently differs in its much smaller, prostrate, semi-rambling growth form, pink or reddish brown foliage, smaller flowers ... and its restriction to ultramafic rocks” (de Lange et al. 2003). The flower, although smaller, looked similar to that of *L. parviflorus* apart from the nectariferous scales surrounding the ovary, which were green in *L. parviflorus*. The plant illustrated was grown in partial shade at Pinhaven, Hutt Valley by AP Druce, which may account for the green leaves on the flowering specimen. “This is unusual as other cultivated specimens of this plant always retain their distinctive reddish leaf colouration, irrespective of soil type and growing conditions” (PJ de Lange pers. comm.).
- 550 *L. parviflorus* *L. parviflorus* also grows in Tasmania and on the Australian mainland, where it can reach a height of 2–4 m.
- 550 *Acrothamnus colensoi* “Although male and female parts are present in all flowers there are size differences in them between plants so that they function as either male or female” (Mark and Adams 1973). Grows in open, well-drained places in shrubland and tussock land. The leaf colour together with the pink buds, which take a long time to develop, can give this plant a distinctive pinkish-grey look; this makes it stand out amongst other shrubs. This was one of the plants found by Colenso in 1847, on the eastern base of Tongariro.
- 552 **CYATHODES** Some species in the genus *Cyathodes* have been placed back into the genus *Leucopogon* following McGlone (1978).
- 552 *Cyathodes pumila* The whitish to very pale green under surface is not present on the leaves of a similar plant, *Pentachondra pumila*, which has slightly larger leaves with a green under surface, distinctive veining and pear-shaped fruit. The fruit of *C. pumila* is round or slightly compressed. At times these two plants grow side by side or even intermixed, but they are easy to distinguish when the leaves are upturned.
- 552 *Leptecophylla robusta* It is similar to the mainland mingimingi (*L. juniperina*) but is a stouter plant.
- 554 *L. juniperina* (i) (from East) This form has much shorter and narrower leaves when compared with the western form of the species. The flesh of the fruit, when magnified, has transparent strands radiating from the seed.
- 554 *L. juniperina* (ii) (from West) In S often preferring limestone or other base-rich rocks. St mainly coastal, or in lowland shrublands. First collected by Banks and Solander at Mercury Bay in 1769.
- 556 *Archeria racemosa* It was first collected about 1850 on Great Barrier I by Captain Rough, the first harbour master for the Port of Auckland.

- 556 *Archeria traversii* Wet montane shrubland and forest extending down to lowlands in the southernmost parts of its range.
- 558 *Epacris pauciflora* var. *pauciflora* (*E. pauciflora*) The leaves can vary considerably in size and colour on different plants growing in the same habitat.
- 558 *E. pauciflora* var. *sinclairii* (*E. sinclairii*) Usually in cloud forest, but very occasionally seen in exposed gumland scrub on skeletal soils, 160–850 m altitude. Often epiphytic on yellow silver pine (*Lepidothamnus intermedius*). Despite field surveys this species has yet to be found elsewhere on the Coromandel Peninsula.
 “...on both Gt. Barrier I. and the Kauaeranga Valley var. *sinclairii* is sympatric with var. *pauciflora*, from which it can be easily distinguished by its densely branched habit and usually greater over-all dimensions. The leaf apices of var. *sinclairii* are blunt, not acute as in var. *pauciflora*, and the leaves are much larger and a brighter green, never bronze tinted. The flowers and fruits are also larger. Var. *sinclairii* flowers mainly from February to April, occasionally to October, var. *pauciflora* has erect branches and flowers all year, peaking in June to August. Pending further study it would seem prudent to regard var. *sinclairii* as distinct from var. *pauciflora* at species level” (PJ de Lange pers. comm.).
- 560 *E. alpina* The plants are spreading or upright. Sometimes the general appearance of a group of these plants is of a reddish hue. Tussockland, grassland, scrub and shrublands.
- 562 *Sprengelia incarnata* Where drainage improves, the proportion and height of shrubs increase, *Sprengelia* still being one of the dominant plants. This plant was first collected by PK Dorizac in 1967 in South Fiordland near Puysegur Point, where it was abundant. It was thought at first that it had been unwittingly introduced to the area by gold prospectors from across the Tasman. There had been considerable mining activity in the area and animals and fodder would have been brought across from Australia and Tasmania where the plant is widespread. But on subsequent visits to different localities Dorizac found other stands of *Sprengelia* in isolated areas well away from any known human activities. So it is now accepted as a member of the indigenous flora of New Zealand. A paper by LB Moore (1969) was consulted for the above comments. Some species of *Dracophyllum* look somewhat similar, but in that genus
 the branchlets are always ringed by leaf scars, not smooth as they are in *Sprengelia*.
- 564 **DRACOPHYLLUM** In most tree species the panicle is terminal, but a new shoot later develops below it and in time, as it grows, this shoot overtops the old dried panicle which then appears to be lateral hence the candelabrum growth habit. “In most *Dracophyllum* species the leaves change to pink then to purple in winter and back to green in summer. It appears as if butterflies are playing a far more important role in pollinating *Dracophyllum* species than was previously thought” (S Venter pers. comm.). Some species of *Dracophyllum* are called turpentine scrub. A low

shrubby species of *Dracophyllum* was discovered by S Venter in 2001 on Mt Rochfort, being the only species with cilia on the petal margins. It is mostly associated with marshy conditions. When the author was made aware of this plant it was too late to include an illustration.

- 564 *Dracophyllum traversii* The fallen leaves remain undecomposed for a long time and in a dense stand of trees form a thick light-brown carpet. In N scattered from Kaitaia to Herangi Range (west of Te Kuiti), Huiarau Range (Urewera N.P.) and Rotokahu Scenic Reserve 18 km west of Tongariro National Park township. In S N.W. Nelson, Westland as far south as Jackson R., and inland Canterbury near the Main Divide.
- 566 *D. latifolium* This is not as large a tree as *D. traversii* but is equally attractive. The two species are readily distinguished by differences in the bark, that of *D. latifolium* being rough and of *D. traversii* smooth, light brown and flaky. Very localised in N.W. Nelson and N. Westland. The leaves of neinei were sometimes used by Maori to make especially fine garments. *D. latifolium* was first collected by A Cunningham from beside the Kawakawa River, Bay of Islands in 1826.
- 568
- 570 *D. elegantissimum* “Mature plants display crowns that vary between columnar to closed candelabra-shaped. Mature plants growing in openings in the forest can sometimes have a more open crown resembling *D. traversii*” (Venter 2004). Grows on a range of substrates including granodiorite, calcareous sandstone, conglomerate, marble and limestone. Often the dominant understorey species. Northern and western parts of N.W. Nelson including Moa Park, Goulard Downs, Aorere, Anatoki and Nile Rivers and Mt. Rochfort.
- This species was first collected by AP Druce in 1968 at Moa Park, Abel Tasman National Park, as similar to, but possibly not, *Dracophyllum traversii*. It was first recognised as a species separate from *D. traversii* by S Venter in 2000. “It is the only *Dracophyllum* that shows signs of herbivory; red deer (*Cervus elaphus*) have an impact on the survival rate of seedlings. This tree and *D. fiordense* are the only *Dracophyllum* species that have cirrose leaf tips” (S Venter pers. comm.). The other *Dracophyllum* species with which it is sympatric are *D. traversii* and *D. townsonii*. *D. elegantissimum* differs from *D. traversii* in that *D. traversii* has a spreading to upright crown, not columnar, adult leaves shorter, 30–60 cm, and wider, 4–5 cm, with a characteristic glaucous bloom and leaf tips not cirrose. *D. townsonii* is a smaller tree with an open candelabra-shaped crown, 6 m tall and with narrower and shorter leaves 13–30 cm long.
- 574 *D. filifolium* Plants growing in bogs may be less than 20 cm in height and right at the water’s edge in Marlborough Sounds. This species has often been regarded as a fine-leaved form of *D. longifolium*.
- 574 *D. longifolium* First collected by the Forsters in Dusky Sound during Cook’s var. *longifolium* second voyage in 1773.

- 576 *Dracophyllum longifolium* var. *cockayneanum* The capsules illustrated were old and empty of seed.
- 578 *D. longifolium* var. *septentrionale* Regarded by many as a species distinct from *D. longifolium*.
- 578 *D. trimorphum* Growing at Puponga, Nguroa Bay Rd. and Echo Point, West Whanganui Inlet. “In impoverished situations plants can change to the intermediate stage at 20 cm in height. The hairy capsule distinguishes this plant from *D. pubescens*. This is not always an obvious feature but is visible with a hand lens” (S Venter pers. comm.).
- 580 *D. townsonii* Found from Wakamarama Range to Coal Ck, S. of Greymouth. *Dracophyllum townsonii* is much smaller than *D. traversii* or *D. latifolium*. W Townson explored the vegetation of western NW Nelson for several years and was the first to collect this plant. He found it on the foothills at the base of Mt Buckland, northern Paparoas (Cheeseman 1914).
- 582 *D. ophioliticum* The leaves have a scabrous upper surface and are rough to the touch. “Similar to *D. filifolium* but differs in being multi-stemmed, stems decumbent, leaves glaucous, minutely verrucose [marked with small wart-like excrescences] and covered in scabrid hairs when young; flowers pedicellate...” (Venter 2002). *D. ophioliticum* was first recognised as being a distinct taxon by AP Druce who considered it a variety of *D. longifolium*, but its decumbent habit and lack of large juvenile leaves are features that distinguish it from this species (Venter 2002).
- 584, *D. sinclairii* (i) & (ii) Illustrations show variation in *D. sinclairii*.
586
- 592 *D. strictum* Habitat particularly on mudstone, pumice or ignimbrite. The leaves usually turn reddish bronze in the autumn.
- 598 *D. urvilleanum* Usually growing in manuka (*Leptospermum*), kanuka (*Kunzea*) or open hard (*Nothofagus truncata*) or black (*N. solandri* var. *solandri*) beech forest. Flowers were drawn from a pickled specimen that was collected from Kaiteriteri. “In this area the shrubs are growing on grey brown gritty sandy loam on granite, on a slight slope with a southerly aspect... I went to Freshwater Cove in the Abel Tasman National Park and collected the specimen illustrated of *D. urvilleanum* from the type locality and most probably the same population as where Dumont D’Urville collected the type 200 years ago. The Kaiteriteri material matches the type specimen nicely” (S Venter pers. comm.).
- 598 *D. oliveri* (i) (from Te Anau) “The material at Te Anau Falls is within the variation range of *D. oliveri*. I have found a population of *D. oliveri* near Hokitika that is close to identical to that of the Te Anau material” (S Venter pers. comm.).

- 600 *Dracophyllum oliveri* “It occurs scattered from Mt. Owen in the north down the West Coast to Arthur’s Pass. Then there is a gap in the distribution. The next localities are near and around Te Anau. A population has also been found at Bealey, Inland Canterbury. It can be used as an indicator of coal deposits on the West Coast” (S Venter pers. comm.). Specimen collected from type locality.
- 600 *D. uniflorum*
var. *frondosum* Specimen illustrated from the type locality. This is now considered by many to be a species distinct from *D. uniflorum* (= *D. rosmarinifolium*).
- 604 *D. scoparium* Sea level to 260 m; in some areas it is the dominant plant. The covering on Campbell Island, where this plant grows, is mainly peat and the climate is severe: “Extremely strong northwest gales, often with violent gusting, usually followed by a cold front and southerly shower or hail conditions are characteristic of Campbell Island” (Oliver & Sorensen 1951).
- 606 *D. subulatum* Monoao used to be plentiful in the pumice country surrounding Lake Taupo before pine trees and farming covered large areas. Very cold tolerant, the typical shrub of central N frostflats. This plant was first collected by JC Bidwill in 1839.
- 608 *D. pubescens* Like *D. kirkii*, the leaves are grey-green and flowers solitary. *D. pubescens* has hairy and wider leaves and is a larger, stouter plant with more branches.
- 610 *D. recurvum* In the autumn the shrubs can colour wide areas with a reddish hue. The larger-leaved flowering specimen at top of illustration may be a hybrid, *D. recurvum* x *D. filifolium*, which is very common whenever the two species meet. *D. recurvum* was first collected by JC Bidwill while exploring on Tongariro and Ngauruhoe in 1839.
- 612 *D. marmoricola* First recognised as a distinct species by AP Druce and previously included in *D. kirkii*. *D. marmoricola* differs from *D. kirkii* in the narrower verrucose leaves and the tips being triangular in cross section. It also differs from the similar *D. recurvum* from the North Island in the leaves being minutely rugose (wrinkled) and verrucose and the leaf tips are not recurved (Venter 2004).
- 612 *D. politum* From the lowlands up to the subalpine zone in bogs, open shrubland and exposed rocky tops.
- 612 *D. muscoides* In stature this is the smallest *Dracophyllum* species. The dead leaves remain on the branchlets. It is a dominant plant over wide areas in the mountains, growing on exposed summits as well as in bogs.
- 614 *D. pronum* Grows particularly in open rocky areas, where it develops a dense mat of wiry branches flattened to the ground.

- 614 *Dracophyllum pearsonii* Is distinguished by the greyish-fawn coloured groups of dead leaves (as illustrated), these remain on the plant for a long time.
- 616 *Pouteria costata* First collected by Richard Cunningham in 1833 on the coast between the Bay of Islands and Whangarei.
- 618 **MYRSINE** Many botanists recognise the segregate genus *Rapanea* that is distinguished from *Myrsine* by having free stamens (Heenan & de Lange 1998). If accepted, then all the New Zealand species would be placed within *Rapanea*.
- 618 *Myrsine salicina* First recorded in the Bay of Islands district by Allan Cunningham. This species may hybridise with *M. divaricata* and the hybrids are known as *M. x montana* (Heenan & de Lange 2004).
- 620 *M. australis* The name matipou is often mistakenly applied to kohuhu (*Pittosporum tenuifolium*). Vegetatively similar to kohuhu, but distinguished from it by the red branchlets and the gland-dotted leaves. Rare hybrids can sometimes be found between *M. australis*, *M. divaricata*, *M. salicina*, and *M. aquilonia*.
- 622 *M. kermadecensis* It is the main tree under Kermadec pohutukawa (*Metrosideros kermadecensis*) and is abundant except in the wet forests of the south coast and in forests above 250 m. This tree was first recorded by Cheeseman in 1887.
- 622 *M. chathamica* In some places where the dunes are stable, the forest is made up entirely of *M. chathamica* and *Olearia traversii* (Cockayne 1928).
- 624 *M. oliveri* “Once on the brink of extinction, following the removal of goats, this species has made a remarkable recovery and is now abundant on Great Island, and also has recently established on South West and West Islands. The adult canopy foliage looks remarkably like *Citrus* foliage” (PJ de Lange pers. comm.).
- 624 *M. coxii* “A spindly shrub when in the understorey and more compact and twiggy when in the canopy. Locally common in *Sporadanthus* bogs, where it often frequents the transition zone between bog and swamp forest. Also found along lake and tarn margins, in associated swamp forest, and, especially, within the peaty ground of tarahinau (*Dracophyllum arboreum*) forest on the Southern Tablelands. It is heavily browsed by stock. The spread of underground stems in this species can be very impressive. One specimen near Lake Rakeinui, Southern Tablelands, main Chatham Island, when unearthed had an underground stem system 10 m long!” (PJ de Lange pers. comm.).
- 626 *M. divaricata* (†)
(*M. divaricata* s.s.) This form of *M. divaricata* matches the type material collected and used to describe the species by Allan Cunningham from the Kerikeri (“Wycaddy”) River in 1839 (Heenan & de Lange 2004).

- 628 *Myrsine divaricata* (ii) The glands in the leaves can be seen quite clearly when a leaf is held up to the light. This, the most widespread form of *M. divaricata*, was named *M. pendula* by William Colenso, on account of its more pronounced weeping habit, especially when compared with *M. divaricata* (i).
- 630 *M. argentea* One of the few New Zealand dolomite rock endemics.
- 630 *M. aquilonia* The leaves are without the dark blotch at the base that some similar looking species have. It grows both on cliffs (as a shrub) and in forest (as a tree). Primarily distinguished from the related *M. divaricata* by the non-divaricating habit, and larger obovate, prominently apically notched leaves that lack a blemish at the leaf petiole junction. Oliver collected the first specimens of this species from the Poor Knights (Allan 1961).
- 632 *M. umbricola* Known rarely from montane silver beech (*Nothofagus menziesii*) forest (800–1200 m), where it forms part of the shrub layer. This species was first recognised as distinct in March 2003. Previously it had been collected by a number of botanists, all of whom thought it to be a shade form of *M. divaricata*. However, none of these people noticed that it grows intermixed with *M. divaricata* (i), where it forms a true breeding population distinguished from that species by its very leafy, slender non-divaricating branches and branchlets, and by the much narrower, dark green, very shiny leaves. In many ways this species forms a link between New Zealand *M. divaricata* and Chatham Island *M. coxii* (Heenan & de Lange 2004).
- 634 *Elingamita johnsonii* The exciting discovery of this very rare tree was made as recently as 1950 when Major Johnson visited the West King, one of the smaller islands in the Three Kings group. The largest tree noticed by Major Johnson when he returned in 1951 accompanied by Professor Baylis had a spread of about 4.5 m. “This plant has the remarkable ability to recover without loss of leaf from the shrivelling of both leaves and stems” (GTS Baylis pers. comm.). The flesh of the succulent red fruits, which tastes not unlike salted apple, is avidly consumed by birds (including gannets) and skinks and geckos (PJ de Lange pers. comm.).
- 636 *NESTEGIS* “The species ... are usually described as dioecious but ... monoecism also occurs and, in addition, flowers may be unisexual or hermaphrodite, even on the same inflorescence or branch. Most flowers were found to be unisexual, either female with non-functional stamens or male with abortive ovaries, but hermaphrodite flowers with a fully developed ovary or with one which is diminutive yet apparently functional have also been seen. The unisexual flowers are not uniform either. Female flowers with no stamens, with small abortive stamens, or with fully developed yet apparently empty stamens have been found, as have male flowers with ovaries of different sizes. Nor does the sexual expression appear to be constant from year to year, for in one gathering of *Nestegis cunninghamii* ... bearing male flowers only (each with an abortive ovary) fruits from the previous year were still carried on the same shoots”

- (Green 1963). The species in the genus *Nestegis* were originally placed in the genus *Olea* and later for a short time in *Gymnelaea*.
- 636 *Nestegis apetala* The drupes take about 12 months to mature. It appears that this tree does not flower every year (JT Salmon pers. comm.).
- 638 *N. cunninghamii* The trunk may be straight with few branches or it may have developed several branches initially. Not common north of Waikato and rare in S being confined to E. Nelson and Kaikoura coast from Waima to Hurunui Rivers. With the single exception of southern rata (*Metrosideros umbellata*), this tree and *Nestegis lanceolata* have the hardest timber of any New Zealand tree. The strength of these timbers was well known to the Maori who used them for root pounders, flax beaters, digging spades and fighting clubs. "It is generally agreed that southern rata is the heaviest wood" (Clifton 1990). "The density of northern rata is exceeded by only two other native species; one is black maire and the other is southern rata" (SP Courtney pers. comm.).
- 640 *N. lanceolata* Rare in S being confined to N. Marlborough and E. Nelson. *N. cunninghamii* is far more abundant than *N. lanceolata* in the southern half of N. This tree is rather similar to *N. cunninghamii*, black maire. "The best way of distinguishing black maire from white maire is to look at the underside of the leaves - only the midrib is visible in white maire; while there are lots of side veins visible in black maire" (CC Ogle pers. comm.).
- 642 *N. montana* The narrow-leaved maire usually has many slender branches.
- 644 **GENIOSTOMA** The New Zealand species and its two varieties have been collectively treated as *G. rupestre* var. *ligustrifolium*. However, de Lange & Cameron (1999) refuted that view citing morphological and ecological distinctions that exist between the New Zealand species and its varieties. They recommended that, pending further study, the treatment offered by Cheeseman (1925) should be followed.
- 644 *Geniostoma rupestre* When in flower it has a distinctive heavy scent that is quite strong for some distance from the plant. Hangehange was first var. *ligustrifolium* (i) collected by Banks and Solander and seen in every locality that (*G. ligustrifolium* var. *ligustrifolium*) they visited in 1769.
- 646 *G. rupestre* An understory shrub, preferring *Meryta* forest on South West var. *ligustrifolium* (ii) and West Islands, and extending into pohutukawa/kanuka (*Metrosideros excelsa*/*Kunzea*) forest on Great Island. The very hairy seedling, semi-scandent growth form, much larger, thicker and darker-green leaves, which are concave and have an undulating leaf margin and the larger flowers separate this variety from var. *ligustrifolium* (i). Viewed from different angles, the hue of the leaves change and they can look darker than those illustrated. The flowers from Great I have the scent of *Heliotropium* cv. 'Cherry Pie'. "The fragrance of the flowers of this genus differs from one island to another, and is of major use in separating the varieties. In this regard the sweet-scented var. *ligustrifolium* (ii) can be immediately separated from the

- curry-scented var. *ligustrifolium* (iii) and var. *ligustrifolium* (i). The flowers may be functionally male, female or hermaphrodite. This plant was first recognised as a distinct variety, var. *major*, by Cheeseman (1906). However, its distinctiveness has only recently been confirmed following field work and cultivation of plants. On Great Island it is sympatric with, and hybridises with, var. *ligustrifolium* (i). The issue was not helped by Allan (1961) including Poor Knights plants within this variety, they are not the same. It would probably be best to treat var. *ligustrifolium* (ii) as a distinct species” (PJ de Lange pers. comm.).
- 648 ***Geniostoma rupestre***
var. ***ligustrifolium*** (iii)
(*G. ligustrifolium* var. *crassum*)
- Common on the Surville Cliffs. Here it grows mainly on the cliff faces, gully heads and associated talus slopes. It is very rare on the plateau. First collected by Cheeseman in 1897. “A very distinct but poorly understood variety. Most recent collections are from plants growing on the plateau, and these are hybrids between var. *ligustrifolium* (iii) and var. *ligustrifolium* (i). Pure var. *ligustrifolium* (iii) is well marked, for it is one of only two Surville Cliffs serpentinite endemics which will not persist in cultivation unless provided with a magnesium-rich soil. Although easily raised by cuttings and seed, without magnesium-enriched soil cultivated plants soon yellow-off and die. This feature, together with its vine-like scrambling growth form, much smaller leaves, and sympatry with var. *ligustrifolium* (i) are sufficient reasons to maintain this variety, and are probably sufficient to argue for its elevation to the rank of species” (PJ de Lange pers. comm.).
- 650 ***Parsonsia heterophylla***
- The sweet-scented flowers are attractive to night-flying moths. “*P. heterophylla* and *P. capsularis* are often very difficult to tell apart without flowers. In *P. heterophylla*, the corolla tube is longer than the calyx, so that the anthers are not, or only slightly, exerted beyond the corolla tube lip. In *P. capsularis*, the corolla tube is shorter and so equalling the calyx in length, so that the anthers are obviously exerted beyond the corolla tube lip. Hybrids have been recorded between these species” (SP Courtney pers. comm.). The achenes parachute to the ground and land in an upright position, even on a hard surface like a table. The reason for this is a lower ring of almost invisible fine, downward curving hairs.
- 652 ***P. capsularis***
var. ***capsularis***
- A smaller, more slender plant than *P. heterophylla* with leaves equally variable but usually much narrower on adult plants and uniform on a particular plant. Pink-flowered plants can be found growing amongst the more usual white-flowered plants. The varieties with red (var. *rosea*) and pink flowers (var. *tenuis*) (illustrated) are S plants and the yellow-flowered var. *ochracea* is occasional in the N from Lat. 39° south and in Canterbury and Otago in the eastern S.
- 652 ***P. capsularis***
var. ***grandiflora***
- “Contrary to the specific name, the flowers don’t appear to be any larger than those of var. *capsularis*. However, it is well marked by its very large leaves” (PJ de Lange pers. comm.). “There is also a large-leaved form known from coastal Nelson and N. Marlborough with leaves c. 8 x 5 cm” (SP Courtney pers. comm.).

- 654 *Parsonsia praeruptis* TF Cheeseman first collected this species in 1896. “Though obviously allied to *P. capsularis* it is a well-marked species, differing in its non-climbing scrambling habit, leaf shape – especially the truncate leaf bases, glabrous calyx lobes, and the shorter peduncle, pedicel and by its restriction to serpentinite rock” (Heads & de Lange 1999). Plants can be grown off serpentinite rock but are very slow growing without regular additions of magnesium-enriched fertiliser (PJ de Lange pers. comm.). Although not sympatric with *P. capsularis*, *P. capsularis* grows in the shrubland adjacent to the serpentinite rock zone of North Cape.
- 656 *Alseuosmia macrophylla* “A distinctive but highly variable plant, showing a diversity in leaf shape, size and in flower shape, colour, and the degree of “frilling” at the corolla mouth” (FM Merrett pers. comm.). “Occasionally sympatric with *A. pusilla*” (SP Courtney pers. comm.).
- 658 *A. turneri* Flowers are very small compared with those of all other *Alseuosmia* species except *A. pusilla*. RO Gardner (1978) describes it as: “Intermediate in appearance between *A. macrophylla* and *A. pusilla*. Differing from the former in its smaller flowers, smaller thinner leaves, lesser stature, and less-branched habit. Differing from the latter in its larger flowers, larger unblotched leaves, new growth of branches never crimson-purple, greater stature, and more-branched habit”.
- Western flanks of Mount Hauhungatahi and Ruapehu and nearby lower country west towards the Whanganui River (Waimarino Region). The first record of this plant (as an unnamed species) is by Cockayne (1928). In many respects *A. turneri* is merely a reduced state of *A. macrophylla* (RO Gardner pers. comm.). However, cytogenetic studies, using genomic *in situ* hybridisation confirm that it is very distinct from that species (PM Datson & PJ de Lange pers. comm.).
- 660 *A. pusilla* This shrub rarely has any branches. In the absence of flowers or fruit, it closely resembles young shrubs of *Pseudowintera colorata* that often grow with *A. pusilla*, at least until the underside of leaves is examined. Greenwood & Atkinson (1977, *N.Z.J.Ecol.* 12: 67-96) considered this to be an example of mimicry, suggesting that browsing moa might have avoided *A. pusilla*, mistaking it for the peppery *P. colorata*.
- 662 *A. quercifolia* (i) Plants currently treated by Merrett & Clarkson (2000) under this name, range from North Cape to Mangatōa Scenic Reserve, north of Awakino in the west, and from Great Barrier Island, the Coromandel Peninsula to East Cape in the east. It is uncommon in the Coromandel Peninsula and at East Cape, and does seem to be absent from the interconnecting Bay of Plenty forests (PJ de Lange pers. comm.). This species is found in areas where *A. macrophylla* and *A. banksii* are absent.
- 666 *A.* sp. (ii) The collection was made by SP Courtney and members of the Wellington Botanical Society during the Society’s celebratory 50th Anniversary trip to Northland in 1990. The subject of mimicry was discussed because in the *Alseuosmia* leaves

collected similarities could be found to a number of local shrubs and trees, such as lancewood (*Pseudopanax crassifolius*), rewarewa (*Knightia excelsa*), black maire (*Nestegis cunninghamii*), ramarama (*Lophomyrtus bullata*) and karaka (*Corynocarpus laevigatus*).

- 676 **COPROSMA** The colour of the drupes is usually in the ‘skin’ but occasionally the flesh is coloured as well. The primary centre of diversity for the genus is New Zealand, where 50–55 taxa are formally recognised, and at least a further six await formal recognition. Only 7 hybrids (out of a possible total number of combinations of well over 1,000) are at all common (AP Druce pers. comm.). Three of the *Coprosma* entities only grow on the serpentine area of the Surville Cliffs and the adjacent plateau.
- 676 ***Coprosma grandifolia*** When a tree, it has a slender trunk and rather stout branches. The flower stalks are three-branched in this species. The drupes of kanono and many other species of *Coprosma* take a year or more to ripen; new season’s flowers and drupes from the previous season are often seen on the same branchlet. *C. grandifolia* is easily recognised by the large membraneous leaves. *C. robusta* has no yellow colour like this; otherwise these species are easily confused at the seedling stage. Only *C. grandifolia* and *C. waima* have a glandular area on outer surface of stipules.
- 678 ***C. macrocarpa*** ssp. ***macrocarpa*** “*C. macrocarpa* on the whole can be distinguished from *C. robusta* by the non-ciliated leaf margin and deciduous stipules” (CC Ogle pers. comm.), and by the finely reticulated leaf venation. This is a very attractive plant due to its bright glossy leaves and large orange-red drupes.
- 680 ***C. macrocarpa* ssp. *minor*** A common shrub of open coastal forest or scrub within its range and often mistaken for *C. robusta*. It can be distinguished from *C. robusta* by the non-ciliated leaf margins and tubular, deciduous stipules. These characters distinguish *C. macrocarpa* as a whole from *C. robusta*.
- 682 ***C. aff. macrocarpa*** (from Surville Cliffs) Of this race de Lange et al. (2004) observed that it was “considered distinct by the late AP Druce (in litt.), differing from *C. macrocarpa* subsp. *minor* through its smaller shrub habit, narrower, yellow-green, lanceolate to elliptic leaves and translucent lemon-coloured fruits”. The fruit the author illustrated was orange, it may be that the lemon-yellow fruit described above was immature. The Surville Cliffs form is similar to *C. macrocarpa* ssp. *macrocarpa* and *C. macrocarpa* ssp. *minor* but the leaves are generally smaller and much narrower, and the flowers are very much smaller. The drupes on ssp. *macrocarpa* are very much larger than those of the other two subspecies. On the specimen illustrated there were a total of 23 flowers in each of two clusters, 5 mm apart on the one peduncle. It was impractical to include so many in the illustration.
- 684, ***C. waima***
686 A plant of cloud forest and associated cliff scarps. In scrub compact, up to 1 m, and in the understorey of forest, tall and slender cane-like, with a few branched stems up to 3 m in

height. “Drupes distinctly didymous when green: depressed-globose and slightly asymmetrical about axis when ripe, ...Basic volcanic cliffs facing SW, in forest and scrub, 640–670 m...” (Druce 1989). Very localised on several high points within the Waima Forest, Northland. “*Coprosma waima* is most closely allied to *C. grandifolia* (Druce 1989). When this plant was discovered by LJ Forester and JG Beachman in April 1986, it was entirely restricted to cliff faces out of the reach of wild goats. Since then, regular goat culls have allowed this species to extend its range back into the adjoining cloud forest. However, the goat culls also resulted in the widespread regeneration of *C. grandifolia*, and now hybrids between *C. waima* and this species, which had not been reported previously (Druce 1989), are widespread. “*Coprosma waima* produces two types of fruits, those sexually derived and those produced by apomixis. Apomictic fruits are smaller, and less frequently produced” (Heenan et al. 2002). (Apomixis: the production of viable seed without fertilization; hence apomictic).

- 690 *Coprosma repens* (ii)
(from Poor Knights Is) Interestingly, plants of this form often have sexually perfect flowers, or possess male and female flowers on alternating stems. (de Lange et al. 1995, de Lange & Cameron 1999).
- 690 *C. petiolata* Leaves generally thinner than those of taupata [*C. repens* (i)], a closely related but distinct species. *C. petiolata* was first collected by J Milne and W Macgillivray during the voyage of the *Herald* in 1854.
- 692 *C. chathamica* First recorded by HH Travers in 1866, this is the tallest species in the genus and is one of the few forest trees on the Chatham Islands. Its closest relative seems to be another tree-forming species, the Norfolk Island *C. pilosa*.
- 694 *C. acutifolia* “Oliver records it in 1908 as a principal species in the dry forest understorey and of the wet forest canopy” (Sykes 1977). Although for many years this plant was uncommon because of goat browsing, in recent years since goats have been eliminated it has made a spectacular recovery. In some ways it is similar to *C. tenuifolia*, both having thin leaves and sheathing stipules, but the leaf colour, the fruit and pedicels are quite different, as is the distribution. First collected in 1854 by W Macgillivray, surgeon on H.M.S. *Herald*.
- 696 *C. tenuifolia* It was first recorded by Colenso on the Ruahine Range. “Closely related to *C. robusta*, with which it hybridises in the wild (and both species also hybridise very commonly with *C. propinqua*). *C. tenuifolia* x *C. propinqua* hybrids have hairs on the stipules, *C. robusta* x *C. propinqua* hybrids have no hairs on the stipules” (CC Ogle pers. comm.).
- 698 *C. robusta* To about 45° 30' on eastern S and Taramakau River (42° 40' S) on western S. Probably the most widespread of all the New Zealand species. Naturalised on the Chatham Islands (de Lange et al. 1999). This plant may be mistaken for *C. lucida* but in that species the flowers are on well-developed peduncles, the midrib is prominent on both surfaces of the leaf and the colour

- of the inner bark on the lower part of the trunk is yellow-orange.
- 700 *Coprosma lucida* Branches stout. When growing in the open it forms a compact rounded shrub with very thick leaves; in forest, where it often occurs as an epiphyte, it is more sparingly branched and has darker, thinner leaves. The bright yellow inner bark on the lower part of the trunk is like that of *C. grandifolia*, but it differs from that species in having smaller shiny, leathery leaves. This is the type species for the genus *Coprosma*.
- 702 *C. dodonaeifolia* First recorded by WRB Oliver in 1929 on the summit of Mount Hobson.
- 704 *C. arborea* The leaves can be larger than those illustrated. Those on young plants are smaller and can be confused with those of *C. spathulata* with which it often grows. If the plant is less than 2 m tall and is in flower or fruit it is *C. spathulata*, as *C. arborea* only flowers when it is a sizeable tree. The bifarious branchlet hairs around the leaf nodes are short and raspy on *C. spathulata*, but not as harsh on *C. arborea*. The drupes are different colours in the two species. *C. arborea* was first collected by Cheeseman in 1875 near Lake Pupuke, Auckland.
- 708 *C. spathulata*
ssp. *hikuruana* “Mature outer bark becoming deeply fissured and longitudinally cracked with age...” (de Lange & Heenan 2001). Ssp. *hikuruana* differs from *C. spathulata* ssp. *spathulata* by its long trailing, prostrate branches. The two subspecies also differ in their fruits, those of ssp. *hikuruana* are narrowly ellipsoid and consistently coloured dull violet black, whereas the fruits of ssp. *spathulata* are usually globose and, although mostly dull black, they may also be orange or red. First collected by WD Burke and GK Richards in 1964.
- 710 *C. foetidissima* When in fruit, the bright shining drupes make hupiro very attractive. However the early botanists had nothing polite to say about this plant, which was collected by the two Forsters in Queen Charlotte Sound during Cook’s second visit to New Zealand in 1773. When the *Erebus* was anchored in the South Island Sounds about 1850, Sir Joseph Hooker in the “Flora of Antarctica” states that he locked this species in a small cabin and found that after half an hour: “...the smell was intolerable and had pervaded the whole of the lower deck” (Cheeseman 1914). Cheeseman wrote: “It is chiefly remarkable for the horribly disgusting odour which it gives off when bruised or while drying” (Cheeseman 1914).
- 712 *C. serrulata* This is an easy plant to identify because the leaves, although variable in size and shape, are distinctive in having a crenulate margin. The only other *Coprosma* with such teeth is *C. crenulata*, which has much smaller leaves and the teeth can hardly be seen without a lens. *C. serrulata* was first collected by J Buchanan on Mount Ida, northern Otago in 1865.

- 712 *Coprosma decurva* Formerly treated by Allan (1961), in error, as *C. parviflora* var. *dumosa*. This name was first applied by Cheeseman for a different plant.
- 714 *C. colensoi* Forms with longer narrow leaves have been called *C. banksii* in the past.
- 716 *C. propinqua* var. *latiuscula* “This coastal variety of *C. propinqua* is confined to areas which experience exposed maritime conditions” (SP Courtney pers. comm.).
- 716 *C. propinqua* var. *martinii* “Branches ascending at a narrow angle and growing in forest, peat bogs and lake sides” (PJ de Lange pers. comm.).
- 718 *C. elatirioides* “The species is characteristically associated with open, mesotrophic to oligotrophic swamps, mires, pakihī and associated poorly drained soils, often frequenting wetland systems dominated by red tussock and/or wire rush” (Markey & de Lange 2003). Mainly in the west from N.W. Nelson to Fiordland and across to South Otago and Southland. Localised in inland Canterbury and absent from Marlborough. “Morphologically, *C. elatirioides* is most similar to *C. intertexta*” (Markey & de Lange 2003), except the latter is a tall upright open-branched shrub.
- 718 *C. tayloriae* *Coprosma parviflora* occurs north of, and is disjunct from, *C. tayloriae*. “*C. tayloriae* is very variable and near its altitudinal limit often grows in the same area as *C. dumosa*, which is also variable and with which it can be confused. *C. dumosa* leaves are mostly ovate to elliptic, while those of *C. tayloriae* are mostly obovate” (SP Courtney pers. comm.). *C. parviflora* and *C. pedicellata* have violet drupes.
- 720 *C. pseudociliata* Shaded branches and juvenile plants have larger leaves with both leaves and young branchlets distinctly hairy.
- 720 *C. dumosa* “In Otago this is a typical plant of rock fields, plants having a few hairs on leaf tips but sometimes difficult to find any hairs” (NC Simpson pers. comm.). Red drupes, almost glabrous leaves with a prominent thin midrib beneath distinguish it from *C. tayloriae*, *C. dumosa* and *C. ciliata* (Jane 2005).
- 722 *C. parviflora* Though it often remains a shrub it can become a small tree in tall scrub and in forest. It also grows in grassland and in swampy areas. It is found from sea level to the tops of hills.
- 722 *C. obconica* Hautapu Valley near Taihape and Tauweru Valley east of Masterton in North Island. “In the South Island sparsely distributed from D’Urville Island and Mt Burnett south to the Buller River catchment with an easterly distribution from Marlborough through Canterbury to Otago, thence extending westwards across Southland to eastern Fiordland” (de Lange et al. 2002). Originally described by Thomas Kirk from specimens obtained from Wairoa Gorge near Nelson in 1899. A distinctive species with a remarkable range of habitat

preferences (de Lange et al. 2002). The Tauweru discovery was made by T Silbery and A Rebergen in April 2002.

- 722 *Coprosma petriei* The shrub form occurs more frequently in riverbeds. “Proof that these very different looking forms belong to the same species is found in those specimens showing both forms on the same branch” (Oliver 1935). Because the flowers are erect and so numerous, they can completely change the appearance of the plant. The male and female flowering plants illustrated were tightly compacted and moss-like when viewed from above. The fruiting plant was of the more twiggy form. “*C. petriei* is closely related to *C. nivalis* of Australia” (Markey & de Lange 2003).
- 724 *C. distantia* *C. distantia* differs from *C. obconica* “...by its prostrate trailing habit, unblemished cream or pale lemon-coloured fruits, seed characters, at a molecular level by its unique nrDNA ITS and ETS sequences, and also by its restriction to ultramafic rocks” (de Lange et al. 2002). The pyrenes of *C. distantia* are much larger than those of *C. obconica*, have a less pronounced curvature of the dorsal surface, and lack the distinct notch of the ventral surface so characteristic of *C. obconica*. (Description from the above paper.) First collected by H Powell in 1950.
- 724 *C. neglecta* (i)
(*C. neglecta* s.s.) First collected by Cheeseman in 1896.
- 726 *C. neglecta* (ii) (from Whangaroa) A well marked form allied to, but rather distinct from, *C. neglecta* (i). It may warrant species status (PJ de Lange pers. comm.).
- 728 *C. neglecta* (iii) (from Three Kings Is) The shade form leaves illustrated were thin, on slender branchlets, but some seen were thick, bronze coloured, round, 2 cm diam. on stout branchlets. Recent molecular studies indicate that this form is part of an introgressed hybrid swarm involving *C. repens* and *C. rhamnoides* (Wichman et al. 2002) and that plants raised from seed do not come true to type (PJ de Lange pers. comm.).
- 728 *C. neglecta* (iv) (from Maunganui Bluff) This form differs from *C. neglecta* (i) mainly by its smaller, consistently light green-coloured foliage.
- 730 *C. aff. colensoi* First recognised as a distinct species by AP Druce.
- 730 *C. fowerakeri* This plant was previously included in *C. pseudocuneata*.
- 732 *C. acerosa* (i)
(*C. acerosa* s.s.) A very variable species, exhibiting several well-marked forms illustrated here. Recent molecular studies suggest that some of these forms may warrant formal taxonomic rank (Markey & de Lange 2003).
- 732 *C. acerosa* (ii) (from Central N) On account of its reddish-tinged leaves this form has often been confused with *C. brunnea*, from which it can be distinguished best by its greater number of branchlets.
- 734 *C. acerosa* (iii) (from Taranaki Coast) Grows on rocky surfaces and on hard, eroded clay-type material at the top of steeply sloping cliffs west of Opunake to Waitotara. A very distinct form, occasionally found growing

close to *C. acerosa* (i) and remaining distinct from it. Where they are sympatric, *C. acerosa* (i) grows on unconsolidated sand and *C. acerosa* (iii) grows on hard surfaces (CC Ogle pers. comm.). Popular in cultivation, it is often sold as *C. acerosa* ‘Hawera’.

- 734 *Coprosma brunnea* (from Cobb Valley) The male flowers were on cutting material collected and planted by SP Courtney on 1 February and sent to author in April; this growth pattern probably accounts for the discrepancy in flowering times. The stigmas were very long, compared with the minute corolla which is barely visible in illustration.
Coprosma brunnea s.s. (not illustrated) is a well-marked species of braided river-beds, gravel bars and cobble beaches. It is distinguished from members of the *C. acerosa* complex by its sparingly-branched growth form, and dark-coloured foliage. Along the Barrytown flats this species is sympatric with *C. acerosa* on cobble beaches. Information from Markey & de Lange (2003). Despite these distinctions, some botanists prefer to treat this species as *C. acerosa* var. *brunnea*, especially as it appears to fall within the range of the variation within the various forms of *C. acerosa*.
- 738 *C. depressa* When growing in alpine scrub and tussock land, the leaves are thick and have obscure veins, but in forests they are thinner and have obvious veins.
- 740 *C. pseudocuneata* (i) (*C. pseudocuneata* s.s.) Much reduced in height in very exposed conditions. The forest plant illustrated from Mt Taranaki/Egmont had particularly large leaves. “This form was provisionally recognised by the manuscript name *C. egmontiana* by Cockayne” (Allan 1961).
- 740 *C. pseudocuneata* (ii) This plant is similar to *C. pseudocuneata* (i) of the North Island but differences occur mainly in the veins and in the wider leaves of the North Island plants when growing in a forest environment. The leaves of plants growing in the subalpine regions of both the North and South Islands generally appear to be similar, other than the latter often being slightly smaller and narrower. Both forms vary in leaf colour, with orange-green leaves not uncommon, particularly on exposed plants. The relationship of both forms of *C. pseudocuneata* to the earlier-named *C. solandri* needs further study (PJ de Lange pers. comm.).
- 742 *C. rubra* Leaves are variable in size and can be up to almost the size of the enlarged leaf in the illustration. The reason for the epithet *rubra* (red) is obscure.
- 744 *C. rhamnoides* (i) (*C. rhamnoides* s.s.) Leaves variable in size and shape; they usually also vary on the same plant. They can be larger than those illustrated. First collected by Richard Cunningham on the banks of the Kerikeri River, Bay of Islands in 1834.
- 744 *C. rhamnoides* (ii) (typical S) “This form with rhomboid to linear leaves is the more common form in the S” (SP Courtney pers. comm.).

- 744 *Coprosma rhamnoides*
(iii) (N.W. Nelson) “The leaves are broader, rounder and fleshier than those of *C. rhamnoides*” (SP Courtney pers. comm.). Grades into *C. rhamnoides* further inland.
- 744 *C. tenuicaulis* “*C. tenuicaulis* is similar to *C. areolata* in appearance but leaves usually thicker and leaf tip less acuminate. The stipules have a sharp dark tip compared with a weft of apical hairs on the stipules of *C. areolata*” (SP Courtney pers. comm.). See comments for *C. areolata*.
- 746 *C. perpusilla*
ssp. *perpusilla* Compared with most other New Zealand species of *Coprosma* this plant has surprisingly large male flowers, and these are sometimes produced in such profusion that the plant is hidden by them. *C. atropururea* and *C. petriei* also produce a profusion of male flowers.
- 746 *C. perpusilla*
ssp. *subantartica* See comment for *C. niphophila*.
- 748 *C. niphophila* Open areas of shallow soils and bedrock amongst snow bank turf and mats, mostly on the floors and lips of cirque basins. Severn R., N.W. Molesworth, upper Wairau and Spenser mountains. “Due to its similarity to *C. perpusilla* it has most likely been overlooked in the past. Its apparent disjunction is probably an artifact as it will almost certainly be discovered at other sites along the Southern Alps” (SP Courtney pers. comm.). Also grows in Australia (Orchard 1986). *C. niphophila* is very cryptic and can be mistaken for *C. perpusilla* ssp. *perpusilla*, a similar looking plant, but the latter has larger male flowers, corolla tube with tiny corolla lobes, the female flower and fruit have three or four stigmas and pyrenes respectively, in place of the usual two. “Vegetatively the stipules are diagnostic. In *C. niphophila* they are volcano-shaped with concave margins and sharply pointed up to a large sharp apical tooth, while in *C. perpusilla* they are more rounded usually with convex margins near the truncated tip with 1–3 smaller blunter teeth” (SP Courtney pers. comm.). “For many years *C. niphophila* was included in the circumscription of *C. pumila*. It was segregated from that species by Orchard (1986) who recognised that *C. pumila* was an Australian endemic and not present in New Zealand and that plants that had been referred in this country to that name comprised three forms. For one of these he provided the new name *C. niphophila*, and for the other two he reinstated the name *C. perpusilla*, and recognised two subspecies, ssp. *perpusilla* and ssp. *subantartica*” (PJ de Lange pers. comm.).
- 750 *C. aff. cheesemanii* (i) This plant has a wider distribution in the North Island than does *C. cheesemanii*. First recognised as a species by AP Druce.
- 752 *C. aff. cheesemanii* (ii) Mt Benson, Iron Hill, Mts Mytton, Arthur, Owen, Hoary Head and Crusader, Mineral Belts of upper Cobb and Takaka Valleys and Arthur Ra, Red Hills, Mt Starveall, Ben Nevis, Dun Mountain. First recognised as a species by AP Druce. This species is a strict basicole, being confined to geologies rich in calcium or magnesium.

- 754 *Coprosma cheesemanii* In some areas of the North Island this species is replaced by a related one, *Coprosma* aff. *cheesemanii* (i).
- 756 *C. pedicellata* In closed forest or dense scrub on river terraces, usually where water lies in the winter. In winter plants may be seen standing in water 10–20 cm deep. They can also withstand relatively dry summers.
The following similar-looking plants can present difficulties in identification. *C. pedicellata* and *C. parviflora* grow in different regions so can't be confused. *C. pedicellata*, *C. rigida*, *C. wallii* and *C. tayloriae* all can form small trees in dense scrub or forest. Apart from the leaves, aids to identification are the bark, the colour of the inner bark, the colour and shape of the drupe, and the long pedicels on *C. pedicellata*. Information from Molloy et al. (1999). This species was first recognised as distinct by AP Druce in 1966.
- 756 *C. wallii* Drupe constricted between the two seeds, dividing it into two lobes. The seeds are round, making this and, to a lesser extent, *C. rotundifolia* unusual in the New Zealand species in not having seeds with one side a flattened surface. Scrub, particularly on inland river terraces up to 600 m. Uncommon throughout most of its range.
- 756 *C. atropurpurea* In comparison with the general miniature nature of the plant, the drupes are surprisingly large and are often set into the leaf mat. Like *C. petriei* and *C. perpusilla*, the plant changes in appearance when covered with male flowers. In tussock land and herbfield, on stony and silty riverflats and rocky ground. *C. atropurpurea* is closely allied to *C. pumila* of Australia (Orchard 1986). This is a very attractive plant because of its large translucent wine-coloured drupes.
- 758 *C. areolata* Similar to *C. tenuicaulis* but taller. *C. tenuicaulis* has spreading, dark coloured branches with longer internodes, and leaves that are darker green, often with light blotches and not so pointed or hairy; the leaf veining is also less obvious. There are also stipule differences (see comments for *C. tenuicaulis*).
- 758 *C. crassifolia* A distinguishing feature of this plant is the whitish under surface of the leaves. The light coloured abaxial surface is less obvious in shaded and juvenile leaves. The drupes are white (i.e., unpigmented). In exposed coastal situations *C. crassifolia* is usually very compact with densely interlaced branches and small, thick leaves. In forest it is upright and openly branched with much larger, thinner leaves. One of the most drought-tolerant *Coprosma* spp. and can be particularly common in dryland sites.
- 760 *C. rugosa* (i) (*C. rugosa* s.s.) Grows especially on river banks and terraces, and new surfaces created by erosion such as silts, gravels and rocklands, descending to sea level in the southern part of its range.
- 760 *C. rugosa* (ii) “In exposed sites it grows as scattered prostrate, more or less creeping shrubs amongst tussock. In relatively sheltered gullies it forms a dense scrub of divaricating plants up to 2 m tall with

- compact foliage that is kept at a constant level by the wind” (SP Courtney pers. comm.).
- 760 *Coprosma virescens* “It is completely deciduous in Dunedin” (BH Patrick pers. comm.). It was first recorded by Colenso in 1847 at the head of the Wairarapa Valley.
- 762 **ASTERACEAE** In some genera there are scales amongst the florets, as in *Ozothamnus*.
- 762 **CELMISIA** *Celmisia coriacea* has leaves up to 50 x 8 cm and flower heads up to 10 cm across, while the leaves of *C. lateralis* are reduced to needles. “It is such remarkable adaptations as these that have enabled *Celmisia* to become one of the dominant genera of the New Zealand subalpine meadows” (Laing and Blackwell 1964). Given (1969) in a synopsis of *Celmisia*, showed that *Celmisia* could be divided into several clear-cut groups and provided a key to these. Key features for distinguishing these include degree of woodiness, the form of bracts surrounding the flower heads and the shape and size of leaves. About 24 of the *Celmisia* species have woody stems and even the herbaceous species are woody at the base, but the scope of the book precludes the inclusion of them all.
- 762 *Celmisia ramulosa* var. *ramulosa* Two varieties have been described: *C. ramulosa* var. *ramulosa*, which is almost restricted to Fiordland, and *C. ramulosa* var. *tuberculata* (not illustrated), which occurs on drier mountains and has rough leaves with scattered tubercles. On rocky bluffs, tussock land, herbfield and fellfield, more often on the wetter western side of the mountains.
- 764 *C. durietzii* As in many *Celmisia* species, the old leaves are slow to decompose. Some botanists consider this species to be conspecific with *Celmisia allanii* and *C. sinclairii*, all differing by their degree of leaf hairiness on both leaf surfaces. The Stewart Island population is probably a species distinct from *C. durietzii*.
- 764 *C. lateralis* This species was first collected by HH Travers in 1871 on the mountains near Lake Guyon. In *C. lateralis* var. *villosa* (hairy) of NW Nelson, the leaves are thickly covered in glandular hairs. This variety should probably be considered to be just a hairy form of *C. lateralis* as hairy and non-hairy plants can occur together.
- 766 **OLEARIA** The New Zealand species need to be critically revised at both the genus and species level. There seems to be good grounds for merging the large, solitary flowered (macrocephalus) *Olearia* species with *Pleurophyllum*, while collectively molecular and cytological evidence strongly suggests that the New Zealand species might be better removed from *Olearia* s.s. (PJ de Lange pers. comm.).
- 766 *Olearia lyallii* Often forming dense stands, growing in places subject to extremely strong winds and harsh conditions. The relationship of this species to *O. colensoi* and its named varieties needs critical study (PJ de Lange pers. comm.). It may best be

- regarded as a variety of *C. colensoi*. As currently circumscribed, *Olearia hyallii* is native to the Snares and Stewart Islands. The Auckland Island population probably established early in the 19th century but the origin of the first plants, whether by wind dispersal of the light seeds or assisted by sealers and settlers, remains uncertain. *O. hyallii* is expanding its range on the Auckland Islands (Lee et al. 1991).
- 768 *Olearia colensoi*
var. *colensoi* In the southern part of its range, it grows at sea level, where it can become a tree.
- 770 *O. colensoi* var. *grandis* “*O. colensoi* var. *grandis* is generally coastal so it and *O. colensoi* var. *argentea* tend not to meet” (Brian Rance pers. comm.). *Olearia colensoi* var. *grandis* is very close to *O. hyallii*, and some botanists prefer to merge var. *grandis* with the latter (PJ de Lange pers. comm.). See comments for *O. colensoi* var. *argentea*.
- 772 *O. colensoi* var. *argentea* Uncommon in S but abundant on St. The author noted that in comparing *O. colensoi* var. *argentea* with *O. colensoi* var. *grandis*, *O. colensoi* var. *argentea* has smaller capitula, thicker leaves which recurve with age, sharply toothed serrations, and the upper surface is smoother without the strong pattern of secondary and tertiary veins of the other variety. The shape and size of the leaves also differ as shown in the illustrations.
- 774 *O. crebra* A local component of cloud forest on high parts of the Waima Forests, often associated with basaltic rock outcrops. This plant, together with *Coprosma waima*, was discovered in April 1986 by LJ Forester and JG Beachman at Hauturu Trig. Here the shrubs grew on a cliff face, out of reach of browsing goats. On easier slopes goats had destroyed all but the seedling plants. Even so it is surprising that two such large-leaved species of plants had escaped the notice of botanists for so long. In 1987 goat control measures were put in place by the Department of Conservation.
- 776 *O. pachyphylla* “There are records of this plant growing near Cook’s Beach and older records of it being found near Coromandel Township and Mt Maunganui. This species can only reliably be distinguished from allied species by its larger, entire margined, more numerous silky-hairy phyllaries” (PJ de Lange pers. comm.).
- 778 *O. townsonii* As treated here, this description includes plants treated as *O. thomsonii* in Allan (1961). *O. thomsonii* was first recognised from the Wanganui Region. In some populations, e.g. in Coromandel, every shrub is visibly different from every other one – leaf size, shape, orientation, plant compactness or openness. This variation is probably the reason for some of the earlier ‘splitting’ of *O. thomsonii*, and other (CC Ogle pers. comm.).
- 780 *O. furfuracea* (i) South of the Kaimai Ranges it is replaced by, or grades into, *O. furfuracea* (ii) (SP Courtney pers. comm.). A rather variable species, for which Kirk recognised several varieties. Although these are currently not retained, further study into the variation

exhibited by *O. furfuracea* is needed. To show this variation I have illustrated two of the more common forms, without attempting to place these within one of Kirk's varieties.

- 782 *Olearia furfuracea* (ii) The minutely crenulate margin is not visible to the eye but discernable when a fingernail is run around the edge of upper part of leaf. This plant differs from *Olearia furfuracea* (i) of northern N in that *O. furfuracea* (ii) has entire leaves without teeth, larger capitula, the ligules of the ray florets being double the size, and pedicels and branchlets more robust.
- 784 *O. rani* var. *rani* *O. rani* var. *rani* and *O. rani* var. *colorata* are compared in the description of *O. rani* var. *colorata*. It was first recorded by Banks and Solander in 1769.
- 784 *O. rani* var. *colorata* "There is a fair degree of variation in *O. rani* var. *colorata*. The amount of exposure, the annual rainfall and the type of substrate all seem to have an influence on the size of leaf and coloration" (P Enright pers. comm.). In the Hapuakohe Range the two varieties are sympatric. *O. rani* var. *rani* generally has broader, more oval leaves, more coarsely serrated than those of *O. rani* var. *colorata* and it flowers more regularly and more prolifically. Colenso in 1880 named this variety after the four colours of its leaves and petioles, light green upper surface, light brownish-white under surface, midrib reddish-brown and petioles darker brown (Allan 1961). The chief attraction of heketara is the abundance of its flowers. These are in large panicles. During the 1970s in a valley near Kawhia the author saw a yellow flowered *O. rani* var. *colorata*, a single tree that stood out amongst the white flowered trees in a valley where heketara was the dominant feature. The petals of the disc florets were bright yellow and those of the ray florets a butter yellow.
- 786 *O. albida* var. *albida*
(*O. albida*) See comments for *Olearia albida* var. *angulata*, a similar looking plant, for comparisons.
- 788 *O. albida* var. *angulata*
(*O. angulata*) "*Olearia albida* var. *angulata* and *O. albida* var. *albida* form a cryptic species pair, which until recently were poorly understood. Chromosomally the species are distinct, var. *albida* has $2n = 324$ chromosomes and var. *angulata* has $2n = 432$ " (Beuzenberg & Hair 1984). Var. *angulata* has the highest recorded chromosome number in any native vascular plant. They are best separated by their foliage. The leaves of var. *angulata* are broadly oblong, with the upper surface coloured a shiny resinous yellow-green with the leaf margins strongly undulate, those of var. *albida* tend to vary from narrowly oblong to ovate or elliptic and are coloured dull greenish-yellow to dark green with the leaf margins gently undulate. The under surfaces of the leaves of both species also differ: In var. *angulata* they are pale yellowish-white, in var. *albida* pure white. Var. *angulata* forms a small tree up to 4 m tall, var. *albida* is usually much taller reaching to heights of 6–8 m" (PJ de Lange pers. comm.). Some floral differences can be seen in the illustrations. Var. *angulata* is widely cultivated - often being sold

- as *O. albida*. In some parts of its range, e.g., the southern Kawhia Harbour, var. *angulata* is sympatric with var. *albida*.
- 792 *Olearia allomii* Primarily a rhyolite rock endemic, however, as a result of past forest clearance, some populations occur in regenerating scrub and along roads. It does not long persist in tall scrub.
- 794 *O. avicenniifolia* This is a common plant and grows on river terraces, on cliffs, in shrubland and along forest margins. It is an early coloniser of bare rocky slopes and riverflats.
- 796 *O. cheesemani* The distribution is disjunct with big gaps in the range, even though suitable habitat exists between.
- 798 *O. ilicifolia* (i) (N) *Olearia ilicifolia* (ii) (S) has leaves which are wider (2–2.5 cm) with larger deeper serrations and greenish white on the under surface.
- 800 *O. ilicifolia* (ii) (S) Descends to sea level at southern part of its range.
- 802 *O. paniculata* Rare south of Banks Peninsula and absent from NW Nelson coast west of Wainui Inlet.
- 804 *O. lacunosa* (i) This plant was recorded by WTL Travers in 1864 from the mountains near Lake Rotoroa, Nelson.
- 808 *O. angustifolia* First collected by David Lyall in 1848 on Stewart Island. This is a beautiful plant even when not in flower but when seen hanging from cliffs and girdling a small island with starry flowers it is a magnificent sight. Considered by some botanists to be a form of *Olearia oporina*.
- 810 *O. chathamica* It grows mostly on steep, exposed coastal slopes and cliffs, particularly along the crests. Primarily a late spring-flowering species. However, occasional flowers may be seen throughout the year. First recorded by HH Travers in 1863. Regarded by some botanists as a variety of *O. oporina*.
- 810 *O. semidentata* Primarily a summer-flowerer but, as with *O. chathamica*, flowers may be found throughout the year. It was first recorded by members of the crew of the French vessel *Venus* about 1836. The colour of the ray-florets is variable, most are purple but some are pink or completely white. In some parts of the southern tablelands it forms hybrids with *O. chathamica*.
- 812 *O. traversii* The illustration shows the smaller size of leaf. It forms stands, unmixed with other trees, on dunes, and elsewhere is common in lowland forests on a wide range of mineral soils (but not peat), growing with kopi (*Corynocarpus laevigatus*), karamu (*Coprosma chathamica*) and *Meliclytus chathamicus*. *O. traversii* is the only non-divaricating species of *Olearia* with opposite leaves in New Zealand. The wood is very strong and long lasting, and it was considered the best native timber on the Chathams. First collected by Dr Ernst Dieffenbach in 1840. Some 120,000 cuttings of *O. traversii* were planted on Mangere Island of the Chathams between 1974 and 1980 to establish a suitable habitat for the gravely endangered black robins (*Petroica traversi*),

there being only six birds left in the world in 1981. Subsequently, the black robins had increased to c. 250 birds by 2003 (DV Merton pers. comm.).

- 812 *Olearia laxiflora* Considered by some botanists to be part of *O. virgata*.
- 812 *O. coriacea* This species and *O. paniculata* are unusual among the New Zealand *Olearia* species in that each capitulum contains a single floret.
- 814 *O. adenocarpa* *O. adenocarpa* was first recognised as being distinct from *O. odorata* by PB Heenan and BPJ Molloy in 2002 (Heenan & Molloy 2004). Compared with *O. odorata*, *O. adenocarpa* is a smaller shrub with a long, narrow involucre, the brachyblasts are more slender, the leaves are smaller and a darker green, and it is only known from flood plains in Canterbury. In contrast, *O. odorata* can achieve the height of a small tree, 4 m or more, the involucre is broad and short, the brachyblasts are stout, squarish and densely ringed with leaf scars, the leaves are a yellowish green, and it is widespread in eastern S.
- 814 *O. polita* First recognised as a distinct species by AP Druce in 1975.
- 816 *O. solandri* The yellow colour on the abaxial leaf surface helps to distinguish this plant from *O. virgata* var. *virgata* though at the seedling stage the yellow may be absent and the two species not easily separated. Uncommon hybrids between *O. solandri* and *O. odorata* occur in S. Marlborough lowlands where the range of the two species overlap. Near the coast in swamps, in rocky places and on hills. It is also occasionally found inland in hill pastures remote from any 'natural' populations, the wind-blown seed establishing on to, e.g., erosion scars.
- 816 *O. fimbriata* The young stem is round for the first few centimetres. It then develops four ridges which make it appear square. As the stem matures the ridges are shed leaving the stem round. Mature stems again have four ridges between each of which are two secondary ridges (see illustration). Ridges obscure on old branches. Young plants semi-deciduous, adults evergreen. Plants are a distinctive grey green colour. "This species was first collected by P Wardle ... in 1951, Bush Gully, Lake Hawea ... but was usually identified as *O. odorata* until 1986 when it was first recognised as distinct by BH Patrick" (Heads 1998). "I first recognised plants in the Pomahaka Valley as being different because I found several species of moths feeding on them that I had never seen before and the plants looked a little strange for *O. odorata*. Insects are good botanists and only eat certain plants" (BH Patrick pers. comm.).
- 818 *O. virgata* (i)
(*O. virgata* s.s.) This description was written for *O. virgata* ssp. *centralis* of Heads (1998), but generally apart from leaf size applies equally to *O. virgata* (i) (see below). Variation of leaf size in *Olearia virgata* (i) 5–10(–20) x 3–5(–8) mm (Allan 1961). Branchlets as fine as 1 mm diameter are hard to break, the central core is made up of long strong white filaments (see illustration). The distinguishing feature of the *Olearia virgata* group is the vertical nature of the

plants. There are various varieties that have been recognised at different times, *O. virgata* (i) (illustrated right) from the Volcanic Plateau was named *O. virgata* ssp. *centralis* by Heads (1998). In regarding *O. virgata* as a naturally variable species, Heenan (2001) merged this and other subspecies into it, without a separate subspecific status. Other N populations (*O. virgata* ssp. *virgata*) and S populations, (*O. virgata* ssp. *implicita*) are included in this distribution. Allan (1961) writes of *O. virgata* ssp. *implicita* as having leaves 6–8 x 2–3 mm and with thin silvery tomentum on under surface. Habitat: wetland and surrounding catchment slopes to subalpine shrubland to 1125 m. Shrublands on frosty valley floors and terraces.

- 818 *Olearia virgata* (ii) Also known as *O. virgata* var. *serpentina* (Allan 1961). In regarding *O. virgata* as a naturally variable species, Heenan (2001) merged var. *serpentina* into it, without a separate taxonomic status. Given there are morphological, edaphic, ecological and biogeographic differences that distinguish this taxon from *O. virgata* (i), the taxonomic placement of this taxon appears to be still unresolved (SP Courtney pers. comm.).
- 820 *O. bullata* Below the subalpine zone in grassland and shrubland, tussock grassland, forest margins.
- 820 *O. lineata* “When seen growing in open country with its slender, drooping branchlets waving in the breeze it is a noticeable feature of the landscape, especially in parts of Otago and Southland” (Metcalf 1972).
- 822 *O. gardneri* Forest, open forest and forest margins on high fertility alluvial river flats and terraces, mudstone (rarely limestone), swampy gullies, and steep hillsides. A nationally critical species (de Lange et al. 2004); it is the third-rarest tree in New Zealand and has little natural regeneration. A population of this plant was at Hutchinson Scenic Reserve, Puketitiri, Hawkes Bay until at least 1958. Their likely habitat is now smothered by blackberry (*Rubus fruticosus* agg.), *Muehlenbeckia australis* and dense tall pasture grasses. *O. gardneri* was named as a distinct species from *O. hectorii* by Heads (1998) although differences between N & S plants had been recognised by Tony Druce, e.g. in Eagle (1982). *O. hectorii* has pale yellow florets, phyllaries lanceolate to oblong, evenly covered in hairs and with entire margins, juvenile leaves oblanceolate or clavate with teeth and covered in copious wavy hairs on upper surface, under surface tomentose and does not have distinctive apiculate teeth on juvenile leaves. There are additional differences described by Heads (1998) & Ogle (2004). The flowers are strongly scented. This species was first collected by Zotov and Druce in 1947 in the Wairarapa. Colin Ogle produced a review of the status and ecology of *O. gardneri* from which a number of the above observations have come.
- 822 *O. hectorii* The plant loses its leaves in the autumn and is very attractive when the pale green membranous new leaves first appear. Previously known from N. Marlborough and S. Nelson but these populations are now most likely extinct.

- 824 *Olearia fragrantissima* It also grows in a few inland sites, e.g. Lake Wanaka.
- 824 *O. moschata* A similar fragrance is present in some other species of the genus. This plant sometimes forms a large part of subalpine shrubland and scrub, especially on old talus slopes and along the edges of unstable gullies in areas of high rainfall. Collected by von Haast in 1862 during his first visit to the headwaters of the Waitaki River.
- 826 *O. nummulariifolia* South Island plants [var. *nummulariifolia* (ii)] have leaves
var. *nummulariifolia* (i) distinctly longer than broad, and therefore not almost round, as in typical var. *nummulariifolia* (i) of the North Island.
- 826 *O. nummulariifolia* Scattered throughout the S high country including Banks
var. *nummulariifolia* (ii) Peninsula, locally common on Tiwai Peninsula. “The leaves of var. *nummulariifolia* (i) are almost round; the leaves of *O. cymbifolia*, a similar plant, are rolled back almost to the midrib, whereas in var. *nummulariifolia* (ii) the leaves are distinctly longer than broad and only slightly rolled back at the edges” (SP Courtney pers. comm.). “Var. *nummulariifolia* (ii) and *O. cymbifolia* often grow together in the eastern South Island but remain distinct” (AP Druce pers. comm.).
- 828 **PACHYSTEGLIA** “Shrubs in the genus *Pachystegia* are rupestral plants usually found on steep bluffs, cliffs and other inaccessible places surrounded by grassland, scrub or forest. Whether they are restricted now in range because of excessive grazing or other depredation of their habitat is unknown. The various entities show distinct distribution patterns that appear to have remained undisturbed. ... They occur from sea level up to at least 900 m ascending to about 1000 m in favoured sites” (Molloy and Simpson 1980). These plants are adapted to tolerate dry conditions. Cheeseman (1914) credits D Monro with collecting *Pachystegia insignis* in 1853, on the banks of the Waihopai River, the principal tributary of the Wairau. Monro being the first European to see this plant. However, “Hooker in 1889 gives that honour to Captain D Rough whose name is commemorated by several native plants” (Molloy and Simpson 1980). Reported leaf blade sizes are more variable than those measured on the plants seen by the author.
- 836 *Pachystegia minor* (ii) The involucre (the bract portion of the flower head) is slender in comparison with other *Pachystegia* species.
- 838 *P. rufa* This plant was first brought to the attention of botanists by A Kennington of Haldon Hills in 1980. BPJ Molloy was one of the first to study and describe this species in 1982. He also named it.
- 840 **HELICHRYSUM** “The New Zealand species currently listed under *Helichrysum* are all endemic. None of them are true *Helichrysum*, but they are retained in this genus while their taxonomy is being revised” (JM Ward pers. comm.). Note: The author acknowledges assistance from RD Smissen with *Helichrysum lanceolatum* and from JM Ward for assistance with the remaining *Helichrysum* entities.

- 840 *Helichrysum lanceolatum* (i)
(*H. lanceolatum* s.s.) Similar large, broad-leaved plants occur near Kaihoka at the northern tip of the S.
- 840 *H. lanceolatum* (ii) The plant illustrated was grown from a cutting collected from Surville Cliffs. After six years in the author's fertile Taranaki soil it was a well-grown plant, but it failed to flower.
- 842 *H. dimorphum* This plant and *Brachyglottis sciadophila* are the only climbers in the New Zealand Asteraceae.
- 844 *H. plumeum* The density of the hairs on the leaves make this species distinctive. On shaded parts of the plant the hairs are almost white.
- 844 *H. coralloides* The entangled hairs of adjacent leaves give the slender stem the appearance of being thick and hairy. This very unusual daisy is one of the many distinctive plants that grow in rocky places in the mountains of north-eastern South Island.
- 846, *H. intermedium*
848 forms (i) to (vii) Rock crevice plants with small, imbricate, appressed leaves. Capitula are solitary on the ends of the branchlets. Floret colour varies from deep yellow through cream to white. *Helichrysum intermedium* is distributed through most of the South Island and encompasses many different forms that have not yet had adequate and comprehensive taxonomic treatment. Seven of these forms are figured here. "Forms included by Allan (1961) under *Helichrysum selago* are now generally known as *Helichrysum intermedium*. The name *H. selago* is based on a type specimen which is a hybrid between *H. coralloides* and *H. parvifolium*, so it cannot be used for anything other than these hybrids" (JM Ward pers. comm.).
- 848 *H. intermedium* (v) The flowers have a perfume reminiscent of manuka honey. At the top of the flowering branchlets were four or five longer, narrower leaves, these, and part of involucre, were bound by a horizontal network of white, woolly hairs. "This is the form originally described by Simpson (1945) as the species *H. intermedium*, but reduced to a variety of *H. selago* by Allan (1961)" (JM Ward pers. comm.).
- 848 *H. intermedium* (vii) This is a similar looking plant to *H. coralloides* in that it has thickish branchlets but that species has yellow flowers. "Specimens with dark green leaves grow beside those with yellow-green leaves" (AP Druce pers. comm.).
- 850 *Ozothamnus leptophyllus* (ii)
(*Cassinia amoena*) Cheeseman first recorded this plant in 1896. A very distinct species which is confined to serpentinite rock. It is sympatric with the local northern form of *O. leptophyllus* (vii), with which it occasionally hybridises. This is one of the few Surville Cliff serpentinite endemics that is very hard to grow off serpentinite rock (PJ de Lange pers. comm.).
- 850 *O. leptophyllus* (iii)
(*Cassinia vauvilliersii*) This plant can be mistaken for plants of *Brachyglottis cassinioides*.

- 852 *Ozothamnus leptophyllus* (v) (*Cassinia albidā*)
Kaikoura Ranges, drainage area of Clarence, Awatere and Wairau Rivers. Common. This plant is sympatric with *O. leptophyllus* (iii) at the upper end of its altitudinal range and hybridises with it.
- 852 *O. leptophyllus* (vi) (from Tai Tapu coast)
“Leaves smaller and more imbricating than the common form of *O. leptophyllus* (i). The low growth habit is retained in cultivation” (SP Courtney pers. comm.).
- 852 *O. leptophyllus* (vii) (*Cassinia retorta*)
O. leptophyllus (vii) occasionally hybridises with *O. leptophyllus* (ii) and was named *Cassinia* × *amoenatorita* by Harry Carse (Allan 1961).
- 854 **BRACHYGLOTTIS**
The woody New Zealand species and six perennial herbs were transferred to *Brachyglottis* and *Urostemon* by Nordenstam (1978, Op. Bot. 44: 1–84), *Senecio kirkii* being the only species transferred to *Urostemon*. Subsequently C Jeffrey of the Royal Botanic Gardens, Kew, opined that the generic name *Brachyglottis* be used for all these plants, including *Senecio kirkii*. This decision was subsequently taken up by New Zealand botanist C Webb (1987), who also made all the remaining necessary combinations.
- 854 *Brachyglottis arborescens*
The trunk soon divides into a few branches. The outer branchlets form a dense, rather flat crown. In old trees, the trunk is often hollow. Primarily an associate of the *Meryta*-dominated forest on Great Island. Otherwise often found growing with *Elingamita* trees under the taller pohutukawa forest on West Island. Occasional plants occur in taupata and *Elingamita* scrub on Hinemoa and Arbutus rocks (Princess Group). Part of this description has been taken from information supplied by GTS Baylis in *The Flora of the Three Kings Islands* (Oliver 1948). “A very distinctive species, unique amongst *Brachyglottis* as the only species to produce corky bark. The mature leaves, like the quite unrelated Three Kings endemic *Pennantia baylisiana* are often strongly folded down the midrib, so as to appear saddle-shaped” (PJ de Lange pers. comm.).
- 856 *B. hectorii*
According to DR Given (1976) it is reasonably widespread but many populations are small. It is closely associated with limestone or marble, or alluvium derived from these substrates. It is frequent on shady slopes in association with seepages, but it can sometimes occur on sunny, well-drained slopes. This plant was first found by WTL Travers near Collingwood, but a description was not published until after James Hector collected it in the Buller Valley in 1872.
- 860 *B. repanda*
Rangiora flowers make a fine display in the spring and are fragrant and very attractive to bees. The leaves of this plant are poisonous to stock.
- 862 *B. rotundifolia* var. *rotundifolia*
Was recorded by the Forsters in Dusky Sound on Captain Cook’s second voyage to New Zealand in 1773. It is this species which gives its name to the “muttonbird scrub” of Stewart and associated islands.

- 864 *Brachyglottis rotundifolia* var. *ambigua* Only half of the dried panicle was illustrated, the total panicle bore about 60 flower heads. “The relationships amongst the various *Brachyglottis* allied to *B. rotundifolia* has yet to be properly resolved. *B. rotundifolia* var. *ambigua* seems to be closely allied to *B. cockaynei* and together they form a north-western S coastal group which has a close relationship to the southern South Island species *B. rotundifolia* var. *rotundifolia*, its montane to subalpine equivalent *B. buchananii* and the closely related, primarily North Island species, *B. elaeagnifolia*” (PJ de Lange pers. comm.). *B. cockaynei* (West Wanganui Inlet) has not been illustrated.
- 866 *B. buchananii* Mount Cargill, the type locality of the species, and Swampy Summit are part of the same range. “*B. buchananii* is the oldest validly published name for this species, which had been previously known as *B. bennettii*. It is uncommon on Swampy Summit but common on the harbour side of Mount Cargill” (B Patrick pers. comm.). Some botanists regard this species as a variety of *B. rotundifolia*. “Further taxonomic investigation is required into all of the named taxa in the *B. rotundifolia* group to which *B. buchananii* belongs” (PJ de Lange pers. comm.).
- 868 *B. elaeagnifolia* Some botanists consider this species to be a variety of *B. rotundifolia*.
- 870 *B. bidwillii* Bidwill, who was the first botanical explorer to collect plants from the Central Volcanic Plateau, found this plant in 1839.
- 872 *B. stewartiae* The branches form a rigid tangle inside the shrub but eventually bend upwards and branch several times, so that on the outside there is an almost continuous leafy surface. This type of growth is also common in *Olearia oporina* (i) (Cockayne 1928).
- 874 *B. huntii* W Martin (1961) wrote of this plant: “... an ornamental tree which, in its flowering season, forms a yellow girdle round almost every forest remnant in the south of Chatham Island” GC Kelly comments: “The soft sage-green foliage contrasts strikingly with the sombre bush trees round about”. A threatened species now virtually restricted to the southern Chatham Tablelands and Pitt Island.
- 876 *B. kirkii* var. *kirkii* Now uncommon through much of its range because of the ravages of possums. “In a few places where possum control has been effective for a number of years, it is becoming quite common again - e.g. Egmont National Park - but needs ongoing possum control to sustain these gains” (CC Ogle pers. comm.).
- 878 *B. kirkii* var. *angustior* This plant should perhaps be considered a distinct species. It usually grows on the ground, flowers in summer, is taller and has narrower leaves than *B. kirkii* var. *kirkii*, with which it is often sympatric. In contrast *B. kirkii* var. *kirkii* is usually epiphytic, flowers in spring, and is a smaller plant with broader, more heavily toothed leaves. Nevertheless, these clear

distinctions between both taxa fall apart on Rangitoto Island, and in some other parts of the northern North Island.

- 880 *Brachyglottis greyi* The plant most commonly cultivated under the name of *B. greyi* differs from the true *B. greyi* in that the leaves are smaller, often crenulate and the flower stems (pedicels) are densely covered in white hairs. This garden plant is of hybrid origin (*B. compacta* × *B. greyi*).
- 882 *B. laxifolia* Some botanists consider that *B. laxifolia* might be better treated as a ssp. or var. of *Brachyglottis greyi*. However, though obviously closely related, *B. laxifolia* is distinguished from *B. greyi* by the unique “tailed” appendages on the basal portion of the anthers, and by its rather different ecology.
- 886 *B. monroi* The outer branchlets are close together forming a compact bush that when in flower presents a mantle of yellow.
- 888 *B. pentacopa* It resembles *B. perdiciooides*, but the capitula of *B. pentacopa* are larger and the leaves are more coarsely toothed and have wavy margins. It is found from the summit scrub (300 m) down to about 75 m where the dense karaka (*Corynocarpus laevigatus*) forest starts. Animals do not eat it and the population has increased at the expense of other plants that have been eaten. It was first brought to the notice of botanists by DR McQueen. It is very closely allied to *B. perdiciooides* and indeed might be better viewed as a southerly extension of that quite variable species (PJ de Lange pers. comm., Druce 1993).
- 888 *B. compacta* Regarded as a local form of *B. monroi* by Druce (1993).
- 890 *B. perdiciooides* First collected by Banks and Solander at Tolaga Bay in 1769.
- 890 *B. cassiniooides* The general appearance is of a greyish-green shrub. It is sometimes mistaken for shrubs of *Ozothamnus leptophyllus*. This plant was originally recorded by A Sinclair in the Wairau Gorge, Nelson, in 1860.
- 892 *B. bifistulosa* In crevices on shaded rock faces, among boulders on rockslides and in snow-tussock grassland at and above the treeline. Although this is a rare plant it is not uncommon locally. Most of the above information has been taken from a paper on *Brachyglottis bifistulosa* by MJA Bulfin (née Simpson) (1974). This is the only plant in the entire book for which the author has not seen a live specimen. It was first collected by D Lyall at Dusky Sound in 1851.
- 894 *B. sciadophila* This plant and *Helichrysum dimorphum* are the only climbers in the New Zealand Asteraceae. In S, east of the main divide from Nelson and S. Marlborough to Southland, but very local. Long thought to be a South Island endemic, the species was first recorded in the N at Mataroa by C Ogle and JW Barkla in 1995 (Ogle and Barkla 1995), with subsequent populations found by AJ Townsend near Masterton in 1996 (Townsend 1996) and further south in the eastern Wairarapa on Waimana Station by P Enright in 1999.

Distribution of the species of *Brachyglottis*

<i>B. arborescens</i>	T.K.	Great I.
<i>B. repanda</i>	N., S.	From N. Cape to N. Canterbury and Greymouth. Naturalised on Banks and Otago Peninsulas, and St. I.
<i>B. kirkii</i> var. <i>angustior</i>	N.	Te Pahi south to Hapuakohe and Kaimai Ranges
<i>B. kirkii</i> var. <i>kirkii</i>	N.	Kaitaia southwards to Wellington
<i>B. myrianthos</i>	N.	Northland: Puketi Forest. Coromandel Ra.
<i>B. perdicioides</i>	N.	East Cape: Hicks Bay; to Mahia Peninsula
<i>B. bidwillii</i>	N., S.	Raukumara Ra. southwards, absent from Taranaki/Egmont
<i>B. elaeagnifolia</i>	N., S.	Raukumara Ra. to N. Marlborough and E. Nelson; absent from Central Volcanoes and Kaimanawa Mts.
<i>B. sciadophila</i>	N., S.	Mataroa nr. Taihape and east of Masterton. NW Nelson and S. Marlborough to Southland; E. of Main Divide, local
<i>B. pentacopa</i>	N.	Mt. Percy 12 km N. of Castlepoint, Wairarapa
<i>B. compacta</i>	N.	Castlepoint, Wairarapa
<i>B. greyi</i>	N., S.	Castlepoint to Aorangi Mts. and S. Rimutaka Ra.
<i>B. adamsii</i>	N., S.	Mt. Holdsworth, Tararua Ra.; N. Marlborough, Nelson
<i>B. rotundifolia</i> var. <i>ambigua</i>	S.	N. Westland: Cape Foulwind to Barrytown
<i>B. laxifolia</i>	S.	Nelson, S. Marlborough and N. Canterbury
<i>B. buchananii</i>	S.	Throughout, in northern part of range absent in east, more common west of Main Divide
<i>B. cassinioides</i>	S.	local
<i>B. hectorii</i>	S.	NW Nelson to N. Westland
<i>B. monroi</i>	S.	S. Marlborough and N. Canterbury
<i>B. rotundifolia</i> var. <i>rotundifolia</i>	S., St.	Southern S.I. Very common on Stewart and nearby islands
<i>B. revoluta</i>	S.	Fiordland, W. Otago and W. Southland
<i>B. bifistulosa</i>	S.	Fiordland
<i>B. stewartiae</i>	St.	Sn. I., Sol. I., Herekopare & other islets in vicinity of St. I.
<i>B. huntii</i>	Ch.	Chatham and Pitt Islands

- 898 *Scaevola gracilis* “Common on the open tuff and pumice slopes on the north side of Raoul I, often forming dense mats several metres in diameter, and on talus along the east coast. Also common and a pioneer coloniser in parts of the crater, as noted by Cheeseman. Fairly common on old landslips and cliff edges, but relatively uncommon along the south coast” (Sykes 1977). First collected by Milne and Macgillivray of H.M.S. *Herald* which visited the Kermadec Islands in 1854.
- 900 *Colensoa physaloides* Richard Cunningham first recorded this plant in the Bay of Islands in 1834. Though often included in *Pratia* by New Zealand botanists, *Colensoa* is amply distinct from members of that genus with regard to its chromosome number, woody shrub habit, floral structure and seed shape, size and patterning (de Lange & Cameron 1999). Recent molecular work supports its separation from *Pratia* (Murray et al. 2004). This genus seems most closely allied to a few similar lobeliaceous genera in northern Australia (NG Walsh pers. comm.). Koru or *Colensoa* is one of New Zealand’s most handsome plants and, because of the blue coloured flowers and berries, one of the most unusual. The species is now scarce on the mainland due to its palatability to browsing animals. It is only really abundant on Great Island, Three Kings group (PJ de Lange pers. comm.).
- 902 **SOLANUM** Potato and tomato (though put in *Lycopersicon* by some botanists) belong to this genus. *S. laciniatum* and *S. aviculare* s.s. are also in Australia.
- 902 *Solanum laciniatum* The Maori used the leaves of poroporo for the treatment of itch and as a poultice and also for other purposes. The berries are poisonous when green but can be used for jam when ripe, though they have an extreme laxative effect if eaten to excess.
- 904 *S. aviculare* f. *aviculare* “In recent years *Solanum aviculare* f. *aviculare* was cultivated near Waitara, north Taranaki, for the production of solasodine, an alkaloid used in the manufacture of steroids. The New Zealand operation proved to be uneconomic in competition with the cultivation of *Dioscorea*, a climbing yam, native to southern China and Mexico. From this latter plant the chemical diogenin is produced and it is used in the production of steroids. The species *Solanum laciniatum* may still be grown elsewhere in the world for the same purpose” (GW Mason pers. comm.).
- 906 *S. aviculare* f. *latifolium* The exact limits of this forma are not clear, and there are many intergrading forms between it and forma *aviculare* occurring throughout the Hauraki Gulf. A seedling was given to the author by the late AP Druce. In 18 months the plant attained a height of 2.5 m, but by then it bore no lobed leaves. A reversion shoot from ground level resulting from damage to base of trunk, produced only lobed leaves, some up to 27 cm long. A lobed leaf blade on AP Druce’s plant measured 40 cm long with a 10 cm petiole. The author’s plant was in flower from October to April.
- 908 **CALYSTEGLIA** The large bracts distinguish *Calystegia* from *Convolvulus*. Of the four New Zealand species, *C. soldanella* and *C. marginata* are

distinctive. *C. tuguriorum* is distinguished from them and *C. sepium* ssp. *roseata* by its small, heart-shaped leaves and white flowers.

- 910 *Calystegia sepium* ssp. *roseata* The indigenous subspecies has pink flowers; the introduced subspecies has pink or white flowers. New Zealand plants of *C. sepium* match *C. sepium* ssp. *roseata*, which is indigenous to coastal habitats throughout the southern hemisphere (RK Brummit pers. comm.). Was first collected from New Zealand by Banks & Solander in 1769, and so is now accepted as native here as well. Previously New Zealand *C. sepium* populations have been treated as entirely naturalised (Flora 4, Webb et al. 1988), or the view has been expressed that it occurs here in two forms, one naturalised and one possibly indigenous (Ogden 1978). Recent research suggests that all New Zealand material of *C. sepium* is referable to *C. sepium* ssp. *roseata*, and that the “naturalised” form of *C. sepium*, is really a hybrid swarm between *C. sepium* subsp. *roseata* and the introduced European *C. silvatica* (great bindweed). The plant illustrated here is *C. sepium* ssp. *roseata* (P.J. de Lange pers. comm.).
- 912 *C. soldanella* Often covers wide areas and acts as a valuable sand binder where sand movement is slight. The seeds float and can still germinate after many months in sea water. Widespread in temperate and even subtropical areas in both hemispheres. Although a perennial, this is not a woody plant but has been included to complete the New Zealand members of the genus. Hybridises with *C. sepium* and *C. tuguriorum*.
- 914 *C. marginata* Bush edges and open areas of grass and low shrubs. Often found in low scrub, fern or amongst grasses on small rock stacks along the eastern Northland Peninsula. It also grows in eastern Australia. This is not a vigorous convolvulus.
- 916 *IPOMOEA* The two New Zealand species have a wide range in tropical countries and in this country appear to be opportunistic colonisers limited by cold temperatures.
- 916 *Ipomoea pes-caprae* ssp. *brasiliensis* Sometimes the seeds are carried by ocean currents, which presumably accounts for the small colonies found along Ninety Mile Beach. Abundant on fairly level or gently sloping sandy beaches. It also grows on steep pumiceous cliffs about 15 m high. On the summit of Curtis Island there is a small colony on the steep inner rim of the crater about 1 m above an active fumerole. It was first collected on Raoul Island by Cheeseman in 1887. Most of the above information has been taken from a paper by WR Sykes (1970).
- 918 *I. cairica* This is a beautiful plant due to the profusion of its pretty flowers and the attractive shape of its leaves, but it can become rather invasive in a garden.

- 920 *Parahebe catarractae* As currently circumscribed *P. catarractae* is a Fiordland endemic. Past treatments recognised *P. catarractae* ssp. *catarractae* and three other subspecies. With the exception of *P. catarractae* (which is retained at species level) the other subspecies are now treated as *P. lanceolata* (this embraces plants formerly known as *P. catarractae* ssp. *diffusa* and subsp. *lanceolata*) and *P. martinii* (formerly *P. catarractae* ssp. *martinii*) (Garnock-Jones & Lloyd 2004).
- 922 *Heliohebe hulkeana* ssp. *hulkeana* This subspecies is distinguished from ssp. *evestita* by the densely puberulent young stems and inflorescences and broadly rounded eglandular-ciliate calyx lobes (Garnock-Jones 1993). The flowers the author illustrated came from a plant which bore over 50 panicles.
- 924 *H. hulkeana* ssp. *evestita* “The absence of a dense puberulent covering, particularly in the distal parts of the inflorescence, distinguishes ssp. *evestita* from ssp. *hulkeana* ... The leaves tend to be more ovate to lanceolate than in ssp. *hulkeana*, and the inflorescence tends to be more graceful, with flowers more distantly spaced” (Garnock-Jones 1993). The plants illustrated were “from cliffs 1–2 m above the river bed, growing in the open and in partial shade and facing southwest; north facing plants elsewhere were much less lush, smaller and sparser” (C Jones pers. comm.).
- 926 *H. lavaudiana* “*H. lavaudiana* can be distinguished from other species by its rounded, dull green leaves, long glandular hairs, and larger white flowers with pink bud in very compact inflorescences” (Garnock-Jones 1993).
- 926 *H. raoulii* ssp. *raoulii* The flowers, which range from mauve to almost white, are unusual because the style emerges and lengthens early in the bud stage. This was noted by WB Brockie and confirmed by LB Moore (1973). The calyx is also unusual because one pair of lobes, those furthest from the stem, are joined for most of their length while the other pair are overlapping, as illustrated. It usually has only four lobes.
- 928 *H. raoulii* ssp. *maccaskillii* Like ssp. *raoulii*, this plant has one pair of lobes joined for most of their length, but it differs in having a small additional lobe separating the other pair, as illustrated in front and back views of capsule. It also differs “... by its tighter, almost divaricating habit, its smaller, more rounded, barely toothed or entire leaves, mauve to white corollas ...” (Garnock-Jones 1993).
- 928 *H. pentasepala* “*H. pentasepala* is similar to *H. raoulii* but has a more erect habit, leaves widest in the middle, and five free calyx lobes, the posterior one usually only slightly smaller than the others” (Garnock-Jones 1993).
- 930 *H. acuta* The plant illustrated was on a “clearly defined habitat of steep rock slope with a thin layer of finely broken greywacke scree on the surface” (C Jones pers. comm.). *H. acuta* was discovered by PB Heenan in the George Stream area in 1990.

- 930 **HEBE**
- H. elliptica* and *H. salicifolia* are the only New Zealand *Hebe* species to extend beyond the New Zealand botanical region, while *H. rapensis* is endemic to Rapa Island, Austral Seamount Chain 24° S 150° W. Though wild hybrids are uncommon, there are many cultivated ones. The identification of *Hebe* species is often difficult, especially if plants are not in flower. They are found from sea level to the alpine zone, and range in height from a few centimetres up to 7 m. The larger-leaved species are usually found on the coast, in northern parts of New Zealand, in lowland scrub and along forest margins. At higher altitudes the smaller-leaved species grow; and in alpine areas there are the whipcord species with leaves reduced to thick scales. Many whipcord species have larger and thinner leaves at the seedling stage. A number of these seedlings were investigated by Cockayne and he showed that the seedling form remains permanent as long as the plant is kept in a moist atmosphere.
- 930 ***Hebe* aff. *brevifolia*** “At present known only from a single plant gathered from the wild in 1996. The plant has many features suggestive of hybridism between *H. brevifolia* ($2n = 118$) and the small coastal form of *H. ligustrifolia* ($2n = 40$) common on the Surville Cliffs. However, the hexaploid chromosome number ($2n = 120$) argues against this. Also the plant comes true from seed” (PJ de Lange pers. comm.).
- 932 ***H. brevifolia*** First recorded by Cheeseman in 1897 and transferred to *Hebe* as a variety of *H. macrocarpa* by Moore in 1961. Elevated to species rank by PJ de Lange (1997).
- 934 ***H. macrocarpa***
var. ***macrocarpa* (i)** *H. macrocarpa* var. *macrocarpa* appears to be a very variable plant as evidenced by one extreme example, the narrow-leaved plants from Great Barrier Island.
- 936 ***H. macrocarpa* var. *macrocarpa* (ii)** (from Gt. Barrier I.) Once believed to be a distinct apparently unnamed species, *Hebe macrocarpa* var. *macrocarpa* (ii) (from Gt. Barrier I.) has only been collected twice from the wild; on The Needles (near Tryphena) and on Tataweka Ridge. It has been considered as a distinct, unnamed species allied to *H. macrocarpa* var. *latisepala*. Later “from chromosomal evidence hybrid status was inferred” (de Lange & Murray 2002). However, more recently, flavonoid analysis could not distinguish these plants from *H. macrocarpa* var. *macrocarpa* (i) and var. *latisepala*. *H. macrocarpa* var. *macrocarpa* is more variable than was hitherto believed, and based on field and herbarium evidence there seems to be little justification for regarding the Great Barrier plant as anything more than one extreme in the range of variation exhibited by *H. macrocarpa* var. *macrocarpa* (AV Kellow, MJ Bayly, & PJ de Lange pers. comms.).
- 938 ***H. macrocarpa***
var. ***latisepala*** Was treated as a species by Kirk (*Veronica latisepala*). On the Barrier Islands this is a very distinctive plant, well marked by its showy, deep blue-purple or violet flowers. However, populations on Mt Manaia and Bream Head have primarily mauve or white flowers, whilst those on the Coromandel Peninsula and Kohuhunui (Hunua Range) have white flowers.

These plants can only be distinguished reliably from *H. macrocarpa* var. *macrocarpa* by their hexaploid ($2n = 120$) chromosome number (PJ de Lange pers. comm.).

- 940 *Hebe speciosa* Found by Richard Cunningham in 1834 at Hokianga Heads. Recent molecular studies by TTJ Armstrong & PJ de Lange have shown that only three of the known populations (South Hokianga Head, Maunganui Bluff and Muriwai) are natural, the other populations appear to be the result of deliberate plantings by Maori (PJ de Lange pers. comm.).
- 942 *H. breviracemosa* WRB Oliver, who in 1910 described the flora of Raoul in detail, discovered and named this Kermadec endemic koromiko. Long considered to be extinct, a single plant was found by Ray Scrimgeour in 1983 growing on a steep cliff where it had escaped goat browsing. Cutting material was brought back to the University of Auckland, where it was propagated by Chris Soulje & Tony Palmer, University groundsman, and distributed from there. Plants have been returned to Raoul Island, now that the goats have been eradicated. Natural regeneration from these plantings was not observed; and a 1993 survey suggested that rats, browsing the small seedlings might be responsible. The conservation situation improved when in 1997/8 during a hazardous survey on high, steep cliffs by the Department of Conservation, a further 50 adult and juvenile plants were discovered. Subsequently, following the rat eradication on Raoul Island in 2002, natural regeneration around those cutting-grown plants that had established was first recorded, and there are now 187 plants known from the wild. The author found it a difficult plant to maintain in a healthy condition in New Plymouth, where it was prone to *Hebe* black spot (*Septoria exotica*). Information from PJ de Lange (1999) and EK Cameron.
- 944 *H. dieffenbachii* “The commonest *Hebe* in the Chathams, mainly in coastal or rocky places, and readily recognised by its blue-green colour and bushy habit” (GC Kelly pers. comm.).
- 944 *H. barkeri* Next to the Chatham Island nikau (*Rhopalostylis* aff. *sapida*), and tarahinau (*Dracophyllum arboreum*) this is the tallest species on the Chatham Islands. It presents quite a spectacle, when Chatham Island pigeon or parea (*Hemiphaga chathamensis*) are nesting in its branches.
- 946 *H. corriganii* “Very near to *H. salicifolia* but leaves do not show the sudden narrowing below the acuminate tip that is characteristic of that species; also the calyx-lobes are broader and of thicker texture, the corolla has a longer tube and less acute, usually shorter, lobes, and the capsule is quite different” (Allan 1961). It differs from *H. macrocarpa* var. *macrocarpa*, which usually has no sinus, in always having a sinus, by the smaller flowers and capsules, and by its preference for montane forest. Some botanists consider this to be a variety of *H. macrocarpa*.
- 948 *H. salicifolia* *H. salicifolia* was found and named by the Forsters when they visited Queen Charlotte Sound in 1773. North Island plants

- without a sinus, formerly called *H. salicifolia*, now belong to a different species, *H. stricta*.
- 950 *Hebe stricta* var. *lata* Considered by some botanists to be a species distinct from *H. stricta*.
- 954 *H. stricta* var. *atkinsonii* Flowers in the autumn.
- 956 *H.* aff. *stricta* Discovered at Wairongomai Valley by PJ de Lange in 1984 but not recognised as potentially distinct until LJ Forester collected material near Pipiwai in 1996.
- 956 *H.* aff. *bishopiana* First discovered by AP Druce and LJ Forester in 1991. This form was later discussed as *Insertae Sedis* (of uncertain position) by de Lange (1996). “In foliage colour the plant was considered to have affinities to *H. bishopiana* by the late AP Druce. In fact it is more closely allied to *H. stricta* var. *stricta* from which it differs in its narrower, longer, maroon-coloured leaves, erect flower racemes, taller habit and tetraploid chromosome number” (PJ de Lange pers. comm).
- 958 *H. bishopiana* This is the only vascular plant endemic to the Waitakere Ranges. Originally described as a hybrid of presumed parentage *H. obtusata* × *H. stricta* var. *stricta*, de Lange (1996) showed that it is too widespread, morphologically uniform, comes true from seed, and is by and large ecologically distinct from either of the presumed parents. Indeed this species is only rarely found sympatric with *H. obtusata*, though on rock pinnacles it is often found in association with *H. stricta* var. *stricta*. Throughout its range it is most frequently found with *H. macrocarpa* var. *macrocarpa*.
- 958 *H. ligustrifolia* (i) Although long considered distinct from *H. ligustrifolia*, detailed studies, supplemented by field collections, revealed that there is a gradation between these southerly extremes and *H. ligustrifolia* (ii).
- 960 *H. ligustrifolia* (ii)
(*H. ligustrifolia* s.s.) The leaves can vary in length on one plant, some being a quarter the size of those illustrated. “Growing in scrub and along forest margins and in open secondary forest such as tall manuka (*Leptospermum scoparium* var. *incanum*)” (CC Ogle pers. comm.).
- 962 *H. acutiflora* This *Hebe* was first recorded by Allan Cunningham in 1838.
- 964 *H. flavida* The yellowish base to the leaves is a feature of some populations. First recognised as potentially distinct by Henry Carse in the early 1900s. Subsequently rediscovered by Maureen Young, Anthony Wright and Lisa Forester in the early 1980s. Close to *H. acutiflora* from which it mainly differs in its yellowish, broader foliage, and more erect shrub to tree habit. Information supplied by PJ de Lange. “It is also similar to *H. ligustrifolia*, from which it differs in its habitat (upland areas) and usually tree habit” (AV Kellow pers. comm.).

- 966 *Hebe perbella* “*H. perbella* is variable throughout its range with respect to leaf and corolla shape as well as flower colour, and these differences are maintained in cultivation”. This species has a long flowering period, with two distinct flushes of flowering occurring in spring and autumn. First recorded by JK Bartlett in 1980 from Ahipara Gumlands. The flowering branchlet illustrated in 1980 was from a specimen collected by John Bartlett. The quotation and additional information from de Lange (1998).
- 968 *H. tairawhiti* In scrub on mudstone slopes; also inland on river banks. First recognised as a distinct species by EA Hodgson of Wairoa in the 1940s.
- 970 *H. townsonii* Past records from the North Island at Mt. Messenger are not accepted here because there are no bona fide wild collections to support the record. However, planted specimens of *H. townsonii* now grow at the car park near the summit of Mt Messenger.
- 972 *H. paludosa* Most common between Lake Ianthe and the Cook River in areas dominated by *Phormium/Carex*. First collected by Cockayne in 1916. Formerly known as *H. salicifolia* var. *paludosa*. This species differs from the West Coast form of *H. salicifolia* by its diffusely branched habit, brittle branchlets, yellow-green somewhat glaucous leaves, conspicuous decurved often twisted leaf tip, flowers with a longer corolla tube, acute corolla lobes, preference for wetland habitats and tetraploid chromosome number (Norton & de Lange 1998).
- 974 *H. stenophylla*
var. *stenophylla* (i) & (ii) *H. stenophylla* var. *stenophylla* is very variable in height, leaf shape and size. North Island plants are not so tall as those of the South Island. In NW Ruahine Range, Kaweka Range and Kaimanawa Mountains plants are usually less than 50 cm in height; elsewhere in the North Island they may be up to 1 m. The under surface of the leaves of var. *stenophylla* have dense stomata whereas var. *hesperia* and var. *oliveri* have few stomata. Information from Bayly et al. (2000). An outlying population exists near Hamilton.
- 974 *H. stenophylla*
var. *hesperia* “Differing from other varieties in having the adaxial leaf surface with few stomata ..., corolla tube hairy within, ... and in usually having a shorter corolla tube”. Usually grows on bluffs and outcrops. Collections of var. *hesperia* “... are particularly variable with respect to leaf size, the small and larger-leaved plants apparently occurring in relatively close proximity” (Bayly 2000).
- 976 *H. stenophylla*
var. *stenophylla* (iii) On steep slopes, the lower branchlets are drooping with upturned terminal shoots. In the North Island this narrow-leaved, mudstone variant of *H. stenophylla* var. *stenophylla* is one extreme of the morphological range. “They are fairly uniform in appearance and seem to retain their features in cultivation ... Superficially most closely resemble South Island plants, ... The ranges of narrow-leaved and broad-leaved forms overlap,

- broader leaved being on more compact shrubs that grow on hard rock e.g. Manawatu Gorge ...” (Bayly et al. 2000).
- 976 *Hebe stenophylla*
var. *oliveri* On an open, exposed ridge and associated steep upper slopes subject to strong winds and amongst *Muehlenbeckia complexa*, *Meliclytus* aff. *obovatus* and other shrubs. *H. stenophylla* var. *oliveri* differs from the other varieties in the shape and size of the leaves and the upper surface of the leaves with few stomata.
- 978 *H. parviflora* Formerly known as *H. parviflora* var. *arborea*. Tree with a dome-shaped head. Branchlets much more yellow in the north, e.g., near Whangarei and green to dark brown on, e.g., Wellington trees (CC Ogle pers. comm.). Along the Taruarau and Rangitikei Rivers ... occur plants that are quite openly branched. *H. parviflora* and *H. stenophylla* var. *stenophylla* can be found growing together – one a tree and the other a shrub. Along with the Chatham Island *H. barkeri*, *H. parviflora* is distinguished as one of the tallest *Hebe* species. Information from Bayly et al. (2000).
- 980 *H. treadwellii* (ii) In the specimen illustrated the leaves in whorls of three were on the new growth of a cultivated plant. The leaves are usually more concave than those shown on the leafy specimen. First collected by SP Courtney.
- 980 *H. adamsii* An openly branched, usually low spreading shrub but taller in scrub. Some plants have consistently narrow leaves. “An attractive easily grown shrub. The wild populations are somewhat variable and three key leaf types are known. The status of this species remained unresolved until its rediscovery in 1980s. The three leaf types could be distinguished in all populations examined. These comprised of long and fat, short and fat and long and narrow. First discovered by Thomas Cheeseman & James Adams in 1896 during a traverse from Spirits Bay to Tom Bowling Bay” (PJ de Lange pers. comm.).
- 982, *H. pubescens*
984 ssp. *sejuncta* (i) & (ii) The leaf bud has a sinus but sometimes this is very small. Leaves can be very variable as shown in illustrations (i) and (ii). “The epithet is Latin-derived and means isolated. This name is used in reference to both the separation of ssp. *sejuncta* from ssp. *pubescens*, and the separation of populations of subsp. *sejuncta* on Little Barrier and the Mokohinau Islands, as well as the single plant known from Great Barrier Island”. This and other information from Bayly et al. (2003). “Herbarium records of *H. pubescens* from Lion Rock, Piha (Allan 1961) are not supported by recent surveys of that location. Critical consideration of the herbarium evidence suggests that the specimens on which the record was based are mislabelled as to locality” (PJ de Lange pers. comm.).
- 984 *H. arganthera* Boulder screes, tussock and subalpine scrub near tree limit and on bluffs, often hanging over ledges. Altitude c. 1000 m. “Common when inaccessible to deer, in other areas not regenerating” (KM Lloyd pers. comm.). “The white anthers are a distinctive feature of the species and unusual in the genus” (Garnock-Jones et al. 2000).

- 986 *Hebe pubescens*
ssp. *pubescens* Found in open pohutukawa (*Metrosideros excelsa*) forest. Also on steep cliff faces, slip scars and offshore rock stacks.
- 986 *H. pubescens*
ssp. *rebruarum* “Prefers open areas and sparse forest near the coast and on close-to-shore rock stacks. When inland grows on rock tors, cliff faces and open stony ground. On The Needles above Tryphena it is the dominant *Hebe* on exposed andesite. ...The epithet ‘*rebruarum*’ honours Ngati Rehua (the descendants of Rehua) being the iwi who exercise mana whenua over Great Barrier (Aotea) Island where subsp. *rebruarum* is endemic” (Bayly et al. 2003).
- 986 *H. diosmifolia* This plant flowers during December and early January, and is one of the distinguishing features between this plant and the following one that flowers in the spring. With reference to *H. aff. diosmifolia* and *H. diosmifolia* cytological evidence suggests only one species exists with respective tetraploid ($2n = 80$) and diploid ($2n = 40$) cytotypes; other perceived differences were found to intergrade (Murray et al. 1989). Similarly AV Kellow & MJ Bayly (pers. comm.) state that: “We haven’t been able to distinguish these on morphological grounds”. Carse (1929) gave the name *H. diosmifolia* var. *vernalis* to the spring flowering type to distinguish it from the summer-flowering type. *H. diosmifolia* is a very attractive shrub; it flowers prolifically and is often cultivated.
- 988 *H. aff. diosmifolia* Flowers during September and October.
- 992 *H. benthamii* This plant has very flexible, bare branches and numerous leafy branchlets. Allan (1961) writes that the leaves can grow to 50 x 13 mm in a garden situation. The blue to purple-blue colouration of the flower is a shade rare in the New Zealand flora. Another unusual feature is the capsule that is more or less round and has three compartments instead of the usual two. The flowers are unusual in that the corolla often has five or six lobes; usual *Hebe* species have four, *H. pauciflora* is also an exception and can have five lobes. JW Mazey, who collected the specimen painted, said that in 1979, during two visits to Campbell Island, he had seen *H. benthamii* only in one relatively small area, which was on the eastern slope of Beeman Hill at 100 m. Unfortunately this plant does not appear to thrive in cultivation on the main islands of New Zealand. Cockayne, who saw this plant when he visited the Auckland and Campbell Islands in 1903 and 1907, wrote: “... the straggling shrubby *Hebe benthamii*, exquisite with its blue flowers” (Cockayne 1967).
- 994 *H. elliptica* (i) (*H. elliptica*
var. *elliptica*) On cliffs, rocky slopes and sometimes it is the predominant plant near the shoreline where it is able to withstand strong winds and salt spray. Collected by the Forsters in Dusky Bay in 1773. The large sweet-scented flowers make this an attractive species. “Across the range of *H. elliptica* there is considerable variation within and between populations. Along the South Taranaki coast and Pelorus Sound. *H. elliptica* never forms a shrub more than 50 cm tall and they always have pale mauve flowers fading to white, whereas those along the South Island

- West Coast, from Cape Farewell to Fiordland and around Otago, Foveaux Strait and the subantarctic islands are 2 m or more tall, more fastigiate and some have deep-mauve flowers. The plants also vary in the colour of the young stems (green or purplish-red), the conspicuousness of the white leaf margin and the size and thickness of the leaves” (CC Ogle pers. comm.).
- 994 *Hebe elliptica* (ii) (*H. elliptica* var. *crassifolia*) This variety is probably not sufficiently distinct to warrant maintaining (AV Kellow pers. comm.).
- 994 *H. subalpina* (ii) *H. subalpina* (ii), formerly *H. fruticeti*, has now been included in *H. subalpina* as a variation (MJ Bayly & AV Kellow pers. comm.).
- 996 *H. chathamica* “This is the most coastal of the Chatham hebes, and is found mainly on steep, remote, rocky coasts” (GC Kelly pers. comm.). “This species is extremely variable, and includes both hairy and glabrous forms, varying in leaf-size, thickness, degree of sprawling, etc. Some forms are very attractive. It appears to hybridise with *H. dieffenbachii*” (GC Kelly pers. comm.).
- 996 *H. glaucophylla* Occasionally in Canterbury the ovaries at least are glabrous. A plant with affinities to *H. glaucophylla* grows in N.W. Nelson. See the *H. albicans* complex.
- 998 *H. carnosula* Leaves become progressively smaller down the branchlet. Also variable is the apiculate tip, which is more pronounced on some leaves. In boulderfields and on outcrops along the Nelson Mineral Belt. “This species is very variable in its leaf shape. What appears to be consistent though, is the rounded shape and small size of the sinus, the open architecture of the branchlets and the yellowish to pinkish leaf margins” (SP Courtney pers. comm.).
- 998 *H. strictissima* The leaves of *H. strictissima* resemble those of *H. traversii*, but the flowers and capsules differ in that *H. strictissima* has larger, more rounded lobes on the corolla, shorter, wider corolla tubes and broader, darker brown capsules.
- 998 *H. crenulata* The margins of the leaves are variable. In the northern part of the species’ range they are often notched (crenulate) on upper half of leaf, sometimes with notches on nearly all the leaves, on some plants they may be very small. In the southern part of the range notches are often absent. This plant differs from *H. cockayneana*, to which it has been affiliated, in the obovate leaves and in often having leaf notches. The unnotched plants can be distinguished from *H. topiaria*, with which it grows, by having a sinus. In the southern part of its range *H. crenulata* cannot be distinguished easily from *H. cryptomorpha*, even when the leaves lack notches the species can still be separated from *H. cockayneana* by its tetraploid ($2n = 80$) chromosome number (Bayly et al. 2002).
- 1000 *H. macrantha* var. *macrantha* The flowers are the largest of any of this genus in New Zealand, and from a distance can be mistaken for a gentian.

- The capsules are also extra large. WTL Travers and Julius von Haast were the first Europeans to observe this plant.
- 1000 *Hebe topiaria* “In the wild, plants of *H. topiaria* reach a height of 2–3 m and then are not of the symmetrical form common in cultivated plants” (p. 337, Moore & Edgar 1970).
- 1002 *H. dilatata* “Herbarium specimens suggest a continuum of forms between typical *H. dilatata* and *H. crawii*, although differences in flavonoid composition between populations ... suggest that the limits of the species might be worthy of further investigation” (Bayly et al. 2002). The plants illustrated may be at the extreme ends of the range.
- 1002 *H. crawii* *H. dilatata* and *H. crawii* have been grown from cuttings in the author’s garden, Dunedin. From these plants the following observations have been made. *H. crawii* is more woody and robust, with a short trunk 2 cm diam., low-growing, but not prostrate enough for branches to take root, whereas in *H. dilatata* the plant is prostrate with slender ground-hugging branches which produce adventitious roots and the leaves are smaller and tend to be patent rather than somewhat upright. The plants cultivated in Dunedin may not be a good indication of their growth habits in their natural habitat.
- 1004 *H. pareora* Large glabrous plants were found in the upper Pareora Gorge by AE Esler in 1954. In 1981 the holotype was collected in that area from cliffs overhanging the river by PJ Garnock-Jones, BPJ Molloy and JA Anderson. Garnock-Jones & Molloy first recognised this plant as a species in 1982. They grow on both sunny and shady rock faces.
- 1004 *H. amplexicaulis* f. *hirta* The degree of hairiness is unusually variable and does not warrant specific rank.
- 1006 *H. rigidula* var. *rigidula* It can sometimes flower when only 15 cm high and is one of the most profusely flowering of the *Hebe* species. “When in full bloom the foliage is almost completely hidden beneath a foamy white mass” (Metcalf 1972). *H. rigidula* var. *rigidula* differs from var. *sulcata* in that, when viewed from the top, the leaf bud is round, not square, the leaves are concave in transverse section, not decurved, and the leaves tend to be narrower. Information from Bayly et al. (2002).
- 1006 *H. rigidula* var. *sulcata* “As with the typical variety, var. *sulcata* is a rupestral plant favouring open, rocky areas and short scrub (especially those associated with the mineralized zone of D’Urville Island). It has an altitudinal range of c. 500–1000 m above sea level”. It is known from Editor Hill and Lookout Peak. The leaves are often wider and more broadly elliptic than those of *H. rigidula* var. *rigidula*, the transverse section through the leaf has a different profile and the leaf bud when seen from the top tends to be more square than round. Some of this information has been adapted or quoted from Bayly et al. (2002).

- 1006 *Hebe scopulorum* Old stems are black or grey producing thick cork with age. All areas where it grows are within 10 km of each other. *H. scopulorum* has flowers similar to those of *H. rigidula* var. *rigidula* but differs in the conspicuous pedicels, the square leaf-buds, larger leaves and in the profile of their transverse section. Formerly regarded as a form of *H. rigidula* and therefore was not fully illustrated. “An uncommon, threatened species first discovered by a local farmer, Jack Scott, in 1961. Although allied to *H. rigidula* var. *rigidula*, *H. scopulorum* has many affinities with the Central North Island endemic *H. colensoi*” (PJ de Lange pers. comm.).
- 1006 *H. cryptomorpha* The leaf bud is squarish when viewed from the top. Leaf blades vary considerably in size and shape on the same plant. Extends west to Mt Robert ... and east to Mr Severn ... and the upper Saxton Valley. It also extends north to the Richmond Range. “On Mount Richmond this species and *H. rigidula* var. *rigidula* [a similar-looking plant] grow side by side but *H. cryptomorpha* flowers later, ascends to about 300 m higher and is a rounded bush rather than openly branched” (AP Druce pers. comm.). “The specific epithet... refers to the fact that the morphological differences between this species and some specimens of *H. crenulata* are obscure or unknown”. Information from Bayly et al. (2002).
- 1008 *H. pinguifolia* (i) “I believe *H. pinguifolia* is much more variable than previously recognised. The main difficulty with this species is that in some populations it is difficult to tell from *H. buchbanani*?” (AV Kellow pers. comm.).
- 1008 *H. pinguifolia* (ii) The leaf bud has a distinct sinus, (*H. pinguifolia* (i) is usually without a sinus).
- 1010 *H. aff. pinguifolia* (i)
(from Mt Peel, Canterbury) “*H. pinguifolia* is a larger plant; with leaves, 1–1.5 cm long, having red margins. It is not as glaucous, or as concave as *H. aff. pinguifolia* (i), although the flowers are similar” (AP Druce pers. comm.). In the opinion of BPJ Molloy it is a distinct species.
- 1010 *H. aff. pinguifolia* (ii)
(from Mt Nimrod) “In the population sampled (January) some plants had red-edged leaves throughout, while some did not” (AV Kellow pers. comm.). A seasonal variation was evident in plants cultivated by Arnold Dench, who also observed that his plants in an open area had brighter red margins than those that were partly shaded.
- 1010 *H. aff. ligustrifolia* Although a smaller-leaved plant, it is generally similar to *H. ligustrifolia* in the light yellow-green leaves and orange midribs, but the racemes are quite different. In the Surville Cliff plants they are short (c. 4 cm) and densely packed with broad-lobed mauve flowers whereas in *H. ligustrifolia* the raceme is long (c. 11 cm) with widely spaced, narrow-lobed flowers. The flowers are also a different colour being white tinged with pale mauve. “On the Surville Cliffs it is nearly sympatric with *H. ligustrifolia* s.s. in one place, where an inlier of gabbro occurs, and on it you find 2 m tall *H. ligustrifolia*” (PJ de Lange pers. comm.).

[Gabbro is mafic, not ultramafic like the serpentinites at Surville Cliffs].

- 1010 *Hebe brockiei* Known only from the original locality where it is plentiful (AV Kellow pers. comm.). “*H. brockiei* is closest to *H. treadwellii* in habit, flowers, leaf colour, sinus etc. It differs from typical form of *H. treadwellii* in having smaller, more rounded leaves, and by its smaller size. It is also similar to *H. subalpina*, which grows nearby and has a much more upright bushy habit and larger, less concave leaves” (AV Kellow pers. comm.). MJ Bayly & AV Kellow (2004) now consider that *H. brockiei* can be included in *H. treadwellii*. Just prior to the illustrations going to the publisher a plant came into flower. This plant was a very small rooted cutting four years previously when given to the author by Michael Bayly.
- 1012 *H. canterburiensis* The flower heads are unbranched and lateral, although they often appear to be terminal because the large and numerous flowers obscure the growing shoot. “There is perhaps a distinct variety of *H. canterburiensis* west of the main divide” (LB Moore, in Allan 1961).
- 1014 *H. albicans* (i) Kellow et al. (2005) include in *Hebe albicans*: *H. albicans* s.s. (of Petrie), *H. recurva*, and plants previously believed by the late AP Druce to be allied to *H. glaucophylla*, as geographic variants of *H. albicans*. An analysis based on leaf shape “...shows sequential overlap between groups with a trend from the broader leaved plants of *H. albicans* s.s. through to the narrower-leaved plants from the Aorere River (*H. recurva* s.s.), with plants from the Roding River and Gorge Creek (part of *H. aff. glaucophylla*) at the extreme of this range. While some groups are clearly distinguished using this method (e.g. *H. albicans* s.s. and *H. recurva* s.s.), some populations of *H. aff. glaucophylla* (e.g. Mt Burnett and Takaka Hill) form intermediate and overlapping groups between these extremes” (AV Kellow & MJ Bayly pers. comm.). Though generally similar in appearance to *H. amplexicaulis* f. *amplexicaulis*, the leaves of *H. albicans* are partly flattened, rather than concave, and the individual flowers have pedicels.
- 1016 *H. albicans* (iv) (from Takaka Hill) Tag-named *H. “glaucophylla* N.W. Nelson” (Druce 1993). These plants “generally have leaves that are not or only weakly amplexicaul, but plants show a range of variation in habit and leaf shape” (AV Kellow & MJ Bayly pers. comm.).
- 1016 *H. albicans* (v) (from Mt Burnett) A stout upright rounded plant but often small, depending on exposure.
- 1016 *H. odora* (i) A plant similar to *H. odora* (iii) but *H. odora* (i) [*H. anomala*] is generally more erect and robust, has branchlets that are thicker relative to the leaf width (see illustration), and the base of the petiole is very broad and pubescent on the margin.
- 1018 *H. odora* (ii) A prostrate or erect shrub. Leaf margins vary considerably, often with more obviously crenate edges, and flowers are much smaller than those in *H. odora* (iii). The plants on Mount

- Anglem are prostrate whereas those at lower altitudes are erect. This plant was treated by AP Druce as a variety of *H. anomala*.
- 1018 *Hebe odora* (iii) In herbfield, shrub-tussock land (especially red tussock land), and scrub, often in damp places.
- 1018 *H. calcicola* “The species occurs ... over a relatively small geographic area. ... locally abundant in some areas (e.g. on the slopes of the Peel Range south-east of Mt Mytton” (Bayly et al. 2001). The size and shape of the leaves resemble those of *H. subalpina*, *H. rakaiensis*, *H. strictissima* and *H. traversii* but these species grow in different areas.
- 1020 *H. pauciramosa* The flattened keel near the tip of the leaf distinguishes *H. pauciramosa* from *H. masoniae*.
- 1024 *H. pimeleoides*
ssp. *pimeleoides* (i) Has straggling or erect branchlets. The stature of plants seems to be influenced by habitat. The presence of a leaf bud sinus is very variable in all subspecies, when present it is very small.
- 1024 *H. pimeleoides*
ssp. *pimeleoides* (ii) Often growing on terraces and banks near rivers.
- 1024 *H. pimeleoides*
ssp. *pimeleoides* (iii) JB and JF Armstrong collected specimens in the years 1868–69. “No other specimens from the wild have been seen but there are matching specimens from gardens in Christchurch and elsewhere in several herbaria” (Allan 1961). There is strong evidence that this plant may be a hybrid.
- 1026 *H. haastii* Leaves in four distinct rows (quadrifarious).
- 1028 *H. macrocalyx*
var. *humilis* (i)
(from Spencer Mts.) This variation, with its apparent laxness and elongated internodes, is almost certainly a shade form. *H. macrocalyx* var. *humilis* exhibits a very variable morphology throughout its range, which appears to be both genetically and environmentally determined.
- 1030 *H. epacridea* (i) (from Otago) “Distinguished from more ‘typical’ *H. epacridea* (iii) by its leaves which do not have a thickened margin and are not strongly keeled or recurved” (AV Kellow pers. comm.).
- 1030 *H. epacridea* (ii) (from Two Thumb Range) *Hebe epacridea* “varieties have not been formally described due to the existence of intermediate forms (e.g. between the Otago population and the more ‘typical’ Canterbury forms). This form, *H. epacridea* (ii), illustrates the variation in leaf size and shape within *H. epacridea*. I have seen similar specimens from the Inland Kaikoura Range in Marlborough” (AV Kellow pers. comm.).
- 1032 *H. epacridea* (iii) The juvenile stage with spreading, young growth is soft and succulent but, as the branchlets mature, the leaves become hardened and leathery. First collected by Andrew Sinclair in 1861 at Tarndale, near Wairau Gorge.
- 1032 *H. murrellii* Formerly regarded as a variety of *H. petriei*, which differs in having corolla lobes narrow and suberect to spreading (although the posterior lobe may be broader), a long slender

- tube and anthers held at corolla tube throat. *H. murrellii* generally has a more compact habit and anthers well exerted from corolla tube. The two species grow together on the Takitimu mountains. No hybrids have been seen.
- 1032 *Hebe biggarii* Originally collected by DL Poppelwell.
- 1034 *H. societatis* “The sinus illustration is possibly broader and more ‘shield like’ than usual. It looks as if it is distended because it includes either inflorescences or lateral branches” (MJ Bayly pers. comm.). Discovered by SP Courtney and GT Jane in February 2001.
- From **Whipcord Hebes**
1034 “These plants are so named for their resemblance to plaited cord, the leaves having become reduced almost to scales. It is probable that all species go through a juvenile stage when they have spreading, stalked leaves, either entire or lobed. The leaves may revert to the juvenile stage when the plant is placed in a moist atmosphere.” LB Moore (in Allan 1961) has divided them into two groups, the “true whipcords” and the “semi-whipcords”. While in the true whipcords the flowers are terminal and the capsules are compressed dorsally (i.e. from the back, except in *Leonobebe cupressoides*), in the semi-whipcords the flowers are lateral and the capsules are compressed laterally (i.e. from the side). *L. ciliolata*, *L. tetrasticha*, *L. cheesemani* and *L. tumida* comprise the semi-whipcord group. In these, the flowers are often, and maybe always, unisexual, with male and female flowers usually on separate plants.
- “Seedlings of all whipcord hebes produce spreading leaves which are variously serrate or pinnately lobed. Similar leaves are produced on reversion shoots, which are mainly found on shaded plants. ... ‘Whipcord’ hebes, other than the taller *L. cupressoides*, form erect bushes up to 0.5 m or even 1 m tall in sheltered sites, but become low, decumbent, and adventitiously rooting when growing in exposed places” (Wagstaff & Wardle 1999). “Studies have shown that *L. cupressoides* is probably more closely related to the ‘semi-whipcords’ than to the true ‘whipcords’” (MJ Bayly pers. comm.).
- 1036 *H. lycopodioides* The yellow stripes help to distinguish this whipcord and its ssp. from others, except *H. imbricata* ssp. *imbricata* and ssp. *poppelwellii*, which have similar stripes.
- 1036 *H. lycopodioides* ssp. *patula* *H. lycopodioides* ssp. *lycopodioides* is a larger plant and has leaves with long tips. Original locality Mount Technical, Lewis Pass.
- 1038 *H. armstrongii* First collected by JF Armstrong and W Grey in 1869 in the Upper Rangitata Valley. Previous records of this species from N.W. Nelson, Marlborough and Kurow are based on *H. ochracea* (see Allan 1961), *H. hectorii* (MJ Bayly pers. comm.), and a mixed collection of garden-grown material of *H. armstrongii* and wild specimens of *H. annulata* respectively (PJ de Lange pers. comm.).
- 1038 *H. ochracea* Usually flat-topped with stout, arching branches. Grows often in association with marble.

- 1038 *Hebe tetragona* This plant was collected by JC Bidwill when he climbed Ngauruhoe in 1839. It was the first species of ‘whipcord’ hebe to be seen by WJ Hooker, who, until he received flowering specimens, was: “...not ashamed to acknowledge that it was taken by us for a *Podocarpus*. Little did we think it was a *Veronica* [*Hebe*]...” (Cheeseman 1914).
- 1040 *H. hectorii* ssp. *subulata* “Towards the south-east, ssp. *demissa* grades into ssp. *subulata*” (Wagstaff & Wardle 1999). When the branchlet is rubbed downwards it feels rough to the touch, like a coarse file, especially when slightly bent.
- 1040 *H. hectorii* ssp. *demissa* On older wood the leaves are persistent, dry, hard and dark-brown, the stem expands around them and so becomes ridged and eventually the leaves wear away. This specimen was collected from the side of a seepage area above which, on the drier area, *H. imbricata* ssp. *poppelwellii* was growing. Subspecies *demissa* grades into both ssp. *hectorii* and ssp. *subulata* (Wagstaff & Wardle 1999).
- 1042 *H. tetragona*
ssp. *subsimplis* (i) Type locality: Mt Hector, Tararua Range (Allan 1961).
- 1042 *Leonohebe cupressoides* Now rare and local and presumed extinct in Marlborough and Nelson. First collected by Dr Sinclair in the Wairau Gorge, Nelson, and nearby at Tarndale, about 1859.
- 1046 *Tecomanthe speciosa* Only the one plant has ever been found in the wild. This plant grows in and around the upper Tasman Stream, where it trails through pigeonwood (*Hedycarya* aff. *arborea*) and kanuka (*Kunzea* sp.). The wild plant has been observed in flower only three times since its discovery in 1945. It has never been known to set seed. Although seriously threatened in the wild it is now very common in cultivation. Plants were first raised from cuttings, and many of these, which freely flower have produced seed. As a result seedlings are now commonly sold by garden centres. Although frost tender, this attractive vine can be easily grown in sheltered sites as far south as Dunedin. Provided its roots have abundant moisture, and the plant is growing in strong sun, it will flower easily.
- 1048 *Rhabdothamnus solandri* (i) Plants may be found in flower most of the year. The pollen-bearing anthers in a newly opened flower ripen before the stigma is mature. The anthers are in a position to come into contact with and deposit pollen on the head of a bird seeking nectar. Later the anthers move to the lower lip of the corolla, and the stigma, now mature, occupies the position the anthers previously held, and is dusted with pollen from a bird that has visited a younger flower. Thus cross-pollination is effected. Found especially along stream banks, throughout but local in the south and east. This species was first collected by Banks and Solander at Mercury Bay in 1769. Plants of the offshore islands have much larger leaves. “Recently it has been shown that taurepo flowers are predominantly bird-pollinated by birds such as tui (*Prosthemadera novaeseelandiae*), bellbird (*Anthornis*

melanura), stitchbird (*Notiomystis cincta*) and silvereye (*Zosterops lateralis*)” (S Anderson pers. comm.).

- 1050 *Rhabdothamnus solandri* (ii) When the leaves are stroked, it is found that the hairs lie in one direction, being harder and scratchier when felt from the tip to the petiole, than in the other direction. The leaves are so hard and stiff that they almost have the texture of sandpaper. The two flowers seen were small compared with those of the common form of taurepo. This may, or may not, be the normal size for this form. When the two specimens were received, the two flowers, (of different colours), had fallen and were not in good condition thus making it difficult to include the amount of detail in the flower illustrations that the author would have liked. This illustration shows part of the normal range of variation in this species.
- 1052 **SCROPHULARIACEAE** Recent comprehensive molecular studies have shown that the traditional arrangement of genera within the Scrophulariaceae was inappropriate. As a result of these studies, many genera previously placed within the Scrophulariaceae have been removed and placed elsewhere. For New Zealand this has meant that such major scrophulariaceous genera as the woody *Hebe* are now part of a greatly expanded Plantaginaceae. Conversely, other families such as the Myoporaceae are now placed in Scrophulariaceae. As currently circumscribed, the Scrophulariaceae is now a much smaller family. “*Eremophila* (*Myoporum*) *debile* (Andr.) Chinnock had been recognised as indigenous to New Zealand by Allan (1961) [and was illustrated in Eagle (1982)]. However, field work, critical examination of herbarium specimens purported to be from the wild, and a review of the evidence suggests that it was more likely to be introduced to New Zealand sometime during the 1800s. It is no longer regarded as indigenous” (Webb et al. 1995, PJ de Lange pers. comm.).
- 1052 *Myoporum laetum* var. *laetum* It may be a low-growing, spreading plant in exposed coastal places. Scattered distribution in the west; south to Big Bay, and in east to Otago Peninsula (where it is common) and south to Taieri R. mouth. It is poisonous to stock. An infusion made from the leaves is recorded as being an insect repellent.
- 1054 *M. laetum* var. *decumbens* Although an apparently distinctive plant, it is highly variable and intergrades in the more usual form of *M. laetum*, even in the “apparent” Type Locality (Poor Knights Islands). The type specimen, which came from a garden plant apparently collected from the Poor Knights Islands, although certainly very distinct, represents one extreme end of the variation seen within this variety. Because of these problems most botanists no longer recognise the variety (de Lange & Cameron 1999).
- 1054 *M. kermadecense* As well as the appearance, chemical differences justify the Kermadec plant’s separation as an endemic species. Kermadec ngaio scrub varies in height from c. 1–5 m and is present all round the Raoul Coast particularly on cliffs and steep slopes. “In very exposed situations forming a low gnarled scrub with succulent, wider than usual leaves” (Sykes 1977). It also grows

in dry inland forest where it reaches its greatest height, up to 13 m. Formerly named *M. obscurum*, which is a Norfolk Island species. “*Myoporum kermadecense* may prove to be the same as the earlier named Rapa Island endemic *M. stokesii*” [Austral Seamount Chain, 24° S, 150° W] (RJ Chinnock pers. comm.).

1056 *Vitex lucens*

Juvenile leaves are more serrated and less coriaceous than adult leaves, often resembling five finger (*Pseudopanax arboreus*). The leaves of this tree can be confused with those of kohekohe (*Dysoxylum spectabile*), but puriri leaves are usually more wrinkled and are palmate while those of kohekohe are pinnate with seven to nine leaflets. Puriri timber is very hard, dense and heavy, and is one of the strongest and most durable of any New Zealand tree along with rata and maire. Even so, it is subject to attack by the larvae of the puriri or ghost moth (*Aenetus virescens*), which bore holes about 10 mm diam. in the trunk. The fruit is eaten by native pigeons. Some flowers and fruit can usually be found on the tree all the year round. LB Moore & Irwin (1978) write that seedling leaves are hairy, pale green, sharply toothed and simple, later developing into a 3-leaflet stage. The puriri was first recorded by Banks and Solander at Tolaga Bay in 1769.

1058 *Teucrium parvifolium*

The life-form of *Teucrium*, where all new stems arise from ground level and have determinate growth, is uncommon in the native woody flora being shared with a few other species such as those in *Coriaria*.

1060 *Avicennia marina* ssp.
australasica

Reduced to a shrub in southern part of range. Naturalised at Tolaga Bay (East Cape) and Parapara Inlet (Golden Bay). Planted specimens are known from the Awakino River (King Country), Mimi River (North Taranaki) and until recently from the Hutt River, Lower Hutt, Wellington. Mangroves grow in tidal creeks and estuaries and, because of this, they have developed a remarkable root system. From wide-spreading lateral roots, numerous upright breathing roots (pneumatophores) are developed, which may be seen standing 15–30 cm above the mud at low water. These pneumatophores are unusual in that they contain chlorophyll, consist mainly of porous tissue, and are without a root cap. The stability of the tree is helped by the pneumatophores. Because of their large numbers, they tend to break the force of the water and also to collect silt and debris that form a mat, holding the lateral roots more securely. Another special development of the mangrove to suit its particular habitat is its seed, in which germination is well advanced before it falls. The cotyledons are fleshy and contain a large food supply for the young plant, which may be drifting for some time before rooting.

1062 *Ripogonum scandens*

When the stem is about 1.5 m long, it winds round some nearby support and then continues its upward climb. A bright touch of colour is added to the forest by the red drupes that are present most of the year. A drupe of this plant found on the ground can always be identified because it contains a distinctive spotted seed. Occasionally the drupe contains 2 or 3 seeds. Banks and Solander collected specimens of supplejack at

Tolaga Bay and other places they visited in 1769. Solander, like everyone else who has come into contact with it, found that sometimes it is so entangled that progress through the forest is almost impossible. The flexible stems were widely used by Maori to make hinaki (eel traps), and, admittedly never popular, they were a substitute for the “cane” of the schoolmasters of the not-so-distant past.

- 1064 **ASPARAGACEAE** The family position of *Cordyline* is unclear, but the most recent recommendation is to place it in Asparagaceae.
- 1064 ***CORDYLINE*** *C. fruticosa* (previously known in New Zealand as *C. terminalis*), ti pore, is a slender, suckering, unbranched plant up to 2.5 m in height, with bright-yellow green paddle-shaped leaves. “This species is very scarce in cultivation, with most plants that have been grown proving it to be the somewhat similar Australian *C. rubra* that seems to have been introduced to New Zealand sometime during the 1800s. Genuine wild occurrences of *C. fruticosa* are known from Raoul Island, Whangaruru Harbour and Mimiwhangata. It was grown for food by the Maori when they settled in New Zealand but is very cold-sensitive. It is not regarded as an indigenous plant” (PJ de Lange pers. comm.) and so has not been illustrated.
- 1064 ***Cordyline australis*** There are several geographically distinct forms which vary from each other in their degree of robustness, branching, and leaf width, stiffness and colour. Cabbage trees give a very distinctive character to the New Zealand landscape and are especially attractive when massed with large terminal panicles of fragrant flowers. Since the 1980s, the devastating Sudden Decline disease has killed many cabbage trees from Northland south to Nelson/Marlborough. *C. australis* is very popular overseas, and is widely grown throughout Europe, America and Australia. In Britain it is known as the Torquay Palm because it is so popular in that coastal holiday town.
- 1068 ***C. indivisa*** The numerous leaves form a massive head. Of equally large proportions are the drooping flower heads. Mainly west of the Main Divide in S. Also on Banks Peninsula.
- 1070 ***C. oblecta*** The leaves are shorter, broader and the veins diverge at a wider angle than those of *C. australis*, the common cabbage tree. This tree has been known by a number of names. On Norfolk Island aside from *C. oblecta* it has also been called *Cordyline baueri* by JD Hooker in 1855, which is still a common name in horticulture, and in New Zealand the Three Kings plants have been referred to as a form of *C. australis* by Cheeseman 1889, or as a distinct species, *C. kaspar*, by Oliver in 1956. Recently de Lange et al. (2005) have referred *C. kaspar* to *C. oblecta*.
- 1072 ***C. pumilio*** *C. pumilio* with its long narrow leaves can easily be mistaken for a sedge except when in flower or fruit. “In some districts leaves are very narrow and in others wider” (CC Ogle pers. comm.). “It seems likely that hybridisation has been important in the evolution of species or forms, forest clearance by people has removed the gap that separated many populations of *C. australis*

and *C. banksii* and hybrids have become common, especially in secondary shrubland dominated by manuka” (Simpson 2000).

1074 *Phormium tenax*

The flowers contain a great quantity of nectar; this attracts birds that cross-pollinate the flowers while feeding from them. This plant, which has one of the strongest known leaf-fibres, has been useful to people from the time of arrival of the first Maori settlers, when every part of the plant was used. There are numerous distinct cultivars grown for a range of purposes. In the early years of European settlement, the leaf fibre was used for the manufacture of rope, twine, woolpacks and matting. The demise of the flax industry occurred because of a phytoplasma that caused the fatal disease known as Phormium Yellow Leaf during the 1930s. To this day, the fibre is an important part of Maori culture for both practical and ornamental items. Like the cabbage tree, flax adds a distinctive feature to the New Zealand landscape, and various forms are cultivated extensively for their ornamental value. *The Otago Daily Times* reports: “Landcare Research in Christchurch is growing a collection of 60 naturally occurring forms of flax, collected by Rene Orchiston in the late 1950s, thus preserving the plants together with their suitability for particular uses, their Maori names and origins” (RO Fraser 2004. One woman’s foresight preserved traditional flax varieties. *Otago Daily Times* 26 November p. 30.).

1076 *P. cookianum*

The fibre of this plant, while having cultural uses, is not used commercially for it has not the length or strength of the fibre of *P. tenax*. Two subspecies are recognised, ssp. *colensoi* and ssp. *cookianum*, but their exact limits are unclear.

1078 **RHOPALOSTYLIS**

There are two named species. Of these, *R. baueri* is endemic to Norfolk Island and to Raoul Island in the Kermadec Island group. *R. sapida* is the common New Zealand species. *R. aff. sapida*, illustrated here from the Chatham Islands, is typical of the form found on those islands. Chatham Island plants are particularly robust, and are said to differ in several leaf and fruit characters from the range of variation normally seen in *R. sapida* populations from mainland New Zealand.

1078 *Rhopalostylis sapida*

“The stout axis of the inflorescence has about forty branches, some of the basal ones being divided again into four or five branchlets. Each finger-like branch bears numerous pink flowers in groups of three, one female with a larger male on either side of it, except on the terminal two or three inches of each branch which bears pairs of male flowers only. Male flowers open almost immediately they are exposed by the splitting spathe. About three days after the spathe has fallen all male flowers are open and swarms of insects (mostly flies) are attracted to the stigmatic fluid of the sterile pistil. By the seventh day most of the male flowers have fallen and it is not until about the fourteenth day that the stigmas of the female flowers appear. Again clouds of insects appear, apparently to feed on the exudate on the ovary just below the stigmas. By this time the ovary has developed to a remarkable extent, the fruits having attained more than one third of their ultimate

length. In less than a year from flowering, the fruits change from green to red and are shed or eaten by pigeons [*Hemiphaga novaeseelandiae*]. Rather variable throughout its range. In monocotyledonous trees such as the nikau, the stem contains a considerable proportion of pith with woody bundles of strands scattered through it. As the bundles do not continue to grow, the stem does not increase in diameter, neither does it taper. The ordinary forest tree grows in thickness by continually adding fresh layers of tissue between the wood and the bark. Contrary to popular belief, the age of a nikau cannot be ascertained from the number of leaf scars on the stem. Two trees planted at Karori, Wellington by R Caldwell had only 27 ring scars after 65 years of growth. AE Esler studied 38 nikau trees near Palmerston North over a period of 7 years and found that there was considerable variation in output of leaves from year to year and from tree to tree. A few shed five leaves in one year, while others lost only one leaf in two years. Description of flowering sequence and leaf fall from Esler & Greenwood (1969).

1080 *R. aff. sapida*

Length of leaflets may be longer on one side of midrib than on the other, and up to 7 cm wide. Inflorescence divides into several main branches and again into five or more branchlets each up to 25 cm long, these branchlets are white and become green and rough in texture as fruit ripens. Photographs of the juvenile and adult plants, specimens and measurements were supplied by AM Baird. Specimens and measurements were also supplied by HM Druce. The flowers sent from the Chatham Islands did not travel well, so it was extremely fortunate that the plant in the Druce's garden flowered for the first time in 2000 and amazing that it did so from a trunk only three leaf ring-scars high, virtually at ground level. This plant was given to AP and HM Druce when a seedling by GC Kelly in 1968 from Pitt I. Therefore it took 32 years for the plant to reach the size when its trunk began to form its first ring scars. "Chatham Island nikau, although appearing very distinctive, are very similar to some forms of *R. sapida* found in the outer Hauraki Gulf" (PJ de Lange pers. comm.).

1082 *R. baueri*

The largest stands are on the east side of the island below Moumoukai where because of the dense ground cover of dead fronds little else grows below the canopy.

1084 *Freycinetia baueriana*
ssp. *banksii*
(*F. banksii*)

The anthers produce copious pollen that tends to stick together. Both the floral bracts and the fruit are much sought after by possums and rats. In the past the bracts and fruit also served as food for Maori and Europeans. Under certain circumstances the plant has specialised roots that Cheeseman describes thus: "When growing near a plentiful supply of water *Freycinetia* puts out numerous 'floating roots'. These are sometimes several feet in length, and are excessively branched, the ultimate divisions being filiform. They are regularly girdled with conspicuous spongy or corky whitish rings, which give the roots a very remarkable appearance" (Cheeseman 1925). This species was treated as a subspecies of the Norfolk Island endemic *F. baueriana*. However, although obviously related, *F.*

banksii is amply distinct from that species. Leaves are prized by Maori as a high quality decorative weaving material.

Dictionary of selected biographies

This dictionary gives information about those people that have been commemorated in the botanical names of the plants depicted in the two volumes. It is an expansion of the dictionary, researched by H. W. Eagle, given in *Eagle's Trees and Shrubs of New Zealand, Second Series* (1982). The author is indebted to the following authors for much useful information included in these biographies: *Nature Heritage Series* (Hamlyn 1974-1976), L. B. Moore & J. B. Irwin (1978), E. J. Godley (1991-2004), M. Taylor (2002). More recent notes have been written in consultation with the subjects.

ADAMS, Albert James (1839-1906). Born in Ireland. Arrived in NZ 1870. Headmaster, Church of England Grammar School, Parnell, and Thames High School. Botanised for many years with Cheeseman. He was the great-grandfather of Nancy Mary Adams, born 1925, botanical artist and algologist. *Brachyglottis adamsii*, *Dracophyllum adamsii*, *Trilepidia adamsii*.

ALLAN, Harry Howard Barton (1882-1957). Born in Nelson. An eminent botanist and First Director of Botany Division of the DSIR. Best known for his *Flora of New Zealand* published posthumously (1961), (after additional contributions by Lucy B. Moore). Founded the Herbarium that in 2001 was given the name "The Allan Herbarium" to commemorate a botanist of distinction. *Hebe allanii* (now known as *Hebe amplexicaulis* f. *hirta*).

ALLOM, Albert James (1825-1909). English. Arrived in NZ 1842. Member of the first survey party in Otago. Warden of the Thames Goldfield. Assisted Thomas Kirk and F. W. Hutton in their botanical survey of Great Barrier Island. It was there that they discovered the *Olearia* that now bears his name. *Olearia allomii*.

ARCHER, William (1820-1874). A Tasmanian who drafted 30 plates for *Flora Tasmaniae*, (1855-1860). Genus *Archeria*.

ARISTOTLE (384-322 B.C.). Greek philosopher. A student of Plato. Author of numerous books, his writings including physics, metaphysics, astronomy, meteorology, plants and animals. He was a teacher and educated Alexander, Prince of Macedonia, who was later to be called "the Great". Genus *Aristotelia*.

ARMSTRONG, John Francis (1820-1902), and **ARMSTRONG**, Joseph Beattie (1850-1926). John Armstrong born on the Scottish border. Arrived in New Zealand in 1862 with his wife and two children, Joseph being the elder. Both father and son were horticulturists and both botanised extensively in Canterbury, collected many plant specimens and supplied specimens to Mr Cheeseman and Dr Haast. (In their day Canterbury extended to the west coast.) JF Armstrong was curator of Christchurch Botanic Gardens (1867-89). Joseph in particular had a very wide knowledge of native plants and wrote several papers. Their collection of specimens is now with the Allan Herbarium, Landcare Research, Lincoln. *Hebe armstrongii*.

ASTON, Bernard Cracroft (1871-1951). Born in England. Educated in Christchurch and Dunedin. Agricultural chemist. Studied and devised cure for "bush sickness" of ruminants pastured on pumice lands. Investigated chemistry of native plants. Studied regrowth of plants on completely sterile soil on Tarawera after the eruption. Botanised in the Ruahine and Tararua Ranges, the Marlborough Mountains and the Subantarctic Islands. *Carmichaelia astonii*, *Coprosma astonii*, *Hebe subsimilis* var. *astonii*, *Muehlenbeckia astonii*.

- ATKINSON**, Esmond Hurworth (1888-1941). Born in Wellington. Botanical artist. Official artist to the Dominion Museum (1919-1932). Many of his pen drawings appeared in the *New Zealand Journal of Agriculture*. *Hebe stricta* var. *atkinsonii*.
- AVICENNA**. From the Latin name for Abu Ali Hussain ibn-Abdallah ibn-Sina (980-1037) An Arabian philosopher and physician. *Avicennia marina* ssp. *australasica*.
- BANKS**, Sir Joseph (1743-1820). “Accompanied Captain Cook in the *Endeavour* as scientist. Took Solander as naturalist and Parkinson as draughtsman ... prominent for his indefatigable labours as an accomplished observer and ardent collector” (Hooker 1896). *Alseuosmia banksii*, *Cordyline banksii*, *Freyinetia banksii*, *Streblus banksii*.
- BARKER**, Samuel Delabere (1848-1901). The Barker family had sheep runs in Canterbury and the Chathams. After leaving the farm Samuel grew many native plants in his Christchurch garden. It was from his experience with native plants that Cockayne received much help. The younger Barker brother farmed on the Chathams and it was on this farm that Samuel found the *Hebe* Cockayne named after him. *Hebe barkeri*.
- BARTLETT**, John Kenneth (1945-1986). A science teacher who developed a great enthusiasm for botany. He became an indefatigable collector throughout NZ specializing in rare and endangered plants and later in lichens and bryophytes. He added some 50 new mosses to the NZ flora, many of which were new to science. In 1985 a new family of mosses was named in his honour, the Hypnobartlettiaceae. He also discovered a new rata tree that now bears his name. *Metrosideros bartlettii*.
- BAUER**, Ferdinand (1760-1826). Austrian artist and botanist. Collected and painted on Norfolk Island (1804-1805). His brother, Francis (1758-1840), was also a well-known botanical artist. *Rhopalostylis baueri*.
- BAYLIS**, Geoffrey Thomas Sandford (1913-2003). Born in Palmerston North. Educated in Auckland and Imperial College, London. Assistant mycologist DSIR Auckland and Lincoln (1938-1940). Senior Lecturer in charge (1945-1952) and then head of the Botany Department of the University of Otago until his retirement in 1978. He specialised in research on arbuscular mycorrhizal fungi. Prof. Baylis visited the Three Kings Islands on a number of occasions to study their amazing variety of rare species. It was here that he discovered *Tecomathe speciosa* and *Pennantia baylisiana*. *Pennantia baylisiana*.
- BENNETT**, Henry and Sons. Nurserymen of Dunedin who won the Loder Cup in 1931 for a display of native plants in Dunedin and in 1932 for a display in Christchurch. *Brachyglottis bennettii*.
- BENTHAM**, George (1800-1884). Born in England. Botanist. His classification of seed plants with Joseph Dalton Hooker, based on an exhaustive study of all known species served as a foundation for modern systems of vascular plant taxonomy. His *Handbook of the British Flora* (1858, 7th edition 1924) remains a standard work. *Hebe benthamii*.
- BIDWILL**, John Carne (1815-1853). Born in England. Visited NZ from Australia in 1839. First European to climb Ngauruhoe. Returned twice to Wellington (1840) and to Nelson (1848). First to record many alpine plants. Author of *Rambles in New Zealand* (1841). *Brachyglottis bidwillii*, *Dacrydium bidwillii*, *Exocarpos bidwillii*, *Libocedrus bidwillii*.
- BIGGAR**, George Valentine (1855-1931). Born in Scotland, arrived in NZ 1861. Settled on a farm at Croydon Bush near Gore, Southland. Worked for several botanists, including Buchanan and Haast, and accompanied DL Poppelwell on botanical excursions. Poppelwell described his friend as being “second to none in camp and bush lore, and always a wise and careful guide in the wild”. *Hebe biggarii*.

- BISHOP**, John Joseph (1865-1933). Born at Titirangi and farmed in that area. Friend of Cheeseman. He was the first botanist to thoroughly explore the Waitakere Ranges and his home became a pivotal meeting place for local and overseas botanists. *Hebe bishopiana*.
- BOEHMER**, Georg Rudolph (1723-1803). A German botanist. Professor at the University of Wittenburg. *Boehmeria australis* ssp. *dealbata*.
- BOLLONS**, J. Captain of the Government steamer *Hinemoa* on which he took the 1907 expedition to the Auckland and Campbell Islands. Botanised on the Solander and Poor Knights Islands. *Hebe bollonsii*.
- BROCKIE**, Walter Boa (1897-1972; in NZ 1921-1972). He grew alpine and subantarctic plants in Christchurch Botanic Gardens and became Curator of Otari Open Air Native Plant Museum, Wellington 1947-1962. *Hebe brockiei*.
- BROWN**, Robert (1773-1858). Born in Scotland. Wrote book in 1810 which "Contains matter still of importance to workers on NZ spp." (Allan 1961). *Pisonia brunoniana*. (bruno Latinised form of Brown)
- BUCHANAN**, John (1819-1898). Born in Scotland. Arrived in Dunedin 1852. Sent collections of flora to the Royal Botanic Gardens, Kew. Botanist and draughtsman to the Otago Geological Survey and Colonial Museum until 1855. Wrote *Manual of the Indigenous Grasses of New Zealand* (1880). This was illustrated by himself. *Hebe buchananii*.
- CALDWELL**, Athol Ceadric Albin (1898-1976). Civil engineer, responsible for the site planning of seven of the ten electricity power stations on the Waikato River. He was particularly knowledgeable about the plants from Lake Taupo northwards. In the 1940s and 50s Athol Caldwell, together with his friend Michael Christian Gudex, were probably the leading amateur field botanists in the Waikato area. Varner J. Cook, upon naming a *Scirpus*, wrote "Named for A. C. Caldwell of Hamilton, for many years an enthusiastic collector and student of our indigenous flora" *Scirpus caldwelli* (= *Bolboschoenus caldwelli*). NOTE: The inclusion of Caldwell is an exception, being a reed and not a woody plant, but Athol Caldwell was my main inspiration in the early days of my career as a botanical illustrator, and this entry is in acknowledgement.
- CARMICHAEL**, Dugald (1772-1827). Scottish army officer stationed in S. Africa. Author of *Flora of Tristan da Cunha*. Genus *Carmichaelia*.
- CASSINI**, Alexandre Henri Gabriel, Count de Cassini (1781-1832). French botanist specialising in Compositae (Asteraceae). Genus *Cassinia* (now *Ozothamnus*).
- CHEESEMAN**, Thomas Frederick (1846-1923). Born England. Arrived in NZ 1856. Botanised widely including the Kermadec and Cook Islands, and was the first to botanise in Rarotonga. Curator of the Auckland Museum. Wrote *Manual of the New Zealand Flora* (1906, 1925) and *Illustrations of the New Zealand Flora* (1914). *Coprosma cheesemanii*, *Hebe cheesemanii*, *Olearia cheesemanii*.
- COCKAYNE**, Leonard (1855-1934). Born in England. Arrived NZ 1881. Wrote a number of important books on plants and many scientific papers. Travelled widely throughout NZ including the outlying islands as far south as Campbell Island. Founded Otari Open-air Native Plant Museum, Wellington (1927). Internationally recognised and honoured by societies in many countries. *Brachyglottis cockaynei*, *Dracophyllum longifolium* var. *cockayneanum*, *Hebe cockayniana*.
- COLENSO**, William (1811-1899). Born in England. Trained as a printer. Arrived in NZ 1834 as a printer to the Church Missionary Society. Keen botanist, met and assisted Joseph Hooker and Allan Cunningham. Botanised throughout the North Island. Became a missionary in 1844. *Coprosma colensoi*, *Manoao colensoi*, *Gaultheria colensoi*, *Hebe colensoi*, *Metrosideros colensoi*, *Olearia colensoi*, *Peraxilla colensoi*, *Pittosporum colensoi*, *Pseudopanax colensoi*.

- COOK**, James (1728-1779). Navigator and explorer. Visited NZ five times, during three voyages, 1769-70, 1773, 1773, 1774, 1777. He made comprehensive maps and scientific observations. On all his journeys he was accompanied by botanists and botanical illustrators. *Phormium cookianum*.
- CORRIGAN**, DHL. The type specimen of *Hebe corriganii* is held in Wellington and is labelled “found by Mr DHL Corrigan” from McLarens Falls (Allan 1961). *Hebe corriganii*.
- COX**, Felix Arthur Douglas (1835-1916). Arrived on Chatham Island about 1866. Farmed at Whangamarino for 42 years. Formerly a soldier in India. He was a direct descendant of the Duke of Buckingham who built Buckingham Palace. A keen observer and collector of the flora of Chatham Island. *Myrsine coxii*.
- CRAW**, Robin C. (born 1950's). Attended Victoria University of Wellington. Panbiogeographer and entomologist. Author of several papers and books on entomology, including many on taxonomy. *Hebe cranii*.
- CROIZAT**, Leon (1894-1982). Born in Turin, NW Italy and emigrated to USA in 1923. He was a biogeographer, botanist, evolutionist and water-colour artist and worked at the Arnold Arboretum, Harvard University. He was an independent thinker and wrote and published books, biological and botanical papers. He also spoke eight languages. Moved to Caracas, Venezuela where he held academic positions. Moved to Coro, W. of Caracas and there was Director of “Jardin Botanica Xerofito”, the garden is now called after him. Genus *Leonohebe*.
- CUNNINGHAM**, Allan (1791-1839) and **CUNNINGHAM**, Richard (1793-1835). Allan arrived in Australia from England in 1816. Visited NZ in 1826. He was a keen botanist and spent five months collecting plants in Northland. Allan's and his brother Richard's botanical explorations resulted in Allan publishing "... his *Florae Insularum Novae Zelandiae Praecursor*; or, *A specimen of the Botany of the Islands of New Zealand*" Richard arrived in Australia 1833. Visited NZ in 1833 and followed his brother's routes in Northland and found new plants. He was critical in collecting many plants for his brother to describe. Killed by aborigines whilst on an expedition in the Australian interior. *Nestegis cunninghamii*.
- DALL**, James (1840-1907). Born in England. Arrived in NZ after many years at sea. Established a nursery garden at Rockville, near Collingwood, and made a living as a botanical collector sending NZ plants, especially ferns, all over the world. *Pittosporum dallii*.
- de FREYCINET**, Henri Louis Claude de Saulces (1779-1842). A French Admiral who led two expeditions to the southern oceans 1817-20. *Freycinetia banksii*.
- de LANGE** Peter James (born 1966, Hamilton). Attended the University of Waikato. In 1990 he started working for the Department of Conservation as a threatened plants ecologist. He has written, or co-authored numerous botanical papers. *Macropiper excelsum* ssp. *peltatum* f. *delangei*.
- de L'OBELL**, Mathius (1538-1616). A Belgian, botanist and physician to James I, King of England. Family LOBELIACEAE.
- de la QUINTINIE**, J. (1626-1688). French writer on horticulture. Genus *Quintinia*.
- DIEFFENBACH**, Ernst (1811-1855). Born in Germany. Arrived in NZ 1839 on the immigrant ship *Tory*, as Naturalist to the NZ Company. He became very interested in Maori welfare, and also made many expeditions collecting and describing plants. He was the first European to make the ascent of Egmont (1839). He left NZ in 1841. *Hebe dieffenbachii*.
- DODOENS**, Rembert (1518-1585). Belgian physician, author of a famous herbal. *Dodonea viscosa*.

- DRUCE**, Anthony (Tony) Peter (1920-1999). Trained as a Civil Engineer. He changed his occupation to science and spent nearly all of his working life in the Botany Division of DSIR. His explorations ranged from Northland to northern Southland resulting in hundreds of cross-checked regional and local plant lists and thousands of plant specimens. The majority of these plant specimens, numbering 37794, are now housed at the Allan Herbarium at Landcare Research, Lincoln. "For a number of years now there have been few published works on NZ plants that don't make reference to these species lists and herbarium specimens" (BPJ Molloy pers. comm.). *Melicytus drucei*.
- DUMONT d'URVILLE**, Jules Sébastien César (1790-1842). French naval officer who specialized in botany and linguistics. He visited New Zealand on three Pacific voyages, on the latter two he commanded the *Astrolabe*. *Dracophyllum urvilleanum*, *Hebe urvilleana*, *Pimelea urvilleana*.
- DU RIETZ**, Gustaf Einar (1895-1967) and Greta. Swedish husband and wife botanists and lichenologists. Visited NZ in 1927. *Celmisia durietzii*.
- EDGERLEY**, John (1814-1849). Arrived in NZ 1835. Nurseryman and plant collector."- a botanist of repute, who contributed several interesting and important botanical specimens for embodiment in the *Flora Novae Zelandiae*" (Featon 1889). *Pomaderris edgerleyi*, *Raukawa edgerleyi*.
- ENYS**, John Davies (1837-1912). Arrived NZ 1861. Purchased Castle Hill Station, Canterbury where he hosted many well-known botanists. He was a plant collector himself. *Carmichaelia enysii* (= *C. nana*).
- FAIRCHILD**, John (1835-1898). Captain of the Government steamers *Stella* (1888) and *Hinemoa* (1890), in which he visited the outlying islands to inspect lighthouses and depots for shipwrecked sailors. Took Andreas Reischek in 1888 and Thomas Kirk in 1890 to the Snares, Auckland, Campbell, Antipodes and Bounty Islands and Cheeseman to the Kermadec and Three Kings Islands. *Pittosporum fairchildii*.
- FIELD**, William Hughes (1861-1944). Member of Parliament, farmer and conservationist. He explored the Tararua Range and a route to Mt Hector is named Field's Track (Taylor 2002). Discovered this species with BC Aston. *Carmichaelia fieldii* (= *C. juncea*).
- FORSTER**, Johann Reinhold (1729-1798) and **FORSTER**, Johann Georg Adam (1754-1794). Father and son who accompanied Captain Cook on his second voyage to the South Seas in 1773, J Reinhold as naturalist and J Georg as draughtsman. They spent much time botanising in Dusky Sound and Queen Charlotte Sound. *Clematis forsteri*. (At one time *Brachyglottis rotundifolia* was named *Senecio reinoldii*.)
- POWERAKER**, Charles Ethelbert (1886-1964). Founding lecturer in the School of Forestry at the University of Canterbury; lectured in botany. Fellow of the Linnaean Society of London. A very good friend of Leonard Cockayne. *Coprosma foverakeri*.
- FRASER**, Charles (?1788-1831). Superintendent of Sydney Botanical Gardens. Collected plants in the Bay of Islands in 1825. He sent plants collected on Macquarie Island to Sir William Hooker. *Leucopogon fraseri*.
- FUCHS**, Leonhard (1501-1566). A German botanist, professor at Tübingen. He wrote a herbal and illustrated it with woodcuts. Genus *Fuchsia*.
- GARDNER**, Rhys Owen (born 1949, Auckland). Attended the University of Auckland, where he obtained a PhD for his research on the Alseuosmiaceae. Research Associate, Auckland War Memorial Museum, Cheeseman Herbarium. He has made collections from New Zealand, the Pacific and Papua New Guinea. *Olearia gardneri*.

GAULT(H)IER, Jean Francoise (1708-1756). Canadian/French physician and Senator of Quebec, amateur botanist. Genus *Gaultheria*.

GESNER, Conrad (1516-1565). Sixteenth century Swiss botanist who showed that flower and fruit characters were of most importance in showing relationships and in classifying plants. Family GESNERIACEAE.

GIBBS, Frederick Giles (1866-1953). Born in London, England. Arrived in NZ in 1877. Educated in Nelson. Headmaster of Nelson Central School. Collected plants in the Nelson area and was a friend of Cockayne. His interests were very wide and included science, art, music, tramping, public reserves and industry. He was Honorary Curator, Atkinson Observatory, Honorary Secretary and Advisor to Thomas Cawthron and was a major influence in establishing the Cawthron Institute, Nelson. (Cawthron is a research organization focused on marine and freshwater environments and aquaculture.) *Hebe gibbsii*.

GILLIES, Thomas Bannatyne (1828-1889). Born in Scotland. Arrived in NZ 1852. He was a farmer, lawyer, politician, judge and naturalist who first lived in Dunedin, then in Auckland. Helped to found the Auckland Institute with Hutton and Crawford. Explored Northland beaches with Kirk. *Pseudopanax gilliesii*.

GODLEY, Eric John (born 1919, Auckland). Attended Auckland Teachers Training College, specializing in biology, then to the University of Auckland. Director of the DSIR, Botany Division 1958-1981. He has published numerous scientific research papers and a series of biographies of people connected with botany from the beginning of European settlement in NZ. He edited the 7th edition of Laing and Blackwell's *Plants of New Zealand* (1964) and the 4th edition of Cockayne's *New Zealand Plants and their Story* (1967). *Sophora godleyi*.

GOODENOUGH, Samuel (1743-1827). Dr. Bishop of Carlyle. Founder of the Linnaean Society of London. Family GOODENIACEAE.

GREY, Sir George (1812-1898). Governor of New Zealand 1845-1853, and 1861-1868, Member of Parliament 1874-1894, Prime Minister 1877-1879. Governor of South Africa 1854-1861. As well as an administrator he was an explorer and ethnologist. He was a keen naturalist and also botanist and established extensive collections. *Brachyglottis greyi*.

GRISELINI, Francesco (1717-1783). An Italian physician and natural historian. Genus *Griselinia*.

HAAST, Sir Johann Franz Julius von (1822-1887). Born in Austria. Trained as a geologist and mineralogist. Arrived in NZ 1858. Surveyed Dun Mountain for Hochstetter. In 1861 became the first New Zealander (naturalised 1861) to be permanently employed as a scientist. Geologist to the Province of Canterbury and helped to found the Canterbury Museum, Christchurch. *Hebe haastii*.

HALL, John William (1830-1915). Arrived in NZ 1858. Pharmacist of Thames, Coromandel and friend of James Adams, also of Thames. He established a collection of NZ tree species on three acres at Parawai. In order to establish the difference between two forms of *Podocarpus totara* he cultivated both of them in his shrubbery. As a result of his observations Kirk (1889) named the thin flaky barked and large juvenile leaved form after Hall. *Podocarpus hallii*.

HAMILTON, William Maxwell (1909-1992). Director General DSIR (1953-1971). Compiler of book on Little Barrier Island (1937, 1961). Of *Pomaderris hamiltonii* LB Moore wrote "Seedlings transferred from Warkworth to the Wellington garden of Dr WM Hamilton have provided fresh material for study ... The specific name records the long association of the Hamilton family with one habitat [Warkworth] of this sp[ecies] and their interest in the native plants of the district." (see Allan 1961). *Pomaderris hamiltonii*.

HECTOR, Sir James (1834-1907). Born in Scotland. Trained in medicine and was also a geologist, botanist and explorer. Came to Otago as provincial geologist. Appointed Director of Geological Survey (1864) and the Colonial Museum (now Te Papa Tongarewa, Museum of New Zealand). Founded the Meteorological Observatory, the Colonial Laboratory (the first Government Chemistry Laboratory), the Botanical Gardens in Wellington and the NZ Institute. *Brachyglottis hectorii*, *Hebe hectorii*, *Olearia hectorii*.

HOLLOWAY, Rev. John Ernest (1881-1945). Born and educated in NZ. Studied at Auckland University and St. John's Theological College. Served in parishes in England (1909-1911). Main botanical interest the study of primitive vascular plants. Lecturer in botany at Otago University (1924-1944). He was a life-long friend of HH Allan. *Carmichaelia hollowayi*.

HOOKER, Sir William Jackson (1785-1865) and **HOOKER**, Sir Joseph Dalton (1817-1911). Father and son. Sir William devoted his life to travel and natural history. He was appointed Director of Kew Gardens 1841. Sir Joseph succeeded his father as Director of Kew Gardens. Member of the British Antarctic Expedition (1839-1843). Visited NZ and met Colenso. Wrote *Flora Novae-Zelandiae* (1852-55) and *Handbook of the New Zealand Flora* (first part 1864, second part 1867). *Carmichaelia hookeri*, *Clematis hookeriana*, *Elaeocarpus hookerianus*, *Phormium cookianum* ssp. *hookeri*

HULKE, TH The following quotes are from a paper addressed to the Botanic Society of Edinburgh by F Mueller in 1863: "... amongst a considerable number of plants forwarded by Th. H. Hulke Esq. from the vicinity of New Plymouth to the Botanic Garden of Melbourne ... *Veronica Hulkeana* ... In mountain-forests towards New Plymouth - Th. H. Hulke Esq".

COMMENTS: Mueller was in Australia 1847-1896: HW Eagle checked church, cemetery and museum records in New Plymouth covering this period and could find only William King Hulke (who, incidentally, was for a time a nurseryman) and Charles Hulke. The author would also point out that *V. Hulkeana* (now *Heliohebe hulkeana*) is known only from the South Island. *Heliohebe hulkeana*.

HUNT, Frederick. (1817-1891). An early settler on Pitt Island in the Chathams. He wrote *25 Years' Experience in New Zealand and the Chatham Islands*, Ward & Reeves (1865). *Brachyglottis huntii*.

HUTTON, Frederick Wollaston (1836-1905). Born in England. Arrived in NZ 1866. Employed by Government, reporting on the geology of Great Barrier Island and the Thames Goldfields. Published catalogue of birds, fishes and molluscs. Appointed professor of natural sciences at Otago University (1877), professor of biology at Canterbury College (1880) and curator of Canterbury Museum (1893). He helped establish the NZ Institute. (Its descendant is the Royal Society of NZ). *Pittosporum huttonianum*.

JOHNSON, Magnus Earle (1885-1978). Through his bravery and initiative in WW1 he rose to the rank of Captain, was awarded the Military Cross and bar, and later rose to the position of Major. After retiring from the Army in 1940 he became a yachtsman whose enterprise, skill and persistence made the exploration of the smaller islands of the Three Kings Group possible. On West Island Major Johnson discovered the tree that G. T. S. Baylis dedicated to him. *Elingamita johnsonii*.

KING, Phillip Parker (1791-1856). Born on Norfolk Island. Grew up in England, joined the Royal Navy, he also became a surveyor. Surveyed NW Australian coastal areas. Commanded the *Adventure* that with the *Beagle* surveyed the South American Coast (1826-1830). Colenso wrote "I have named this species *C. Kingiana* (in honour of my much respected friend, Capt. P. P. King, R.N.)." *Coriaria kingiana*.

KIRK, Thomas (1828-1898). Born in England. Arrived in NZ 1863. Botanised throughout NZ including the subantarctic islands. Explored Great Barrier and Little Barrier Islands. He was a teacher and later became Chief Commissioner of State Forests. He influenced Vogel into introducing the NZ Forest Act of 1874. Published *The Forest Flora of New Zealand* (1889) and *The Students' Flora of New Zealand and the Outlying Islands* (1899). *Carmichaelia kirkii*, *Halocarpus kirkii*,

Dracophyllum kirkii, *Pittosporum kirkii*, *Brachyglottis kirkii*.

KNIGHT, Thomas Andrew (1758-1838). Plant physiologist, President of the Royal Horticultural Society of London and friend of Sir Joseph Banks. Genus *Knightsia*.

KORTHALS, Pieter Willem (1807-1892). Dutch herbalist-philosopher who travelled widely in E. Indies [Indonesia]. Genus *Korthalsella*.

KUNZE, Gustav, Dr (1793-1851). Professor of medicine and botany, Leipzig, Germany. Especially interested in ferns. Genus *Kunzea*.

LAING, Robert Malcolm (1863-1941). Born in Dunedin. Botanist and teacher. He lived in Canterbury and studied the plants of the area. In 1907 he visited Campbell Island. Best known for *Plants of New Zealand* written with Ellen Wright Blackwell in 1906 (7th edition, revised by EJ Godley, published in 1964). *Hebe laingii*.

LAVAUD, Charles-François (1798-1878). Captain of the French ship *L'Aube* that visited Akaroa (1840-1841). *Heliobebe lavaudiana*.

LESSON, Pierre Adolphe (1805-1888). Accompanied d'Urville as surgeon-botanist on the *Astrolabe* in 1827. *Dracophyllum lessonianum*, *Pseudopanax lessonii*.

LINDSAY, William Lauder (1829-1880). Collected plants in Eastern Otago (1861-2). Wrote *Contributions to New Zealand Botany* (1868). *Korthalsella lindsayi*.

LYALL, David (1817-1895). Member of the British Antarctic Expedition (1839-1843) as assistant surgeon and botanist on the *Terror*. In 1847 joined the *Acheron* on the voyage to complete Cook's hydrographic survey of the New Zealand coast. Studied plants in Fiordland coastal areas. First European to botanise on Stewart Island. *Hoberia lyallii*, *Olearia lyallii*, *Pimelea lyallii*.

McCASKILL, Lancelot William (1900-1985). Former Director, Tussock Grasslands and Mountain Lands Institute, Lincoln. Lecturer in Rural Education at Lincoln College (1944). Formerly lecturer in Nature Study and Agriculture at Dunedin Training College and Christchurch Training College where he established a unique teaching garden. Material collected by him is now growing in botanical gardens in England, Scotland and America. *Heliobebe raoulii* ssp. *maccaskillii*.

MACINTYRE, John Wood (1850-1931). "I have pleasure in associating with it *Nothopanax macintyreii* [now *Pseudopanax macintyreii*] the name of Mr Macintyre, formerly chief gardener to the late Mr Henry John Matthews [at Hawthorn Hill, Dunedin] and for many years a most successful cultivator of New Zealand plants" (Cheeseman 1925). Mr Macintyre's special interest was in NZ native plants many of which he successfully raised in the Matthew's garden in Dunedin. *Pseudopanax macintyreii*.

MARTIN, William (1886-1975). Born in Otago. Schoolmaster, lecturer, headmaster and field botanist. Author of *Flora of New Zealand* (1940) originally *The New Zealand Nature Book* (1929). Co-author with John Child of *Lichens of New Zealand* (1972). The Dunedin suburb of Fairfield has replaced the nursery of that name established by his forebear William Martin (1823-1905). *Coprosma propinqua* var. *martinii*.

MASON, Ruth (1913-1990). Botanical research scientist. Appointed to Botany Division of DSIR in 1938. Engaged in many mountaineering and botanical trips. Collected plants from all over NZ. Wrote Post-Primary School Bulletin on Water Plants (1950). Wetland plants being her particular speciality. *Hebe masonae*.

MATTHEWS, Henry John (1859-1909). Dunedin nurseryman. His speciality being native plants, these he collected on his many exploratory trips around the southern parts of NZ. His Hawthorn Hill nursery and garden in Dunedin had an extensive collection of plants of the rarer alpine and

subalpine species. New Zealand's first appointment of Chief Forester with the Forest Service. Author of *Tree culture in New Zealand* (1905). *Hebe matthewsii*.

MENZIES, Archibald (1754-1842). Scottish surgeon/naturalist. He made two major circumnavigations of the world. Although surgeon his other important purpose was to collect numerous specimens of plants for Sir Joseph Banks. His second voyage was with Captain Vancouver in the *Discovery* 1791-1795. During the first year of this voyage he spent a short time botanising in Dusky Sound. *Dracophyllum menziesii*, *Nothofagus menziesii*.

MOLLOY, Brian Peter John (born 1930, Wellington). Attended Massey College, Canterbury University and Lincoln College. He was a Research Scientist with the Botany Division of the DSIR at Lincoln (now Landcare Research) specialising in plant taxonomy, ecology and conservation. He has served on a number of Authorities including National Park, Water Catchment and Regional Water Boards. From 1989-1998 he was Director of QEII National Trust Board. He has written over 100 scientific papers and the book, *Native Orchids of New Zealand*. *Sophora molloyi*.

MONRO, Sir David (1813-1877). Born in Scotland, trained as a doctor of medicine and set up in practice in Edinburgh in 1838. Arrived in Nelson in 1842 and settled at Waimea West. He corresponded with Sir William Hooker, Director of the Royal Botanic Gardens at Kew, London. Upon Sir William's request for plants Monro collected numerous specimens mainly from Marlborough and Nelson. A number of these were used in publications of the NZ flora by both Sir William and by his son Joseph. In 1853 he became a Member of Parliament and was later knighted for his services to politics. *Brachyglottis monroi*, *Carmichaelia monroi*.

MOORE, Lucy Beatrice (1906-1987). Dr Leonard Cockayne was friend and mentor in LB Moore's early years. Most of her working years were spent with Botany Division of the DSIR, first in Wellington and then at Lincoln, Canterbury. A major contribution to New Zealand botany was the publication of *Flora of New Zealand* vol. 1 in 1961 & vol. 2 in 1970. Lucy Moore was responsible for a considerable part of both volumes. She travelled widely, particularly for her special areas of study: montane tussock grasslands, seaweeds and orchids. Author (with Irwin) of *The Oxford book of New Zealand plants* (1978). *Hebe mooreae*.

MUEHLENBECK, Heinrich Gustav (1798-1845). An Alsatian doctor who worked on mosses and fungi. Genus *Muehlenbeckia*.

MURRELL, Robert (?-1953). Fiordland explorer and well-known boatman and guide of Manapouri and Doubtful Sound. He re-opened the Doubtful Sound Track in 1920. He was the first Chief Guide on the Milford track. *Hebe murrellii*.

OELSCHLAEGER, Johann Gottfried (1635-1711). Wrote a *Flora of Halle*. His surname means "oil-presser" and was Latinised as Olearius. Genus *Olearia*.

OLIVER, Walter Reginald Brook (1883-1957). Born in Tasmania. Educated in NZ. One of NZ's greatest all-round naturalists. He was the first to thoroughly document the flora of the Kermadec Islands. Edited Cheeseman's *Manual of New Zealand Flora* (1925). Wrote *New Zealand Birds* (1930). Other publications included writings on whales and dolphins, molluscs, marine intertidal ecology and early botanical explorers of NZ. Director of the Dominion Museum 1928-1947. *Dracophyllum oliveri*, *Myrsine oliveri*.

OLSEN, A. A plant collector who worked between 1890 and 1900, mainly on the eastern side of the Ruahine Range. *Parabebe olsenii*.

PARKINSON, Sydney (1745-1771). Born in Scotland. Botanical artist engaged by Banks for Cook's voyage in the *Endeavour* (1768). Died at sea from dysentery that he contracted at Batavia (Jakarta). *Metrosideros parkinsonii*.

- PARSONS**, James (1705-70). English worker on seeds. Genus *Parsonsia*.
- PEARSON**, Walter Henry (1832-1911). Born in India, educated in England and came to New Zealand in 1855. He worked in the Land Office in Dunedin, later becoming Commissioner of Crown Lands. Collected plants on the islands, including the original specimen of *Dracophyllum pearsonii* either on Codfish Island or in “Chew-tobacco Bay” (Stewart Island). *Dracophyllum pearsonii*.
- PENNANT** Thomas (1726-1798). A Scottish botanist, zoologist and author. The unusual monogeneric family Pennantiaceae is named in his honour. Family PENNANTIACEAE, Genus *Pennantia*.
- PETRIE**, Donald (1846-1925). Born in Scotland. Arrived in NZ 1874. Botanist and collector of NZ native plants. Inspector of Schools to Otago Provincial Government then in Auckland. President of the Auckland Institute and Museum. “Petrie made exhaustive studies of the New Zealand grasses and other difficult genera. He published numerous papers, and held an extensive private herbarium. He was a significant mentor to Walter Oliver, and was the person whom Leonard Cockayne specifically entrusted with the task of formally describing his new botanical discoveries” (PJ de Lange pers. comm.). *Carmichaelia petriei*, *Clematis petriei*, *Coprosma petriei*.
- PHILLIPS TURNER**, Edward (1865-1937). Born in England. For a long time in the Forest Service and inspector of Scenic Reserves. Co-author with Leonard Cockayne of *The Trees of New Zealand* (1928, 1939, 1943, 1947). *Alseuosmia turneri*, *Pittosporum turneri*.
- PISO**, Willem “(1611-1678). Authority on medicine in Dutch colonies” (Moore & Irwin 1978). Genus *Pisonia*.
- POPPELWELL**, Dugald Lewis (1863-1939). Solicitor and one-time mayor of Gore. Conservationist, horticulturnist, botanist and traveller. Visited and listed the flora of many areas in Otago, Fiordland, Southland and Stewart and adjacent Islands. He wrote 17 botanical papers. His main companions were GV Biggar, S Speden and WA Thomson. *Hebe poppelwellii*, *Pimelea poppelwellii*.
- POTTS**, Norman (1886-1970). Born in Christchurch. Grandson of Thomas Henry Potts, the ornithologist. A keen botanist closely associated with the Hukutaia Domain near Opotiki from 1926 until his death. *Coriaria pottsiana*.
- RALPH**, Thomas Shearman (1813-1891). *Myrtus ralphii* (now *Lophomyrtus ×ralphii* a hybrid between *Lophomyrtus bullata* and *L. obcordata*) was discovered by Dr Ralph of Wellington and was described from material collected by him in “woods at Wellington” (Allan 1961). He also collected the type specimen of *Pittosporum ralphii* at Patea. *Pittosporum ralphii*.
- RAOUL**, Etienne Fiacre Louis (1815-1852). French naval surgeon-botanist to the vessels *L'Aube* and *L'Allier*, which supported early French settlers at Akaroa, NZ. He collected plants at Bay of Islands and Akaroa. Author of *Choix des Plantes de la Nouvelle Zelande* (1846). His uncle Joseph Raoul travelled in the South Pacific, Raoul I (Kermadecs) was named after him. His nephew Édouard Francois Armand Raoul (1845-1898) visited NZ in 1886-7 and arranged for the publication of a French edition of Mrs C. Hetley's book, *The Native Flowers of New Zealand* (Taylor 2002). *Heliobebe raoulii*.
- SCHEFFLER**, J. C. Author of Flora of Danzig 1764-66. Genus *Schefflera*.
- SCHMIDEL** C. C. (1718-1792). A German botanist. *Rubus schmidelioides*.
- SINCLAIR**, Andrew, Dr. (1794-1861). Born in Scotland. Botanist and naval surgeon. Friend and fellow explorer with von Haast. Appointed Colonial Secretary by Governor FitzRoy (1844). He collected plants for the Royal Botanic Gardens Kew, London. *Dracophyllum sinclairii*, *Epacris sinclairii*, *Kunzea sinclairii*, *Meryta sinclairii*, *Raukawa simplex* var. *sinclairii*.

- SMITH**, Joseph Crosby (1853-1930). Arrived in NZ 1876. Lived in Invercargill. He collected plants in Otago and Southland and listed the flora of the Princess Mountains, SE Fiordland. *Olearia crosby-smithiana*, *Pimelea crosby-smithiana*.
- SMITH**, Stephenson Percy (1840-1922). Born in England. Surveyor and ethnologist. Arrived in NZ 1850. Carried out the trig survey of the Chatham Islands and the triangulation of the greater part of the North Island. Interests included botany, conchology, geology, ethnology and the Maori language. His major work was probably associated with the Polynesian Society that he founded and the *Journal of the Polynesian Society* which he established. *Streblus smithii*.
- SOLANDER**, Daniel (1736-1782). Born in Sweden. A pupil of Carl von Linne (Linnaeus). Accompanied Banks on Cook's first voyage in the *Endeavour* to the South Seas. He became Keeper of the Natural History Department of the British Museum, London. He was a brilliant scholar and critical, cautious, botanist, whose untimely death more than any other reason was why Joseph Banks never completed his *Floregium*. *Nothofagus solandri*, *Olearia solandri*, *Rhabdothermus solandri*.
- SPRENGEL**, Christian, Konrad (1750-1816). Professor of Botany, Halle University, Germany. Genus *Sprengelia*.
- STEVENSON**, George (1878-1960). Marlborough runholder and N. Otago farmer. Discovered the species named after him near the mouth of the Clarence River. *Carmichaelia stevensonii*.
- SUTER**, Andrew Burn (1830-1895). Bishop of Nelson. Born in England. For many years took considerable interest in the Botany of the Nelson District. *Pimelea suteri*.
- SUTER**, Henry (1841-1918). Born in Zurich. Arrived in NZ 1886. Collector of land and freshwater snails. Produced *Manual of New Zealand Molluscs*. *Carmichaelia suteri* (= *C. uniflora*)
- TAYLOR**, Grace Marie (1930-1999). Attended Victoria University in Wellington. She started her career teaching in Wellington Girl's College and later at Victoria University. She then went to Auckland University where she spent 20 years tutoring in the Botany Department. She wrote papers and keys to divaricating shrubs, notably the genus *Coprosma*, although her real love was for fungi. She later took up research into fungi and the illustration of them, and became a leading expert in mycology for both New Zealanders and visiting scientists. Publications included *Mushrooms and Toadstools of New Zealand* which was published in two series (1970, 1981) and *Meanings and Origins of Botanical names of New Zealand Plants* which was published posthumously by the Auckland Botanical Society. *Coprosma tayloriae*.
- THOMSON**, William Alexander (1876-1950). Dunedin dentist and company director. "The species is named in honour of Mr WA Thomson, of Dunedin who has kindly supplied me with flowering specimens cultivated in his garden at Half-way Bush, Dunedin" Cheeseman (1925). *Olearia thomsonii* (= *O. townsonii*)
- TOWNSON**, William Lewis (1855-1926). Born in England. At different times pharmaceutical chemist of Westport, Masterton/Marton, Gisborne and Thames. Upon the encouragement of TF Cheeseman he explored the greater portion of south-west Nelson between 1899-1907. He made large collections of the vegetation and these Mr Cheeseman found invaluable for his work on the *Manual of the New Zealand Flora* (1906). *Dracophyllum townsonii*, *Hebe townsonii*, *Olearia townsonii*.
- TRAVERS**, William Thomas Locke (1819-1903). Born in Ireland. Arrived NZ in 1849. District Court Judge and M.P. Naturalist collector, especially in Nelson and Marlborough. He was the first European to explore the Spenser Mountains, these he named after the English poet. He took a major role in the development of the Wellington Botanic Gardens. Genus *Traversia*. *Archeria traversii*, *Dracophyllum traversii*, *Hebe traversii*.

TRAVERS, Henry Hammersley (1844-1928). Accompanied his father, William, on much of his exploration. The son is best known for his work on the Chatham Islands flora. He studied the cultivation of NZ plants. *Olearia traversii*, *Pseudovintera traversii*.

TREADWELL, Charles Herbert (1862-1936). A lawyer of Wellington who cultivated an unusual *Sophora* species which was known in gardening circles as *S. treadwellii* before it was described as *S. longicarinata*. *Hebe treadwellii*.

VAUVILLIERS, Geneviève Jean Victor (1784-?). Born Saint Chéron, France. Secretary-General of the Department of Navy and Colonies in France from 1817 to 1831. *Ozothamnus vauvilliersii*.

WALL, Arnold (1869-1966). Born in Ceylon and educated in England. Came to NZ as Professor of English language and literature at the University of Canterbury (1898). Had life-long interest in botany and mountaineering. Wrote on many botanical regions. Probably his best-known work was *The Botanical Names of the Flora of New Zealand* with HH Allan (1945), the forerunner of Taylor (2002). Well known for his broadcasts on the English language. *Coprosma wallii*.

WEINMAN, Johann Wilhelm (1863-1741). Bavarian apothecary, producer of a great work of botanical pictures (*Phytanthozaiconographia* 1737-1745). Genus *Weinmannia*.

WILLIAMS, William Leonard (1829-1916). Born in NZ. Third Bishop of Waiapu. He was knowledgeable about NZ native plants and botanised in the East Cape district. He was also a Maori scholar. In 1871 and 1892 he revised his father, William Williams', publication, the first Maori dictionary. *Carmichaelia williamsii*.

WINTER, John, Captain. He accompanied Francis Drake to Magellan Straits in 1578. During this voyage he "... saved his crew from scurvy at the Straits of Magellan by feeding them the bark of the tree which ... was being called Winter's bark (*Drimys winteri*)" (Taylor 2002). Family WINTERACEAE.

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