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New Zealand Botanical Society

President: Jessica Beever
Secretary/Treasurer: Anthony Wright
Committee: Bruce Clarkson, Colin Webb, Carol West
Address: C/- Canterbury Museum
Rolleston Avenue
CHRISTCHURCH 8001

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c/- Department of Conservation
P O Box 743
INVERCARGILL

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Cover Illustration

Fruiting specimen of *Luzula celata* (Juncaceae) and its habit, drawn by **Catherine Beard**. See *Desiderata* column.

Acknowledgement: Pamela Barnard produced camera-ready copy for printing.

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Regional Botanical Society News

■ Auckland Botanical Society

June Meeting

Two graduate students spoke of their research projects on wetlands in the Auckland region. Kerry Bodmin spoke on the wetlands of Motutapu Island, a DoC Recreation Reserve in the Hauraki Gulf. With vegetation highly modified by Maori, farming and defence forces, Kerry's first task was to assess what is currently growing in the damp gullies, and then prioritise areas according to restoration aims. Gillian Rutherford studied the vegetation of the Kaitoke Swamp on Great Barrier Island. This swamp, covering 320 ha, was an estuary c. 67,000 years ago. It has been modified by fire, logging of the surrounding hills, and drainage. Gillian identified eight major vegetation types and considered the effects of the surrounding land use.

June Field Trip

A filmy fern workshop, led by John Smith-Dodsworth, gave an opportunity to compare the features of the various species of these confusing ferns. John has access to several species which are not found, or are very rare, in the north. Of these, perhaps *Hymenophyllum rufescens* and *Trichomanes colensoi* were of most interest. After a picnic lunch in the Domain a walk in the newly restored fernery completed the day.

July Meeting

Peter de Lange and Ewen Cameron took turn about to present an interesting talk on the history, geology, flora and fauna of the Mokohinau Islands, a scattered group of islands and rock stacks situated to the north-west of Great Barrier Island. The vegetation of all of the main islands has been modified by repeated burning. Sheep and cattle have grazed on Burgess Island, the lighthouse island, and goats were present on other islands. Flax dominates the recovering vegetation. Fanal Island has an area of forest which escaped burning, and this remnant is the source of seed for revegetation. The little visited Tatapihi, or Groper Island, was described in detail. This small rocky islet supports a vascular flora of only 20 species, but amazingly, has no adventives present. Seven species of lizard and a large population of diving petrels can be found there. After the meeting three venerable members, Dan Hatch, Frank Hudson, and Jack Rattenbury were wished happy 80th birthdays.

July Field Trip

Only three extant populations of the mistletoe *Ileostylus micranthus* were previously known to exist in the Auckland area, so the discovery of a fourth site at Ararimu in South Auckland was a significant find. This field trip to the Gilbert's farm at Ararimu was undertaken to explore several small bush remnants and estimate the number of mistletoe plants present. It was found that there were large numbers of healthy plants parasitising the totara - both *Podocarpus totara* and *P. hallii*, but that they were absent from any other potential host. Fortunately the remnants are fenced, covenanted, and are regularly cleared of possums.

August Meeting

A well attended meeting was given a fascinating talk by ethnobotanist Sue Scheele on the traditional uses of native plants. Sue pointed out that Maori would have arrived in Aotearoa with most of the skills needed to use the plants found here: skills in preparing fibre, weaving and plaiting, and making plants safe and palatable for eating. Then, armed with a good supply of specimens and a Maori myth or two, she proceeded to demonstrate the various usages.

August Field Trip

Chatswood Reserve on Auckland's North Shore is a remnant of kauri/hard beech forest that once covered much of the area. Surrounded as it is by housing developments, it is a real surprise to find such a botanically rich reserve in the city. The fern *Loxosoma cunninghamii*, is one of the treasures to be found there, *Alseuosmia macrophylla* was in full, and early, flower

and *Phebalium nudum* was reasonably common. A circuit through nearby Kauri Point Centennial Park completed the walk. The vegetation here is more typical of gumland scrub, with many maritime pines scattered throughout. A band of local volunteers care for these reserves and work hard to keep weeds under control.

Forthcoming Activities

Evening Meetings

7 October - Snails and trees (Jim Goulstone)

4 November - Landcare Research programme in the Waikato (Bruce Burns)

2 December - Pot luck dinner in the Botanic Gardens

Field Trips

17 October - Brynderwyn to Pararaha (Ewen Cameron)

12 December - Iwi Tahī with Native Orchid Group (Catherine Beard)

Maureen Young, 36 Alnwick Street, Warkworth

■ **Wanganui Museum Botanical Group**

February Field Trip: Lake Alice wetlands, Bulls

Lake Alice is a privately owned dune lake in farmland. In 1996, our group had explored a fragment of dune forest that adjoins the lake; this year's visit was to explore and document the vegetation of the lake's swamp edges. A dry summer meant the lake level was low which was good for botanists, though we saw a lot of damage from stock which had pushed in for lush wetland fodder. We covered little distance in the morning, taking time to study the flower structure and beauty of the wetland plants. Typical of the region's dune wetlands were flax (harakeke), purei (*Carex secta*), a shrub daisy (*Olearia virgata*), swamp coprosma (*Coprosma tenuicaulis*), and it was good to find regionally uncommon wetland plants like the fern *Hypolepis distans*, the robust sedge *Eleocharis sphacelata*, and the small herbs *Pratia perpusilla*, *Hydrocotyle hydrophila* and *H. pterocarpa*. Grey willows (*Salix cinerea*) seem to be spreading. The most novel find for us all was a creeping, almost fleshy herb, *Elatine gratioloides*, which may be its first record in the region. It was in only one place, but there quite common with the exotic daisy, *Centipeda cunninghamii*, and a native cress, *Rorippa palustris*, on and between polygons of sun-baked mud. In all, we saw 58 native wetland plant species.

Early May Field Trip: Whangaehu Valley forest remnants

Two forest patches that had been visited in 1991 were explored again by eight of us. No additions were made to the plant list for either area. Beside Kauangaroa Road, a fenced portion of bush on the hill-slope is broadleaved forest and has a protection covenant, but the adjoining and regionally rarer podocarp forest on the river terrace has no protection. Among the regionally uncommon plants in the podocarp stand are *Hoheria angustifolia*, *Mazus novae-zeelandiae* and *Korthalsella lindsayi* (rather unusually, growing on *Coprosma areolata*). Before exploring a bush remnant in Ohaumoku Road, the owner invited us to eat our lunches on his verandah, then supplemented our own provisions with tea, fruit cake, a cheese platter, a fillet of smoked trout and wine! The forest (which we did get to) covers an arc of a steep face lying open to the south-east and was shaded and very wet. Stock are in the bush and little of botanical note was recorded except, perhaps, the numbers of very large hawthorn trees lining the forest on the valley floor.

Late May Field Trip: Bulls

This was a grey day with several light showers. The morning visit was to the farm of Dennis Hocking who is well-known in farm forestry circles. Using aerial photographs, Dennis explained firstly the problems of sand country farming. He outlined the geological origins of the dunes, variability in the terrain and how different exotic tree species were proving suitable for different parts. In the field we saw a wide range of planted species of *Pinus*, *Acacia* and *Eucalyptus*. We also inspected an arboretum of exotic species which had been planted by his father, a past Conservator of Forests in the NZ Forest Service.

After a hurried lunch we returned to Bulls to Keith Tricker's forest remnant which is mostly on the flood plain of the Tutaenui Stream, but extends on to old dunes. The forest is in two parts, both of which we visited. About eight species were added to a plant list that we and DoC staff had made on visits in the early 1990s. Perhaps the most notable addition was a shrub of *Neomyrtus pedunculata*; surely a strange location, on the edge of sand country? We managed to re-find several plants of bamboo rice grass (*Microlaena polynoda*), the shrub of *Pittosporum cornifolium*, but not the plant of *Teucrium* we found here in 1992. The last-named may have succumbed to *Tradescantia fluminensis*, common here in 1992, but now an extremely dense carpet of over most of the forest floor. The ferns *Lastreopsis microsora*, *Adiantum diaphanum* and an apparently unnamed species of *Pellaea* (it looks somewhere between *P. rotundifolia* and *P. falcata*) seem unlikely to persist here much longer with this shocking weed.

July Field Trip: Eucalypts of Wanganui City

The lessons learned from a practical evening on eucalypts last November were put into practice when about 14 members and associates joined Colin Ogle in a tour of the city. Wanganui has a surprising range of eucalypts and we saw some 28 species, some common and others seldom grown in NZ. Before concentrating on two of the city's parks, we toured more widely to see, among others, snow gum (*E. pauciflora*), round-leaved gum (*E. deanei*), tallow-wood (*E. microcorys*) and Gippsland mallee (*E. kitsoniana*). At Virginia Lake we saw, firstly, some trees that resemble eucalypts (species of *Angophora*, *Syncarpia* and *Lophostemon*), then bushy yate (*E. conferruminata*), with its remarkable clusters of hard spiky fruits, and bullich (*E. megacarpa*) with large white flowers, a magnet for many tui while we were there. *En route* to Victoria Park we paused on Great North Road to see a tree of swamp yate (*E. macrandra*) with its greatly elongated flower buds. Victoria Park has a grove of eucalypts comprising at least 20 different species that Chris Ecroyd of Forest Research and the Australian eucalypt guru, Ian Brooker, had helped Colin identify several months earlier. We didn't check all 20 on our July visit, but some highlights were karri (*E. diversicolor*), *E. blaxlandii*, *E. cypellocarpa*, *E. paniculata*, the cream-flowered swamp yate (*E. occidentalis*), white box (*E. albens*), and sugar gum (*E. cladocalyx*). No-one seems to know the origins of these plantings at Victoria Park but as one of the city's botanical assets they need more careful management than they get now.

Forthcoming Activities

Evening Meetings (1st Tuesday each month)

6 October - Colin and Robyn Ogle: Sulawesi, Indonesia.

3 November - Proteaceae (practical evening)

1 December - Christmas Social evening

2 February 1999 - Jim and Diana Howard: Chatham Island

Field Trips

3 October - Plimmer Reserve, Kauarapaoa Road

7 November - Lake Papaitonga, Levin (trip with Wellington Botanical Society)

28 November - Forest remnants, Mt Curl

31 January 1999 - Lake Wiritoa

Robyn Ogle, 4 Brassey Road, Wanganui

■ **Nelson Botanical Society**

June Field Trip Report: Richmond Hill

Who would have thought that two very interesting patches of bush exist at the top of Queen Street, a short distance from the centre of Richmond. The first patch was a real mixture of ferns with two or three similar species close by, so that comparisons could be made, such as between *Pteris macilenta* and *P. tremula*. Later, *Arthropteris tenella* and *Phymatosorus scandens* caused much discussion. A bulldozed track between patches was notable for a great display of Triassic bivalve fossils. Julie and Les soon strayed into a tangle of the leafless lawyer *Rubus squarrosus*. Next we found ourselves in an almost pure matai grove of one very large tree, presumably the "matriarch", and dozens of trees, from seedlings to half grown.

Lunchtime, found us in a grove of mature tawa. Eventually after quite a steep scramble we made it to a forestry road and a glorious view out over Richmond and Tasman Bay, all agreeing that it had been a special day.

July Field Trip Report: Happy Valley

A large contingent set off from the car park in bright sunshine. As we ascended the farm track the vegetation gradually changed from pine forest and scrub to a fine podocarp stand with some huge matai. The shaded banks yielded a wide variety of ferns including the locally uncommon *Doodia media*. Other "coastal" plants seen included akeake (*Dodonaea viscosa*) and akiraho (*Olearia paniculata*). Apparent hybrids between *Hebe gracillima* and *H. stricta* were also a source of discussion. After lunch in a sunny spot we took a track that descended down the gully (back out of the sun) past some huge matai and through groves of tawa and titoki. Here there was a good showing of filmy and other ferns. The locally uncommon jointed fern, *Arthropteris tenella*, was of special interest. Near the bottom of the gully Les Moran had spotted *Botrychium bifforme* under a stand of black beech. At last we were back out into the sun and Les was once more waiting to ferry us across the river home.

August Field Trip Report: Waiharakeke

In spite of a brilliant day only 15 left from the Nelson end for Waiharakeke and dawdled along the beach in the sun awaiting the group from Totaranui. Along this section gorse and kanuka descended to the shore. Interesting plants hidden here included *Peperomia urvilleana*, *Poa anceps* and, further back, grand old northern rata and the odd karaka. Once round the Awaroa sandspit (and at first into the shade) the forest became dominated by beeches and podocarps. Of particular fascination was the bamboo rice grass (*Microlaena polynoda*) with its bamboo-like stems over 2 m long. Further along orchids (*Pterostylis alobula*, *Acianthus sinclairii* (finished flowering) and *Cyrtostylis reniformis* (only a week or two from flowering)) were quite abundant. A brief foray into the forest at a stream mouth added greatly to the growing list of ferns (over 60 for the day). Of particular interest were *Hymenophyllum ferrugineum* and *Blechnum fraseri*, species not often seen around Nelson. During the final return through pukatea and beech forest confusion between pukatea and hutu aroused discussion. Ferns were also abundant, with new additions including *Botrychium bifforme*.

Forthcoming Trips

October 18 - Hackett

Labour Weekend 23-26 October - Kaikoura Coast

November 22 - South Head Croisilles

December 20 - Red Hills

Graeme Jane, 136 Cleveland Terrace, Nelson

NOTES AND REPORTS

Plant Records

■ Notes on *Senecio marotiri* (Asteraceae)

Introduction

In his review of the New Zealand members of the *Senecio lautus* complex, Webb (1988a) recognised a new species, *S. marotiri* (Fig. 1), based on specimens collected from Coppermine Island, the westernmost of the four main islands which make up the Chickens or Marotere/Marotiri Islands (Fig. 1). Within the same archipelago Webb (1988a, 1988b) also reported the species from Motumuka and Middle Rock, in the Bay of Islands from Whakairipiha Island and from three islands, Motumorirau, Waimate, and Motukopuke near Coromandel (Fig. 2).

As *S. marotiri* appeared to be uncommon its conservation status was classified as "Rare" by Given (1990). Subsequent assessments (Cameron *et al.* 1993, 1995) have retained this listing. Since 1990 I have studied *S. marotiri* populations in the wild and cultivated the species. This article provides some additional information from these studies regarding the distribution, relationships, ecology, and conservation status of *S. marotiri*.

Distribution

Since its formal description, the range of *S. marotiri* has not been extended outside the area originally defined by Webb (1988a), i.e., the greater Hauraki Gulf and the Bay of Islands. Within this area, we now know of further *S. marotiri* populations from several sites on Great Barrier Island (P.J. de Lange unpubl. data), and the Mokohinau Islands (de Lange et al. 1995). However, it would seem that *S. marotiri* is absent from the mainland, the Inner Hauraki Gulf Islands, and Poor Knights Islands (P.J. de Lange & E.K. Cameron unpubl. data). The reasons for this pattern are not clear, but they are paralleled by other lautusoid taxa within the Hauraki Gulf, e.g., *Senecio sterquilinus* (de Lange 1998) and *S. "Cuvier"* (de Lange 1996).

Relationships

Within New Zealand *S. marotiri* is a distinctive species readily distinguished from *S. lautus* s.s.,

and other lautusoid taxa, by its taller, narrowly erect habit, usually lanceolate leaves, longer, narrower, involucral bracts, and fewer, shorter ligules (1-3 mm) which have distinctly incised apices (Webb 1988a, 1988b; P.J. de Lange unpubl. data). Plants are also distinguished from *S. lautus* s.s. by their chromosome number ($2n = 80$ in *S. marotiri*, $2n = 40$ in *S. lautus* s.s. [Webb 1988a; B.G. Murray unpubl. data]). Although the leaf shape of *S. marotiri* is usually lanceolate, I have observed that the basal and mid-cauline leaves of some recent (1993-1994) collections from the Mokohinau Islands (e.g., de Lange 2678 AK 226987, Cameron 7755 & de Lange AK 225305) are lyrate-pinnatifid or pinnatifid (Fig. 1). Seedlings raised from these lyrate-pinnatifid plants have $2n = 80$ chromosomes (B.G. Murray pers. comm.). Furthermore, from the observation of dried and cultivated plants, it is apparent that the involucre of *S. marotiri* varies depending on the stage of floral development from the cylindrical state described by Webb (1988a) to an urceolate condition (pers. obs., see also comments made by Belcher 1992: 250). These leaf and involucre characters are seen also in *S. australis* Willd. (Belcher 1992; AK!),

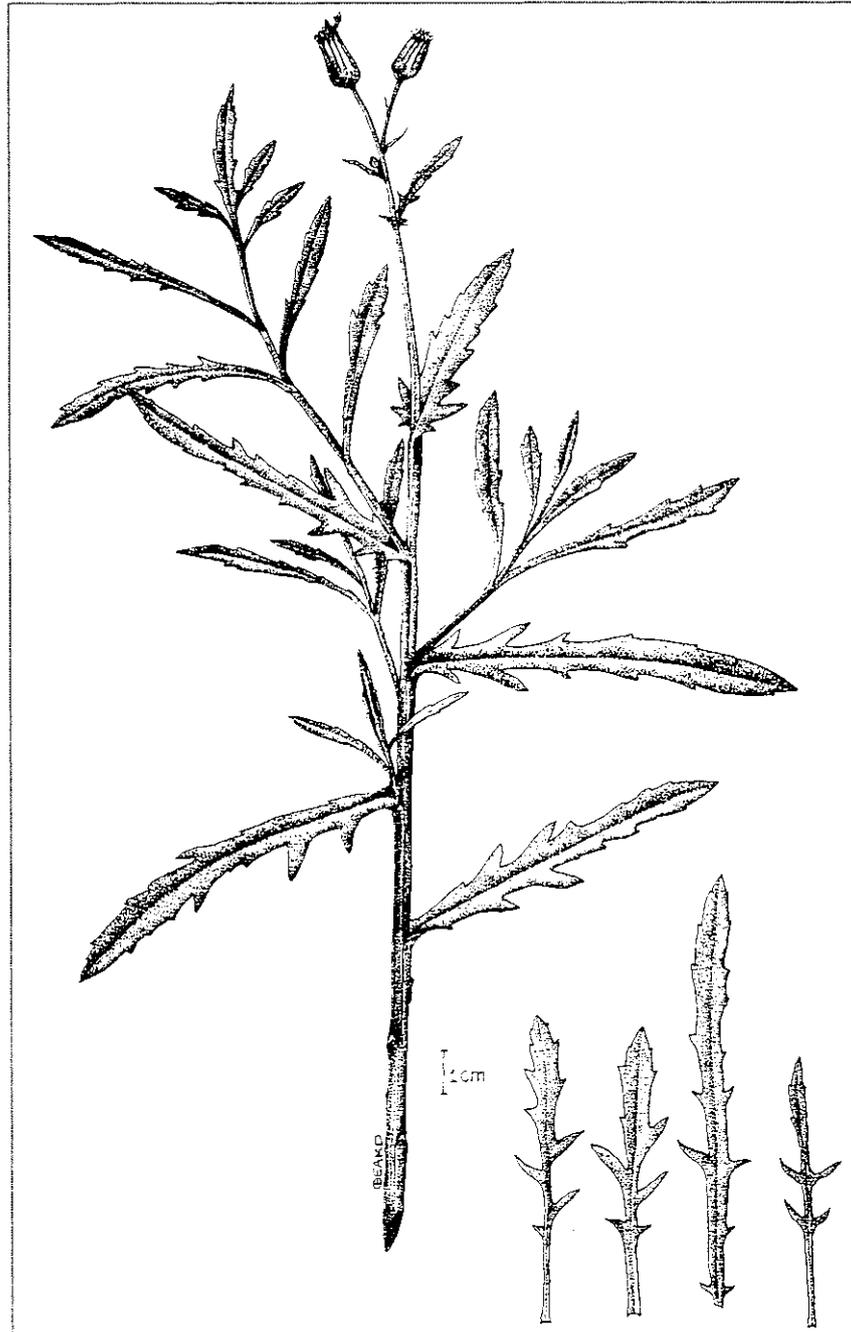


Fig. 1. Habit of *S. marotiri* and leaf variation. Specimen drawn from a seedling raised from seed obtained from Fanal (Motukino) Island (E.K. Cameron 7755 & P.J. de Lange, AK 225305). Leaves from a range of specimens of *S. marotiri* from Fanal, Burgess (Pokohinu) and Great Barrier Islands.

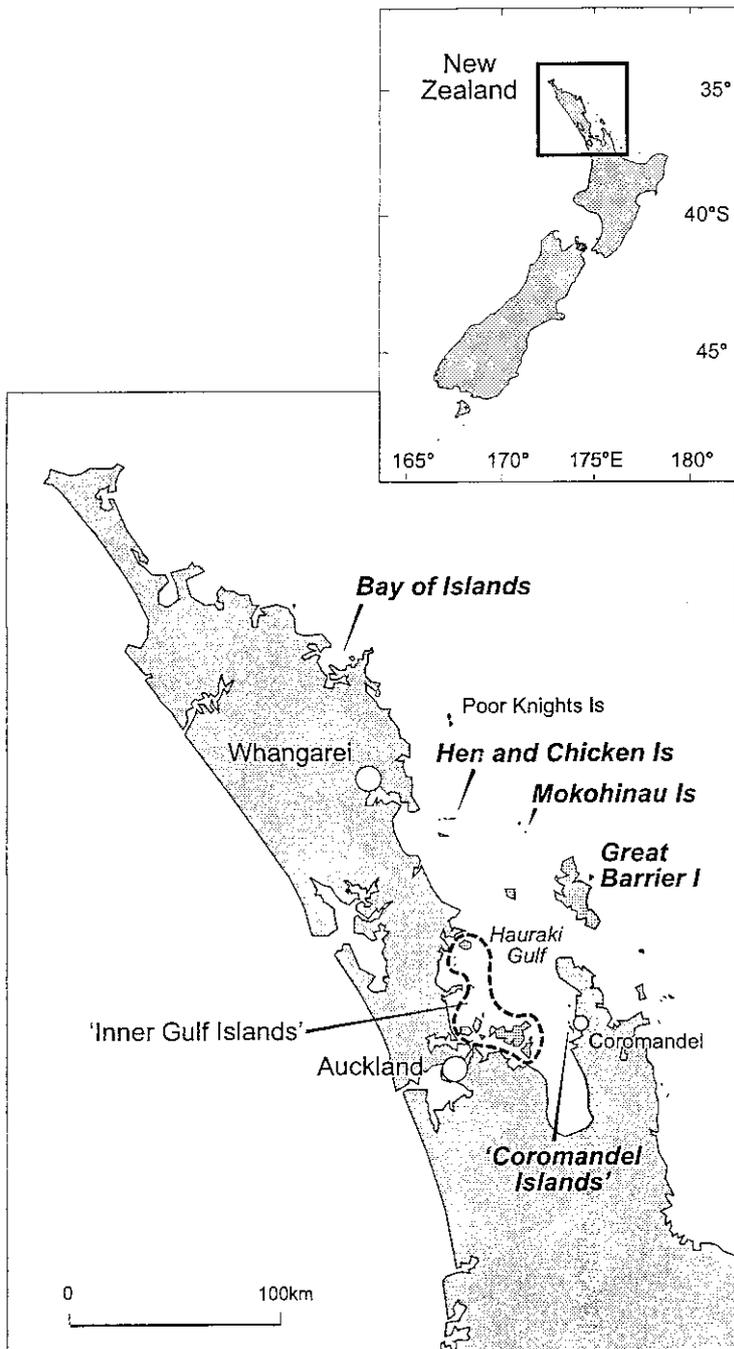


Fig. 2. Distribution of *S. marotiri* (locations in bold type).

which at the time of the formal description of *S. marotiri*, was discussed by Webb (1988a) as an apparently unnamed Norfolk Island endemic. As better material of both species is now available in New Zealand herbaria a further investigation of the relationship of these two taxa is warranted.

Ecology

Senecio marotiri is a strictly coastal species. It is most frequently found in exposed sites within coastal herbfield, on rock stacks, boulderfields, cobble beaches and amongst "petrel scrub". In the majority of the locations where I have seen it, *S. marotiri* grows intermingled with *S. lautus* var. *lautus*. Although it will grow in richly manured, guano soils, it is not exclusive to these, showing a preference for any recently disturbed ground irrespective of fertility levels. This penchant for a variety of seral habitats is well seen within the islands of the Mokohinau archipelago. For instance, on Burgess (Pokohinu) Island *S. marotiri* has been collected from the cracked concrete of an old footpath within the former lighthouse settlement, while on nearby Stack "D" plants grow with

Lepidium oleraceum amongst diving petrel (*Pelecanoides urinatrix*) burrows. On Fanal (Motukino) Island, aside from frequenting the coastal herbfield habitat of the western cliffs, *S. marotiri* also grows in coastal forest within canopy gaps created by wind-throw (de Lange et al. 1995).

Conservation Status

In terms of its abundance, *S. marotiri* is best described as a naturally sparse (*sensu* de Lange & Norton 1998) species. Certainly the small number of herbarium specimens would support this view (a total of 17 sheets known [excluding cultivated specimens] from four New Zealand herbaria, AK!, AKU!, CHR!, WAIK!), while field studies suggest that most populations consistently number between 20-40 plants. The only place where this pattern is disrupted seems to be Fanal (Motukino) Island, where 150-200 plants were observed in September 1994, and a similar number again in December 1997. At other locations, such as Oruawharo

Bay, Great Barrier Island, the small number of plants seems to be maintained from season to season irrespective of local conditions. Why this should be so is unclear, as plants produce copious quantities of viable seed, and rarely suffer from insect browse or other obvious diseases. Indeed, in cultivation, *S. marotiri* (in common with other lautusoid *Senecio*) readily self-sows and can become a nuisance.

Many sparse species are predisposed to extinction because they are already uncommon (de Lange & Norton 1998). This is particularly the case where sparse plants occupy habitats already at risk. In the case of *S. marotiri*, this is less likely to be a problem as the majority of the known populations occur within remote island nature reserves. Even those few populations found on private land are very inaccessible, and unlikely to suffer from the usual array of plant threats. Furthermore, *S. marotiri* seems to be remarkably tolerant of drought. In December 1997, a visit to Fanal (Motukino) Island, located very few specimens of *Lepidium oleraceum* and only one plant of *Rorippa divaricata*. Both species, normally abundant on this island had succumbed to the unseasonably dry weather caused by the 1997-1998 El Niño weather cycle. Nevertheless, despite the dry conditions, that island's *Senecio marotiri* populations showed no ill effects. Therefore, provided that the locations of *S. marotiri* populations are made known to land administering authorities, and periodic monitoring of a representative sample to determine population cycles and stability is undertaken, there seems no justification for listing this species as threatened.

Conclusions

Senecio marotiri is more widespread within the Hauraki Gulf than was once believed. The species is an opportunist, utilising most near shore coastal habitats, except dense forest. Studies of several populations suggest that, despite the large quantities of viable seed produced, *S. marotiri* seems to be a naturally uncommon, sparse species. Because the majority of the known populations occur in secure, reserved, and often remote locations, and as the species seems to be tolerant of natural climatic perturbations, *S. marotiri* should no longer be viewed as threatened. This is provided that a representative population sample spanning the known range of the species is routinely monitored (see de Lange & Norton 1998). The relationship between *S. marotiri* and *S. australis* requires further study, a task which is being undertaken by the author.

Acknowledgements

I would like to thank Bec Stanley, Ian McFadden, David Norton, and Ewen Cameron for company in the field. Rhys Gardner, Peter Heenan, Bec Stanley, Colin Webb and David Norton kindly commented on the content and scope of this article. Chris Edkins provided Fig. 1 and Catherine Beard Fig. 2. My thanks to Brian Murray for providing the chromosome count reported here for Fanal Island specimens of *S. marotiri*. Lastly I thank Ngati Rehua, especially Whetu McGregor, for the goodwill and interest expressed in my studies of the Mokohinau Island flora.

References

- Belcher, R.O. 1992: Rediscovery of *Senecio australis* Willd. (Asteraceae) after nearly two centuries. *Taxon* 41: 235-252.
- Cameron, E.K.; de Lange, P.J.; Given, D.R.; Johnson, P.N.; Ogle, C.C. 1993: New Zealand Botanical Society threatened and local plant lists (1993 revision). *New Zealand Botanical Society newsletter* 32: 14-28.
- Cameron, E.K.; de Lange, P.J.; Given, D.R.; Johnson, P.N.; Ogle, C.C. 1995: New Zealand Botanical Society threatened and local plant lists (1995 revision). *New Zealand Botanical Society newsletter* 39: 15-28.
- de Lange, P.J. 1996: The vascular flora of Te Wakatehaua (The Bluff), Ninety Mile Beach. *Auckland Botanical Society journal* 51: 54-60.
- de Lange, P.J. 1998: A new northern limit for *Senecio sterquilinus*. *New Zealand Botanical Society newsletter* 52: 8-10.
- de Lange, P.J.; McFadden, I.; Cameron, E.K. 1995: Preliminary report of the flora and fauna of Fanal Island, Mokohinau Islands Nature Reserve. *Science and Research series no. 94*. Wellington, Department of Conservation.
- de Lange, P.J.; Norton, D.A. 1998: Revisiting rarity: a botanical perspective on the meanings of rarity and the classification of New Zealand's uncommon plants. *Royal Society of New Zealand miscellaneous series* 48: 145-159.
- Given, D.R. 1990: Threatened and local plant lists - New Zealand botanical region (vascular plants), September 1990 edition. Christchurch, Botany Institute, DSIR Land Resources.
- Webb, C.J. 1988a: Notes on the *Senecio lautus* complex in New Zealand. *New Zealand journal of botany* 26: 481-484

Peter J. de Lange, Science & Research Unit, Department of Conservation, Private Bag 68908, Newton, Auckland

■ The flora endemic to western Nelson

Introduction

The idea that some regions of New Zealand have more endemic species than others has a long history, dating back at least as far as Cockayne (1928). The northern South Island is one such region (Burrows 1964, 1965) and it was reported as having c. 110 endemic species by Wardle (1963), based on the distributions given in Allan (1961). This figure was increased to 155 by McGlone (1985), using data from Druce (1984). Of these, 105 were shown as being confined to an area west of the alpine fault and north of a line between Brunner and Hanmer that can best be described as north-west South Island. At the same time as these accounts were being published, A.P. Druce was compiling lists for the north-western portion of this area, which he called north-west Nelson, an area bounded by the Motueka and Hope catchments in the east, and by the Buller catchment in the south.

Despite this region including the Kahurangi National Park and reputedly having a large number of endemic taxa, an accessible list has never been available. Our aim is to provide a catalogue of the named and putative taxa, and their taxonomic relationships as a foundation for understanding regional endemism.

Method and criteria for inclusion

The New Zealand floras, published lists, unpublished lists, and accounts of vegetation of north-west South Island were searched for the mention of endemic taxa. We talked to taxonomists about the state of their unpublished knowledge. Only about half the taxa listed or mentioned are formally described with published names and there are even doubts about the taxonomic rank of some of these e.g., *Astelia nivicola* ssp. *moriceae* may warrant specific status. The other half can be referred to only by tag names and CHR herbarium numbers for "representative specimens". These fall into two groups, those with names in manuscript and those that are "working hypotheses" based mainly on field observations of A.P. Druce and others, but which may eventually prove to be worthy of formal status. Apart from those with formal names, we make no distinction here, but putative taxa for which no referable specimen could be found were excluded. We indicate genera where there are informed opinions of there being further unnamed taxa. For some genera, such as *Gentiana*, *Colobanthus*, and *Hebe*, the state of taxonomic knowledge is quite advanced, while for others such as *Craspedia*, *Euphrasia*, and *Myosotis*, the taxonomy is still very incomplete.

Preliminary investigations revealed that several taxa previously thought to be endemic to north-west Nelson, in fact have a wider distribution to the south. Several are found on the coal plateaux, while others extended as far south as the Paparoa Range and to calcareous rocks in the Glenroy catchment north of Murchison. We therefore compiled three lists:

1. The area of the North-West Nelson Ecological Region (McEwen 1987), but expanded to include that part of the North-Westland Ecological Region north of the Buller including the coal plateaux. This entire area we term western Nelson.
2. Those taxa which are found mainly in western Nelson, but which also extend south into the northern end of the Paparoa Range.
3. Those few taxa that are almost confined to western Nelson, but which being calcicoles, also extend south onto calcareous rocks in the Glenroy valley.

Both these extensions are still within the area referred to by previous authors as north-west South Island. A few taxa, marked with a cross, we consider are likely to be confined to the above areas, but they are represented by a single specimen outside of these areas. These specimens require verification. A few taxa which are widely believed to be endemic to western Nelson were found to occur in other areas: *Astelia skottsbergii*, *Hebe recurva*, and *Pseudopanax macintyreii*.

Table 1 Taxa confined to Western Nelson: (a) north of Buller, (b) including the Paparoa Range, (c) and of the Glenroy Valley calcareous rocks

Herbarium no.	Distribution	Geo.#	Main habitat	Family	Life form	Fruit	Dispersal	Floristic element (Wardle 1991, pg 11-13)												
								1	2	3	4.1	4.2	4.3	4.4	4.5					
HERBS																				
<i>Astelia niticola</i> var. <i>moriceae</i>	x	w	b	Liliaceae	erect tufted lily	berry	animal													
<i>Aciphyllia anomala</i>	x	w	a	Apiaceae	er. rosette herb	schizocarp	unspec.													
<i>Aciphyllia hookeri</i>	x	w	a	Apiaceae	er. rosette herb	schizocarp	unspec.													
<i>Aciphyllia trifoliolata</i>	x	w	a	Apiaceae	er. rosette herb	schizocarp	unspec.													
<i>Anisotome</i> 'N W Nelson'	x	w	a	Apiaceae	pr. rosette herb	schizocarp	unspec.													
<i>Bulbinella talbotii</i>	x	w	o	Liliaceae	erect lily	capsule	unspec.													
<i>Brachybotrys</i> 'Rochefort'	x	w	o	Asteraceae	rosette herb	achene	wind													
<i>Cardamine</i> 'Magneslie'	x	w	o	Cruciferae	rosette herb	siliques	unspec.													
<i>Carex dolomitica</i>	x	cc	o	Cyperaceae	rush	nut	unspec.													
<i>Carex</i> 'Brocklei'	x	cc	a	Cyperaceae	rush	nut	unspec.													
<i>Carex</i> 'Matiri'	x	cc	a	Cyperaceae	rush	nut	unspec.													
<i>Carex</i> 'Takaka'	x	cc	a, o	Cyperaceae	rush	nut	unspec.													
<i>Carex</i> 'Wakaitipu small'	x	cc	a	Cyperaceae	rush	nut	unspec.													
<i>Celmisia</i>																				
<i>Celmisia dalii</i>	x	w	a	Asteraceae	rosette herb	achene	wind													
<i>Celmisia dubia</i>	x	w	a	Asteraceae	rosette herb	achene	wind													
<i>Celmisia gibbsii</i>	x	w	a	Asteraceae	subshrub	achene	wind													
<i>Celmisia monoil</i> var. <i>'morganii'</i>	x	w	b	Asteraceae	rosette herb	achene	wind													
<i>Celmisia parva</i>	x	w	o	Asteraceae	rosette herb	achene	wind													
<i>Celmisia</i> 'Pupu'	x	w	o	Asteraceae	rosette herb	achene	wind													
<i>Celmisia rupestris</i>	x	w	a	Asteraceae	subshrub	achene	wind													
<i>Celmisia strobilis</i>	x	w	a	Asteraceae	subshrub	achene	wind													
<i>Chionochois juncea</i>	x	w	o	Poaceae	tussock grass	caryopsis	unspec.													
<i>Clematis marmoraria</i>	x	cc	a	Ranunculaceae	mat herb	achene	unspec.													
<i>Colobanthus</i> 'Marble'	x	cc	a	Caryophyllaceae	cushion herb	capsule	unspec.													
<i>Colobanthus squarrosus</i>	x	cc	a	Caryophyllaceae	cushion herb	capsule	unspec.													
<i>Colobanthus wallii</i> subsp. <i>wallii</i>	x	w	a	Caryophyllaceae	cushion herb	capsule	unspec.													
<i>Coprosma labrockii</i>	x	w	o	Rubiaceae	mat herb	drupe	animal													
<i>Craspedif</i>																				
<i>Craspedia</i> 'Calcicole'	x	cc	a	Asteraceae	rosette herb	achene	wind													
<i>Craspedia</i> 'Ganibaldi'	x	cc	a	Asteraceae	rosette herb	achene	wind													
<i>Craspedia</i> 'Fyle'	x	w	o	Asteraceae	rosette herb	achene	wind													
<i>Craspedia</i> 'Gouland Downs'	x	cc	o	Asteraceae	rosette herb	achene	wind													
<i>Craspedia</i> 'Long hairs'	x	w	a	Asteraceae	rosette herb	achene	wind													
<i>Craspedia</i> 'Lovetidge'	x	cc	a	Asteraceae	rosette herb	achene	wind													
<i>Craspedia</i> 'Lake Henderson'	x	w	a	Asteraceae	rosette herb	achene	wind													
<i>Craspedia</i> 'Pikikiruna'	x	cc	o	Asteraceae	rosette herb	achene	wind													
<i>Eupatorium</i> 'Pink'	x	c	a	Onagraceae	tufted herb	capsule	wind													
<i>Euphrasia</i>																				
<i>Euphrasia weitzsteiniana</i> +																				
<i>Euphrasia</i> 'Ganibaldi'	x	w	o	Scrophulariaceae	tufted herb	capsule	unspec.													
<i>Euphrasia</i> 'Mt. Peel'	x	c	a	Scrophulariaceae	tufted herb	capsule	unspec.													
<i>Euphrasia</i> 'Red throat'	x	w	a	Scrophulariaceae	tufted herb	capsule	unspec.													
<i>Euphrasia</i> 'Zelland'	x	w	a	Scrophulariaceae	tufted herb	capsule	unspec.													
<i>Forsteria</i>																				
<i>Forsteria mackayi</i> +																				
<i>Forsteria</i> 'N W Nelson'	x	w	a	Stylidiaceae	tufted herb	capsule	unspec.													
<i>Gentiana</i> aff. <i>delicatifolia</i>	x	c	a	Gentianaceae	tufted herb	capsule	unspec.													
<i>Gentiana</i> aff. <i>corymbifera</i>	x?	w	a	Gentianaceae	tufted herb	capsule	unspec.													
<i>Gentiana</i> 'Cobb'	x	w	o	Gentianaceae	tufted herb	capsule	unspec.													
<i>Gentiana</i> 'Decumbent'	x	w	a	Gentianaceae	tufted herb	capsule	unspec.													

Herbarium no.	Geo. #	Main habitat	Family	Life form	Fruit	Dispersal	Floristic element (Wardle 1991, pg 11-13)											
							1	2	3	4.1	4.2	4.3	4.4	4.5				
<i>Gentiana filipes</i>			Gentianaceae	annual, tufted	capsule	unspec.												
<i>Gentiana Lookout</i>	CC	a, o	Gentianaceae	cushion herb	capsule	unspec.				X								
<i>Gentiana vernicosa</i>	W	a	Gentianaceae	tufted herb	capsule	unspec.				X								
<i>Gentiana townsonii</i>	W	a	Gentianaceae	tufted herb	capsule	unspec.				X								
<i>Gingidia "Anc"</i>	CC	a	Apiaceae	tufted herb	schizocarp	unspec.												X
<i>Gingidia "Burnett"</i>	CC	a	Apiaceae	tufted herb	schizocarp	unspec.												X
<i>Hypoxis "Burgoo"</i>	W	a, o	Campanulaceae	creeping herbs	capsule	unspec.					X							
<i>Leptinella calcarea</i>	C	o	Asteraceae	creeping herb	achene	unspec.					X							
<i>Libertia "Calcareous"</i>	CC	b	Irdisaceae	tufted herb	capsule	unspec.												
<i>Luzula "Cobb"</i>	W	o	Juncaceae	tufted herb	capsule	unspec.				X								
<i>Myosotis</i>																		
<i>Myosotis angustata</i>	CC	a	Boraginaceae	tufted herb	capsule	unspec.					X							
<i>Myosotis brockiei</i>	C	o	Boraginaceae	tufted herb	capsule	unspec.					X							
<i>Myosotis concinna</i>	CC	a	Boraginaceae	tufted herb	capsule	unspec.					X							
<i>Neopaxia "Arthur"</i>	CC	a, o	Portulacaceae	creeping herb	capsule	unspec.					X							
<i>Oreopanax alpinum</i>	C	a	Euphorbiaceae	creeping herb	capsule	unspec.												X
<i>Oursia</i>																		
<i>Oursia "Hope"</i>	W	b	Scrophulariaceae	tufted herb	capsule	unspec.												X
<i>Oursia gouldiana</i>	W	o	Scrophulariaceae	tufted herb	capsule	unspec.												X
<i>Parahelbe</i>																		
<i>Parahelbe "Whiskers"</i>	CC	b	Scrophulariaceae	tufted herb	capsule	unspec.												X
<i>Poa sudicola</i>	CC	a	Poaceae	grass	caryopsis	unspec.												X
<i>Ranunculus "Burgoo"</i>	W	a, o	Ranunculaceae	creeping herb	achene	unspec.												X
<i>Ranunculus "Cobb"</i>	W	o	Ranunculaceae	creeping herb	achene	unspec.												X
<i>Ranunculus "Hope"</i>	C	a, o	Ranunculaceae	creeping herb	achene	unspec.												X
<i>Ranunculus mirus</i>	C	a	Ranunculaceae	creeping herb	achene	unspec.												X
<i>Senecio glaucophyllus</i>																		
spp. <i>glaucophyllus</i>	CC	a, o	Asteraceae	tufted herb	achene	wind												X
<i>Simplicia bucharanum</i>	C	b	Poaceae	grass	caryopsis	unspec.												
<i>Uncia "Coastal turf"</i>	W	o	Cyperaceae	sedge	nut	animal				X								
TREES AND SHRUBS																		
<i>Brachyotites hectorii</i>	C	b	Asteraceae	shrub	achene	wind												X
<i>Dracophyllum townsonii</i>	W	b	Ericaceae	small tree	capsule	unspec.												X
<i>Dracophyllum "glaucous"</i>	C	a	Ericaceae	shrub	capsule	unspec.												X
<i>Dracophyllum longifolium</i>	X	X																
var. "Serpentine"	W	o	Ericaceae	small tree	capsule	unspec.												X
<i>Hebe albicans</i> var. <i>albicans</i>	C	a	Scrophulariaceae	shrub	capsule	unspec.												X
<i>Hebe albicans</i> var. "Burnett"	CC	o	Scrophulariaceae	shrub	capsule	unspec.												X
<i>Hebe "Marble" (H. O. of Eagle)</i>	CC	a	Scrophulariaceae	shrub	capsule	unspec.												X
<i>Hebe masoniae</i>	W	a	Scrophulariaceae	shrub	capsule	unspec.												X
<i>Hebe glaucophylla</i> "N. W. Nelson"	C	a	Scrophulariaceae	shrub	capsule	unspec.												X
<i>Hebe ochracea</i>	C	a	Scrophulariaceae	shrub	capsule	unspec.												X
<i>Hebe townsonii</i>	CC	b	Scrophulariaceae	shrub	capsule	unspec.												X
<i>Pimelea</i> aff. <i>sericeovillosa</i>	W	o	Thymelaeaceae	shrub	berry	animal												X
<i>Pimelea longifolia</i> var.	W	b	Thymelaeaceae	shrub	berry	animal												X
<i>Pitiosporum delilei</i>	W	b	Pitiosporaceae	small tree	capsule	animal												X
<i>Meliclytus "Burnett"</i>	CC	b	Violaceae	small tree	berry	animal												X
<i>Myrsine "Burnett"</i>	CC	b	Myrsinaceae	small tree	drupe	animal												X
<i>Pseudowintera traversii</i>	W	b	Winteraceae	shrub	fleshy	animal												X
Totals	90	19	5	90			14	1	2	20	22	15	14	3				

* Genera where there are reputedly one or more additional endemic taxa for which herbarium specimens were not located. ++ Main habitats (a) above alpine tree line, (b) below treeline in forest or mainly on bluffs, stream sides, and ephemeral sites; (c) below treeline on non-forested areas induced by poor drainage, fertility, temperature inversion, or exposure.

Each taxon is listed with its broad distribution, degree of calcicolity, predominant habitat, family, the life form, type of fruiting body, and seed dispersal mode. Also indicated is the biogeographical history of the taxon, based on the floristic elements described by Wardle (1991). These are:

1. Genera derived directly from the ancient Miocene flora.
2. Species belonging to small, ancient Gondwanan genera of cold infertile soils.
3. Species of widespread genera which have arrived relatively recently.
4. An assemblage comprising the bulk of the New Zealand herbaceous and shrubby flora evolved during the Quaternary era. There are four subgroups:
 - 4.1 Genera cosmopolitan in cool regions but with a secondary centre of evolution in New Zealand.
 - 4.2 Genera concentrated in southern lands and with distinct species clusters in New Zealand.
 - 4.3 Genera of mostly southern distribution that have radiated from the lowlands into the mountains.
 - 4.4 Genera with their main development at high altitudes and only a few species in the lowlands.
 - 4.5 Small genera of high altitudes or latitudes that are satellites of larger genera.

Results and discussion

There are 68 taxa, either named or referable to herbarium specimens, endemic to western Nelson north of the Buller, and a further 22 taxa if we include those also found on either the calcareous rocks of the Glenroy valley or on the Paparoa range to the south (Table 1). Less than half of them are formally described.

There are about 30 herbaceous genera with a wide range of life forms (Table 1), but the taxa are concentrated in just seven genera; *Aciphylla*, *Carex*, *Celmisia*, *Craspedia*, *Euphrasia*, *Myosotis*, and *Ranunculus*. Of the eight woody genera, *Hebe* contains half the woody endemic species. Only one genus endemic to New Zealand that is confined to Western Nelson (*Oreopyranthera*), and three other small endemic genera are well represented (*Forstera*, *Pseudowintera*, *Simplicia*). Most taxa have small seeds that are readily wind dispersed and in many cases assisted by pappus hairs. Very few taxa have fleshy fruit requiring the services of an animal, including birds or lizards, (Table 1) for dispersal.

The biogeographical analysis shows that 14 taxa belong to group 1, with an ancient history and they are mainly in two genera, *Carex* and *Euphrasia*. Only three taxa belong to either group 2 or group 3, and the majority are in group 4, those considered to have evolved during the Quaternary. They are fairly evenly spread within the subdivisions of group 4 with the exception of 4.5 which has only three taxa.

Most herbaceous taxa are found mainly above tree line or in open areas below tree line caused by such factors as poor drainage (Table 1), while a few herbs, and woody taxa with the exception of *Pseudowintera traversii*, are found below tree line in topographically controlled habitats such as bluffs and stream sides. We have not determined the proportion of taxa in these altitudinal zones for the region as whole, but for New Zealand, the figure is about 13% (Wardle 1991), which shows the extreme concentration of regional endemism at higher altitudes. Approximately 30% of the taxa on our list are weak calcicoles and a further 15% are strong calcicoles, some 6.5 times the proportion of strong calcicoles, just 2.3%, found on the Tertiary limestones of the Matiri tops (Druce et al. 1987). So it appears most of the calcicolous endemics are found on the older Paleozoic calcareous rocks.

In summary, there is likely to be at least 80 taxa confined to north-west South Island, if you include the northern Paparoa Range and an additional more southerly area of calcareous rock. The endemics include very few woody plants, and most are high altitude herbs belonging to a limited number of genera. A good proportion are derived from the ancient Miocene flora, but they have mostly evolved during the Quaternary era, along with the majority of our high altitude flora. Almost half of them are to some degree calcicolous, demonstrating that not only is the absolute floristic diversity of this region greatly dependent on the geology (Williams, unpubl. data), but also the number of endemic taxa found there. To what extent this applies to other regions of New Zealand would be interesting to determine.

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References

- Allan, H.H. 1961: Flora of New Zealand. Vol. 1. Wellington, Government Printer.
- Burrows, C.J. 1964: Some discontinuous distributions of plants within New Zealand, and their ecological significance. 1. *Tuatara* 12: 125-133.
- Burrows, C.J. 1965: Some discontinuous distributions of plants within New Zealand and their ecological significance. 2. *Tuatara* 13: 9-29.
- Cockayne, L. 1928: The vegetation of New Zealand. 2nd edition. Leipzig, W. Engelmann.
- Druce, A.P. 1984: Distribution of indigenous higher plants in North Island and northern South Island, New Zealand. Unpublished report, Botany Division, DSIR.
- Druce, A. P.; Williams, P. A.; Heine, J.C. 1987: Vegetation and flora of Tertiary calcareous rocks in the mountains of western Nelson. *New Zealand journal of botany* 25: 41-78.
- McEwen, W.M. (ed) 1987. Ecological regions and districts of New Zealand. *New Zealand Biological Resources Centre publication no.5, part 3*. Wellington. Department of Conservation. 105 p. and map.
- McGlone, M.S. 1985. Plant biogeography and the late Cenozoic history of New Zealand. *New Zealand journal of botany* 23: 723-49.
- Wardle, P. 1963: Evolution and distribution of the New Zealand flora, as affected by Quaternary climates. *New Zealand journal of botany* 1: 3-17.
- Wardle, P. 1991: Vegetation of New Zealand. Cambridge University Press, Cambridge.

Peter A. Williams, Landcare Research, Private Bag 6, Nelson and **Shannel Courtney**, Department of Conservation, Private Bag, Nelson

■ Managing *Crassula ruamahanga* at its type locality and a new northern limit for the species

Crassula ruamahanga (Fig. 1) is one of 13 indigenous species of *Crassula*. First described by Kirk (1899) as *Tillaea acutifolia*, the species was described from specimens collected in the North Island from the Hurunuiorangi Pa on the banks of the Ruamahanga River, and from the South Island at Winton Forest, Southland. A new combination was made for the species in *Crassula* (Druce in Connor & Edgar 1987) as *C. ruamahanga*, the epithet "acutifolia" being preoccupied within *Crassula*. Although the exact location of the Hurunuiorangi Pa is uncertain, it was thought to be in the vicinity of Carter's Bush, a remnant alluvial podocarp forest near Carterton in the Wairarapa Plains (Bagnall & Petersen 1948; A.P. Druce pers. comm.). Carter's Bush is a Scenic Reserve, notable as a refuge for several uncommon plants, including *Crassula ruamahanga* (Wassilieff et al. 1986, as *C. acutifolia*). Sykes (1988) records the species as ranging from the Lower Ruamahanga River (Carter's Bush [c. 41° 4'S]) to Southland and Fiordland, omitting Nelson and Marlborough from its South Island distribution.

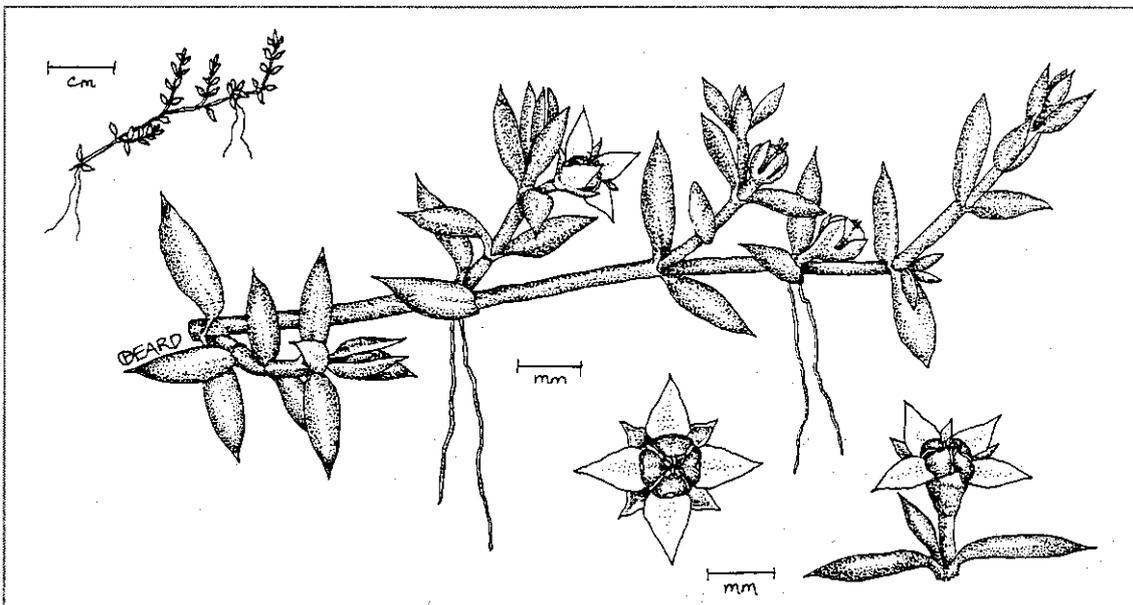


Fig. 1. *Crassula ruamahanga* drawn from cultivated specimens originally from Carter's Bush, Wairarapa.

Rogers (1989: 238) noted that *C. ruamahanga* was one of 52 species present in the South Island and southern North Island but absent further north.

During May 1997 one of us (CCO) collected a sterile piece of a *Crassula* from lakeside turf at Lake Wiritoa (39° 58'S), near Wanganui. However, because of some uncertainty over the vegetative separation of *C. ruamahanga* from *C. hunua*, CCO passed a piece of it to PdL to check its identity. This was confirmed as *C. ruamahanga*, which may be distinguished from the vegetatively similar *C. hunua* by its acute, slightly mucronate leaf tips, light yellow green colour, and lax creeping habit. Despite this assessment, specimens were kept in cultivation until they flowered, as flowers provide the chief means to distinguish between these two species (Sykes 1988). In early October the plants flowered, and from their sharply acute calyces and petals, it was clear that they were *C. ruamahanga*, thus extending the northern limit of the species by c. 150 km. A voucher of this specimen is now lodged in the Auckland Museum Herbarium (AK 234448). On 30 November 1997, CCO collected flowering material of *C. ruamahanga* (CHR 515021) in periodically submerged turf under crack willows (*Salix fragilis*) on the edge of another Wanganui dune lake. This was Kaitoke Lake, at latitude 39° 57'S, making it about 1.5 km north of the earlier collection from Lake Wiritoa, and 2 km distant, in a direct line. The two sites are in different sub-catchments of Kaitoke Stream.

In common with several other endemic species of *Crassula*, *C. ruamahanga* is a sparsely distributed and somewhat local species. Of *C. ruamahanga* Sykes (1988) stated, [it is] "very local and scattered, [found on] damp ground on stream banks under trees, damp forest clearings and margins, [it is] also a bowling green weed". An aquatic form of the species was illustrated by Johnson & Brooke (1989) who considered *C. ruamahanga* to be "very scattered; uncommon, and [a] poorly known lowland species of wet muddy hollows, damp sand, turf or riverbanks, or aquatic in shallow, still water". *C. ruamahanga* was first listed as "Rare" by Given (1990), a conservation status it has retained in subsequent revisions of the national threatened and local plant lists (Cameron et al. 1993, 1995).

Along with the majority of our indigenous *Crassula* species, very little is known about the ecology of *C. ruamahanga*. From the study of cultivated plants we know that *C. ruamahanga* is self-compatible, and probably predominantly selfing, as plants in insect-excluded cages set seed. However, one of us (PdL), has observed fungus gnats (species unidentified) visiting the faintly scented flowers and transferring pollen to receptive stigmas. The gnats presumably visit flowers to feed on the small quantities of nectar exuded by the flower. Our field observations and studies of its behaviour in cultivation suggest that *C. ruamahanga* is an opportunistic species, often taking seasonal advantage of recently disturbed ground. For instance, its persistence at Carter's Bush Scenic Reserve appears to have been accidentally enhanced by Department of Conservation weed management during winter.

At this reserve *C. ruamahanga* was discovered in several sites within the lowland podocarp forest and under crack willows by A.P. Druce and members of the Wellington Botanical Society. One of the Society members, Tom Moss, concerned over the small and apparently transitory nature of these populations transferred pieces of *C. ruamahanga* to the gravel footpath traversing the forest (T. Moss pers. comm., 1990). In this unlikely habitat *C. ruamahanga* has done remarkably well, despite the passage of numerous visitors' feet and regular winter applications of the glyphosate weed killer Roundup G2® to plants at the standard 1% rate (= 3.6 mg/l glyphosate) to keep the footpath weed-free. At a meeting reviewing the management of the various uncommon plants within the reserve in October 1994 the effect of using Roundup on the section of footpath containing *C. ruamahanga* was debated. As a result a series of trials (unfortunately not replicated) using Roundup G2®, Gallant® (haloxyfop - a grass selective killer) and sections of untreated ground were set up by GF in August 1995. After several years these interim trials have shown that *C. ruamahanga* declined in plots that were untreated due to competition from *Poa annua* and *Cardamine hirsuta*. Plants also declined in sites treated by Gallant® but increased their percentage coverage in those sites treated by Roundup G2®.

Recently, the Department of Conservation contracted NIWA to determine the tolerance ranges of wetland herbaceous species to herbicides (Champion 1998). Most native species trialled were killed by the Roundup G2® treatments. However, some species showed remarkable

tolerance to this herbicide. Plants of *Crassula ruamahanga* and *Iti lacustris* survived at all rates tested. All plants of *Crassula hunua*, *C. ruamahanga*, and *Juncus holoschoenus*, and some plants of *Hypsela rivalis* and *Iti lacustris*, were unharmed by the standard and half rates of this herbicide.

The interim trials suggest that the use of Roundup G2®, in the short-term at least, poses no immediate threat to the survival of *C. ruamahanga* at Carter's Bush. However, the long-term effects of using herbicides such as this on the environment, and in particular on the groundwater resources (G.M. Crowcroft pers. comm., 1998) still need to be reviewed.

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References

- Bagnall, A.G.; Petersen, G.C. 1948: William Colenso, - his life and journeys. Wellington, A. H. & A. W. Reed Ltd.
- Cameron, E.K.; de Lange, P.J.; Given, D.R.; Johnson, P.N.; Ogle, C.C. 1993: New Zealand Botanical Society threatened and local plant lists (1993 revision). *New Zealand Botanical Society newsletter* 32: 14-28.
- Cameron, E.K.; de Lange, P.J.; Given, D.R. Johnson; P.N.; Ogle, C.C. 1995: New Zealand Botanical Society threatened and local plant lists (1995 revision). *New Zealand Botanical Society newsletter* 39: 15-28.
- Champion, P.D. 1998: Selective control of weeds in New Zealand wetlands using herbicides. NIWA Client Report 80220, prepared for Biodiversity Recovery Unit. Wellington, Department of Conservation.
- Connor, H.E.; Edgar, E. 1987: Name changes in the indigenous New Zealand flora, 1960-1986 and nomina nova IV, 1983-1986. *New Zealand journal of botany* 25: 115-170.
- Given, D.R. 1990: Threatened and local plant lists - New Zealand botanical region (vascular plants), September 1990 edition. Christchurch, Botany Institute, DSIR Land Resources.
- Johnson, P.N.; Brooke, P. 1989: Wetland plants in New Zealand. Wellington, DSIR Publishing.
- Kirk, T. 1899: The student's flora of New Zealand and the outlying islands. Wellington, Government Printer.
- Rogers, G.M. 1989: The nature of the lower North Island floristic gap. *New Zealand journal of botany* 27: 221-242.
- Sykes, W.R. 1988: Crassulaceae. In: Webb, C.J.; Sykes, W.R.; Garnock-Jones, P.J. Flora of New Zealand. Vol. IV. Christchurch, Botany Division. 1365 p.
- Wassilieff, M.C.; Clark, D.J.; Gabites, I. 1986: Scenic Reserves of the lower North Island. *Biological Survey of Reserves series no. 14*. Wellington, Department of Lands & Survey.

Peter J. de Lange, Science & Research Unit, Department of Conservation, Private Bag 68908, Newton, Auckland; **Colin C. Ogle**, Wanganui Conservancy, Department of Conservation, Private Bag, Wanganui; **Garry Foster**, Wairarapa Area Office, Department of Conservation, Private Bag, Masterton; **Paul D. Champion**, NIWA, P.O. Box 11-115, Hamilton

■ **Yellow-flowered mistletoes on Waitaanga Plateau, North Taranaki**

Waitaanga Plateau is a dissected peneplain inland from Tongaporutu in North Taranaki, 390-540 m in elevation. Alluvium and peat have in-filled shallow valley floors to produce broad swampy flats between low hills. The plateau retains a wide variety of forest types, including forest with silver beech (*Nothofagus menziesii*) on the cold, poorly-drained plateau surface and hard beech on ridges (*N. truncata*). Although some of the indigenous forest has been cleared for pastoral farming, extensive tracts remain in both private and public tenure. Much of the remaining forest was logged in the past and some logging continues on private land.

There are conflicting reports about which species of beech mistletoes (*sensu* de Lange et al. 1997a) occur at Waitaanga or occurred here in the past (Bayfield et al. 1991; Barkla & Ogle 1997). The purpose of this note is to clarify the issue, based on findings from surveys carried out during 1994-1998.

Past mistletoe records

In 1979, A.P. Thompson reported seeing yellow mistletoe flowers in "those most interesting and unusual silver beech forests of inland Taranaki". He described the flowers as ranging in colour from red to yellow and interpreted the plants as being red-flowered *Elytranthe* (*Peraxilla*) *tetrapetala*, yellow-flowered *E. (Alepis) flavida* and hybrids between the two.

A.P. Druce (1973) listed *P. tetrapetala* as the only mistletoe he saw on visits to Waitaanga in 1958, 1960, and 1973. Subsequent authors have accepted previous Waitaanga records for *P.*

tetrapetala and *Alepis flavida* (Bayfield et al. 1991; Barkla & Ogle 1997), records of the latter species being based upon Thompson (1979). *P. tetrapetala* was re-discovered by Bruce Clarkson at Waitaanga in 1985 (Bayfield et al. 1991). On 16-18 December 1996, in north Waitaanga, John Heaphy of the then New Plymouth Field Centre, Department of Conservation, found three plants growing on separate trees of hard beech (Heaphy 1997). These three host trees were within 1 km of each other. Heaphy (pers. comm.) could not find the plant of *P. tetrapetala* on private land at Waitaanga South, recorded by Bruce Clarkson.

In 1994, John Heaphy found three plants of *P. colensoi* in south Waitaanga, growing on silver beech (*N. menziesii*). He undertook an aerial survey by helicopter of south Waitaanga in mid-January 1997 and found 11 flowering plants of *P. colensoi*. One of these he reported as having "very orange coloured flowers" (Heaphy 1997). The locations of the plants were mapped using GPS, and most were found subsequently from ground surveys, all growing on silver beech. Heaphy's discoveries of both *Peraxilla* species were the basis for the Waitaanga records in Table 1 of Barkla and Ogle (1997).

Current monitoring of *Peraxilla colensoi*

In January 1998, one of us (BW) searched for *P. colensoi*, again from helicopter, in the south Waitaanga forest. Plants found in 1997 (Heaphy 1997) proved difficult to find in 1998 as they appeared to be flowering less profusely. No new plants were found from the air, but some of the previously known plants of *P. colensoi* had yellow flowers and some had red.

Eight flowering plants were observed subsequently from the ground on 13 January 1998; four had red flowers and four had yellow. Over the next two weeks, BW noted that the yellow flowers changed to orange and then to red as they matured. There were both yellow and red flowers on the same plant. Records were made of the colour changes in one flowering plant with still photography and video.

A black and white photograph of unopened flower buds and open flowers in de Lange et al. (1995) is labelled "*Peraxilla colensoi* 'Yellow' Tuatapere S.R.", which Peter de Lange (pers. comm.) says was a fully yellow-flowered form. Jones (1997) recorded that, at Ohakune, *P. colensoi* has yellow to orange flowers but a Kaimanawa population has red flowers. Peter de Lange (pers. comm.) notes that the labels on two herbarium specimens of *P. colensoi* in WELT, from Ohakune and the Tararua Range, mention yellow flowers. In each of these cases, *P. colensoi* may be a purely yellow-flowered variant. On the other hand, in none of the cases is it reported whether the flowers were watched over the period from unopened buds to petal fall. It is possible, therefore, that at least some of the yellow or orange flowers reported in *P. colensoi* at other sites are also the result of flower ageing, as observed at Waitaanga.

Discussion

Thompson (1979) made his observations on mistletoe flower colour in silver beech forest on the Waitaanga Plateau, where we now know that the mistletoe *Peraxilla colensoi* exhibits a range of flower colours from yellow to red, depending upon the age of the flowers. Thompson did not identify *P. colensoi* at Waitaanga, instead ascribing his observed colour differences to *Alepis flavida*, *P. tetrapetala* and hybrids between the two. Because his visit was probably of short duration, Thompson did not observe that *P. colensoi* flowers change colour as they mature, in this location, at least.

We believe that, at Waitaanga, Thompson (1979) was seeing flower colour variation within *P. colensoi*, and did not see plants of *Alepis flavida* or its hybrids with *P. tetrapetala*. In support of our view, we note that there are no other records of *Alepis flavida* in the region (de Lange et al. 1997a) and, at least in the past decade, *P. tetrapetala* has been found at Waitaanga on hard beech only. The nearest currently known approach of *P. colensoi* to *P. tetrapetala* is about 9 km.

The possibility of hybrids between *A. flavida* and *P. colensoi* is rejected also by de Lange et al. (1997b), who cite evidence to show that hybrids between any of New Zealand's loranthaceous mistletoes are unlikely because they all have different karyotypes. As a result, we reject A.P. Thompson's (1979) records of *Alepis flavida* and of hybrids between *Alepis flavida* and *Peraxilla tetrapetala* on the Waitaanga Plateau in North Taranaki.

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References

- Barkla, J.; Ogle C.C. 1997. Status of loranthaceous mistletoes in the Wanganui Conservancy. Pp. 47-49 in *New Zealand's loranthaceous mistletoes: proceedings of a workshop, Cass, 17-20 July 1995* (Editors: P.J. de Lange & D.A. Norton). Department of Conservation, Wellington.
- Bayfield, M.A.; Courtney, S.P.; Wiessing, M.I. 1991. North Taranaki Ecological District. Survey report for the New Zealand Protected Natural Areas Programme. *NZ Protected Natural Areas Programme no.16*. Department of Conservation, Wanganui. 172 p.
- de Lange, P.J.; Norton, D.A.; Clegg, S. 1995. Mistletoe workshop is a resounding success! *Conservation Sciences Newsletter 15 & 16*: 2-3.
- de Lange, P.J.; Norton, D.A.; Molloy, B.J.P. 1997a. Historical distribution of New Zealand loranthaceous mistletoes. Pp. 11-22 in *New Zealand's loranthaceous mistletoes: proceedings of a workshop, Cass, 17-20 July 1995* (Editors: P.J. de Lange & D.A. Norton). Department of Conservation, Wellington.
- de Lange, P.J.; Norton, D.A.; Molloy, B.J.P. 1997b. An annotated checklist of New Zealand mistletoe hosts. Pp. 83-104 in *New Zealand's loranthaceous mistletoes: proceedings of a workshop, Cass, 17-20 July 1995* (Editors: P.J. de Lange & D.A. Norton). Department of Conservation, Wellington.
- Druce, A.P. 1973 (last revised July 1992). Vascular plants of Waitaanga Plateau, west of Taumarunui. *Checklist no. 93* (unpublished). Botany Division, DSIR, Lower Hutt. 5p.
- Heaphy, J. 1997. *Peraxilla colensoi* helicopter survey and management, South Waitaanga 1997. Unpublished file report, File PLA 10, Department of Conservation, Wanganui. 6p.
- Jones, C. 1997. Status of loranthaceous mistletoes in the Tongariro-Taupo Conservancy. Pp. 39-41 in *New Zealand's loranthaceous mistletoes: proceedings of a workshop, Cass, 17-20 July 1995* (Editors: P.J. de Lange & D.A. Norton). Department of Conservation, Wellington.
- Thompson, A.P. 1979. Mountains as I see them. *New Zealand Man and the Biosphere report no. 2*: 71-77.

Bryan Williams, Department of Conservation, PO Box 462, New Plymouth and **Colin Ogle**, Department of Conservation, Private Bag 3016, Wanganui.

■ A newly discovered grass of marble cliffs - the Riwaka "Poa"

In December, 1996 curiosity led me to a bluff system in the Riwaka catchment (near Motueka) on a "shortcut" to some marble pavement. Here I found a grass rather resembling a coarse and glaucous *Poa anceps*. On a later trip I found three large populations spread over about 2 km of rough country. The major area would amount to several thousand plants, with it being the dominant ground cover in places. Surveys of other likely areas along the Pikikiruna Range, in the western Richmond Range, and at Westhaven have located only one new area to date, in the Pikikiruna Range. Specimens and photographs have been lodged at CHR and specimens at AK. The plant has yet to be identified, but is being worked on by H.E. Connor.

The grass appears to be restricted to tall, marble bluff systems, facing the south-east that get morning sun but are shaded later in the day. It appears to occur at 600-700 m altitude, near the lowland podocarp-beech forest transition. It seems to prefer damp, somewhat shaded, sites and perhaps even some shade. The preferred soil is a silty, almost sandy loam. The largest populations are in *Olearia avicenniifolia* shrublands on slopes of between 30 and 70 degrees where canopy cover is about 50% or less. It also occurs in small canopy openings of about 6-7 m width on ledges and crevices in the rock pavement (fluted marble). It does not occur in open areas such as long rock avalanche tracks where tall fescue (*Festuca arundinacea*) is dominant. It is not browsed by goats although almost everything else seems to be!

Other associated plants include *Hebe albicans*, *Coprosma propinqua*, *Blechnum fluviatile*, *B. chambersii*, *Helichrysum bellidioides* on relatively flat sites and *Libertia grandiflora*, *Uncinia clavata* on the steeper places to *Brachyglottis monroi*, flax and *Olearia avicenniifolia* on the really steep bits, to name only the main species.

Plants form rather lax tussocks up to about 2 m across. A few tillers removed suggest that it is weakly rhizomatous. Where it is growing on the cliffs, it is quite pendulous and culms are over 150 cm long. In the shade leaves are narrower (about 0.5 cm) and longer (90 cm). In the open I found one plant with leaves of 55 cm long and 0.8 cm wide.

From about 15 measurements, average plants would have:

Leaf sheath 15-25 cm, strongly flattened, scabrid to touch. Ligule well hidden in the fold of the lower blade, short and even, with a finely ciliate top. Blade 40-70(-90) cm x 5-7(-8) mm, blue-green, folded at the base but flat for most of its length, then tapering abruptly to a sharp canoe-shaped tip. Midrib prominent above and as a keel below. Scabrid on the upper surface but margins smooth except around the collar at the junction of leaf and sheath where a few fine hairs are present. Both sheath and blade normally with a glaucous bloom. Culm 70-120-(160) cm, oval, scabrid at the nodes and towards the panicle. Panicle purplish, turning brown on drying, quite open, with scabrid branches, 15-20-(35) cm. Spikelets purplish, about 7 mm long, of 3-5 florets. Glumes about equal the lemma, but are themselves unequal. Lemma, rather narrow, c. 5 mm long, rounded on the back but with prominent veins and with a small mucro or awn.

My impressions are that the plant is well integrated in the cliff ecosystem. The isolation of the area from farmland as well as its preference for shrubland and shade suggest that it is not an adventive. I think it could be on other bluff systems elsewhere in Nelson (although most probable sites have been explored) and perhaps in the southern King Country or the Paparoa Ranges.

Graeme Jane, 136 Cleveland Terrace, Nelson.

■ ***Phragmites australis* (common reed): a potentially serious weed of New Zealand waterways**

Introduction

The aquatic and semi-aquatic grass *Phragmites australis* (Cav.) Trin. ex Steudel (= *P. communis* Trin.) is being promoted by a North Canterbury company, Oceans Environmental Engineering, NZ Ltd, as a plant which can be used to form reed beds for the purpose of removing nutrients and other pollutants from sewage effluent. *Phragmites* is a native in almost every part of the world from the tropics to the cold-temperate zones, except New Zealand. It occurs sparsely here, in cultivation and is naturalised in a few places.

Phragmites australis is classed as a "Surveillance Plant Pest" by the Canterbury Regional Council. Surveillance relates to plant pests that are known to cause serious adverse impacts in other regions and represent a potential threat to the Region. The Regional Council will seek to prevent their establishment, or spread, by prohibiting their sale, propagation and distribution. Thus, it appears that any scheme to promote *Phragmites* is illegal, as it contravenes these rules. Oceans Environmental must have one or more cultures of the plant because they have been conducting a trial at the Bromley waste water treatment plant (with approval of the C.R.C.) to test its efficacy as a reed bed nutrient stripper. This article is written to draw attention to the undesirability of trying to use *Phragmites* for this purpose.

The weed potential of *Phragmites australis* is well-known and documented elsewhere (Chapman 1996; Grime et al. 1988). The evidence is very clear that it could be a hazard in New Zealand freshwater and brackish water ecosystems. If it were to spread, by seeds, or rhizomes it could establish widely both in developed areas, in streams, drains, ponds, lakes and lagoons, as well as in unmanaged natural systems.

Nature of the Plant

Phragmites australis is a tall, rhizomatous, perennial grass which can form dense monospecific stands. It is summer green in temperate regions. The culms are frequently 2 m tall and may be up to 3 m tall. New shoots develop in spring; there may be more than 100 of the bamboo-like shoots per square metre. About 25% of the shoots can produce flower heads (Grime et al. 1988). The large panicles appear in mid-late summer. The rhizomes form a dense network over wet soil, or in shallow water. Different populations of the species have been found to have different ploidy ($x = 12$) from $2n = 36$ to $2n = 96$, with a wide range of numbers between (Chapman 1996, Grime et al. 1988).

Reproduction

In the far north of its range in the Northern Hemisphere (60°N or more), the species is usually entirely vegetative. In temperate and tropical regions nearer the equator *Phragmites* reproduces vigorously by means of its rhizomes, which can remain functional for about five years. Detached pieces of rhizome (which has aerenchyma) can float and new plants can develop from them.

Large vegetative clones develop (Grime et al 1988). *Phragmites* also sets seeds. Different populations may behave differently with viable seed numbers per inflorescence varying from a few to several thousand (Haslam 1972; Chapman 1996). The grains (attached to the lemma and with a basal whorl of long hairs) are dispersed in autumn by wind and water. Long distance dispersal capabilities are attested by its colonisation of Krakatau, Java, after the 1883 eruption (Ridley 1930).

Ecology

Phragmites australis prefers eutrophic to mesotrophic water, with pH more than 4.5. However, some ecotypes grow in acid peat. The plant is widespread in freshwater sites in lakes, ponds, rivers, streams and mires. It is also tolerant of slightly brackish water and can grow in coastal lagoons (Haslam 1972). In Britain it occurs from the coast to about 500 m altitude. In Australia it extends from tropical Queensland to temperate Tasmania.

The vigorous rhizome and shoot systems, and the height and density of the plant give it competitive advantage over other species in the same habitats. Most other species are excluded. This effect is enhanced by the winter die-down of foliage. Decay of the litter adds nutrient-rich organic material to the substrate. In the right circumstances *Phragmites* can form peat. In cultural situations (canals, drains) it is well-known as an invasive species.

Weed Potential

It is clear that, through the vigour of its rhizome development and its fecundity with respect to seed production, *Phragmites australis* is a potentially serious weed. Holm et al. (1977) say "Apart from being one of the world's most widely distributed angiosperms *Phragmites* is also one of the world's worst weeds, capable of blocking up waterways and drainage canals". My personal experience of *Phragmites* is only observational - in the Fens of East Anglia and various other locations in western Europe. However, I know that this dominant plant of fenland generates considerable costs each year for its clearance from drains and other waterways. Conscious as we should be of the costly task of dealing with aquatic and wetland plants in settled areas, it would seem to be very unwise to introduce *Phragmites* to New Zealand regions where it does not occur naturally. If it were to escape into natural ecosystems their ecology could be altered irrevocably.

References

- Chapman, G.P. 1996. The biology of grasses. Wallingford, Oxford, Commonwealth Agricultural Bureau International.
Grime, J.P., Hodgson, J.G., Hunt, R. 1988. Comparative plant ecology. London, Unwin Hyman.
Haslam, S.M. 1972. Biological flora of the British Isles: *Phragmites communis* Trin. *Journal of ecology* 60: 585-610.
Holm, L.G., Plucknett, D.L., Pancho, J.V., Herberger, J.P. 1977. The world's worst weeds. Honolulu, University Press of Hawaii.
Ridley, H.N. 1930. The dispersal of plants throughout the world. Ashford, Reeve.

Colin J. Burrows, Research Associate, Department of Plant and Microbial Sciences, University of Canterbury, Christchurch.

Comment

■ *Carex fascicularis* and *C. maorica*

There has been considerable confusion between *Carex fascicularis* and *C. maorica*, closely allied robust sedges of similar wetland habitats. They are amongst a number of *Carex* species which grow to about a metre tall, have double-folded leaves which are drooping rather than rigid, and have culms which do not usually extend further than the leaves. Their female spikes, which are reasonably large for this genus, are similar in size. These two species may be distinguished from the other large *Carex* species by the prominent cross-veinlets (visible with a hand-lens) on sheaths and leaves, especially near their bases. However, they can be difficult to distinguish from each other, especially in the field.

They have a confused taxonomic history (Hamlin 1957), beginning with Solander in 1769. During Cook's first voyage to New Zealand, Solander collected a specimen labelled in his unpublished manuscript as 'fascicularis'. It appears that this was later recognised as distinct from the *C. fascicularis* of Australia and New Guinea, and was named by Boott in 1853 in Hooker's *Flora Novae-Zelandiae* as *C. fascicularis* var. *minor*. Examples of Solander's

specimens of this taxon are in three New Zealand herbarium collections (AK, WELT and CHR). Over the next hundred years it was renamed several times by European authors and misidentified as a northern hemisphere species by Cheeseman. In 1957 it was described by Hamlin as *C. maorica*.

Carex fascicularis occurs in Australia and New Guinea (Harden 1993) as well as in New Zealand, whereas *C. maorica* is restricted to New Zealand. In New Zealand *C. fascicularis* has a strictly northern North Island distribution, with collections recorded by Hamlin (1957) from Northland, Auckland, Thames Valley and south of Hamilton at Otorohanga (38°S). However, *Carex maorica* is much more widespread, occurring throughout the country except around Gisborne and in Fiordland.

Comparative features

Carex fascicularis is a larger plant than *C. maorica* in most respects, with wider leaves, taller culms and longer spikes. Moore & Edgar (1970) describe female spikes of *C. fascicularis* as more or less distant, pedunculate and pendulous, whereas those of *C. maorica* are given as close-set, sessile, usually erect, occasionally spreading with the lowest possibly rather distant, and shortly pedunculate. Johnson & Brooke (1989) describe *C. maorica* spikes as in 'a fan-shaped cluster, erect or spreading'. Both these species have separate male spikes which are terminal, and thinner and different in appearance from the female spikes below them.

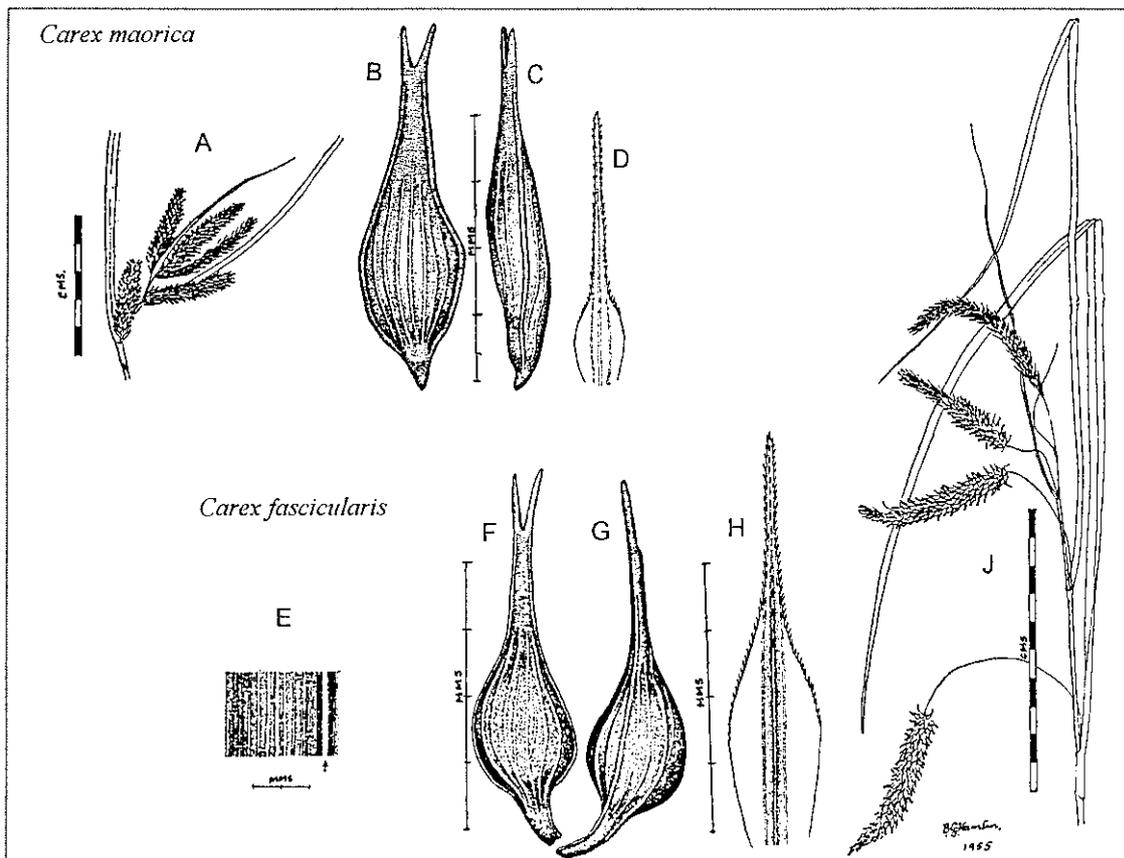


Fig. 1. *Carex maorica*: A, inflorescence; B, utricle, dorsal view; C, utricle, side view; D, glume. *C. fascicularis*: E, leaf surface showing cross-veinlets (arrow at midrib); F, utricle, ventral view; G, utricle, side view; H, glume; J, inflorescence. N.B. In side views of utricles the dorsal surface is to the left. (Reproduced with permission from Hamlin 1957: 685.)

Typical *C. fascicularis* female flower spikes are pendulous and are spread out along the culm (Fig. 1: J). The lowest spike has a longer peduncle than the others, usually longer than the spike. At least some of the leaves are more than 6 mm wide. Typical *C. maorica* has sessile rather than pendulous, clustered female spikes, sometimes with the lowest spike on a very short peduncle a little below the others on the culm (Fig. 1: A). Leaves are narrower, less than 6 mm and often only 3-4 mm wide.

In the key to *Carex* in *Flora of New Zealand, Volume III*, p. 154, these two species are separated on spike characters which are readily visible to the naked eye:

- Female spikes distant to \pm approximate, yet not clustered at one level round base of male spike
C. fascicularis
- Female spikes clustered at one level round base of male spike, rarely one spike slightly below the cluster
C. maorica

Flora of New Zealand, Volume II, p. 240, step 35, uses the same character separation. However, as each alternative quite validly indicates that considerable variation occurs, a decision may be difficult. The difference between 'approximate' and 'clustered' is subtle, and the phrase 'distant to \pm approximate' offers a daunting range of possibilities. It can be misinterpreted if a range of comparative material is not available. On herbarium sheets *C. fascicularis* spikes can appear to be at a similar level if the spikes have been arranged to lie together, and their pendulous nature may not be obvious.

Utricle shape differs slightly between the two species, those of *C. fascicularis* narrowing suddenly to a long neck or beak of almost even width, whereas those of *C. maorica* taper gradually to a widish neck (see Fig. 1).

Glumes vary in shape and length within a spike, with those at the base of the spike usually much longer than most of the others. In both species some are narrow, almost linear and others have a wide translucent margin. In *C. fascicularis* the wide margin, sometimes brownish, is more likely to extend around the swollen body of the utricle, and the narrow awn or tip extend as far as, and sometimes beyond, the tip of the utricle neck. In *C. maorica* the glumes are likely to have a short narrow translucent margin and their awns reach only to the base of the gradually tapering neck of the utricle.

Summary of Distinguishing Features (see Fig. 1)

Carex fascicularis Boott

Leaves usually >6 mm wide.

Female spikes pedunculate, the lowest peduncle usually long (= or > spike), pendulous.

Female spikes spread along culm, not clustered.

Utricle narrowed suddenly to long beak of almost even width.

Glumes (excluding awn) 2-3.5 mm long, 1-1.3 mm wide. Awns reach further than base of utricle neck.

Carex maorica Hamlin

Leaves <6 mm wide, often 3-4 mm.

Female spikes sessile, lowest sometimes with short peduncle (< spike), usually erect, not pendulous.

Female spikes close-set, clustered, lowest may be slightly below cluster.

Utricle tapers gradually to an ill-defined beak with a widish neck.

Glumes (excluding awn) c. 1.5 mm long, 0.7 mm wide. Awns usually to base of utricle neck.

Observations and Conclusions

We examined herbarium specimens of these species from NZFRI (*Forest Research* herbarium), AK (Auckland Museum herbarium), AKU (University of Auckland herbarium) and WAIK (Waikato herbarium). The specimens included some identified as *C. fascicularis* which were from well south of Hamlin's range for this species. After our examination, which led to some redeterminations, we found that the *C. fascicularis* specimens from these herbaria fell into Hamlin's range for the species, being from Northland, Auckland, and as far south as Meremere (37°34' S). All the specimens which had been labelled as *Carex fascicularis* from the Bay of Plenty/Rotorua region have been redetermined as *C. maorica*, so that in our opinion there are no vouchers in NZFRI, AK or AKU for *C. fascicularis* from the Rotorua Lakes Ecological District or from adjacent Ecological Districts.

In a small number of specimens there are characters which do not seem to fit the species descriptions. For example, leaf width can be a little narrow in otherwise typical *C. fascicularis* specimens, and in some *C. maorica* specimens' leaves can be slightly wider than described. It is assumed that local habitat factors affect leaf width more than most other characters.

We found two specimens where spike characters did not appear to match utricle characters, and in each case we used utricle shape as the deciding factor, considering it less likely to be affected by external factors. AK 214410 (Western Springs, Auckland) has spike characteristics like *C. maorica* but utricles like *C. fascicularis*. AKU 18355 (Ohakune Lakes) appears to have spike characteristics like *C. fascicularis* but utricles like *C. maorica*.

Similar Species

Species which look similar to *C. fascicularis* or *C. maorica* and can easily be confused with them include *C. forsteri*, *C. lambertiana*, *C. ochrosaccus* and *C. subdola*. *C. forsteri* differs in its large wide glumes and utricles which have a scabrid beak with an oblique orifice. It usually occurs in lowland forest, often in clearings or on track edges. *C. lambertiana* has large awned chestnut brown glumes and very short-beaked utricles. *C. ochrosaccus* is similar to *C. lambertiana* but has light cream glumes. *C. subdola* has pendulous, \pm distant spikes but the leaves are narrow and form stiff tufts. It has a short-beaked utricle and the glumes are distinctively dark red-brown with a pale midrib.

References

- Hamlin, B.G. 1957: Studies in New Zealand Carices II and III. *Transactions of the Royal Society of New Zealand* 84(4): 681-687.
- Harden, G.J. (ed.). 1993: Flora of New South Wales, Volume 4, p. 390. New South Wales University Press.
- Healy, A.J. and Edgar, E. 1980: Flora of New Zealand, Volume III, pp. 150-173. Wellington, Government Printer.
- Johnson, P.N. and Brooke, P. 1989: Wetland Plants in New Zealand, pp. 128-138. Wellington, DSIR Publishing.
- Moore, L.B. and Edgar, E. 1970: Flora of New Zealand, Volume II, pp. 238-268. Wellington, Government Printer.

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Elizabeth Miller and Chris Ecroyd, Forest Research, Private Bag 3020, Rotorua, email: millere@fri.cri.nz; ecroydc@fri.cri.nz

Herbarium Report

■ Auckland Museum Herbarium (AK) Report for 1 July 1997 to 30 June 1998

General

The main activity has been researching and collecting for the new natural history galleries due to open at the end of 1998. Field work for the galleries outside the Auckland region was conducted in the Craigieburn Ranges (December and January) and the Desert Road area in the central North Island. Despite this, databasing has continued at a reasonable rate and visitors (both groups and researchers) were accommodated. More internal demands are being made on Douglas Rogan, Botany technician, for his computer skills. The new Botany Department space (since April 1997) has been a wonderful improvement on the old area. It has been such an advantage to have increased storage and the space to spread material out.

The highlight of the year for the curator, Ewen Cameron, was to represent the New Zealand National Herbarium Network at the annual Council of Heads of Australia Herbaria (CHAH) meeting at Hobart. It was an important opportunity to share information about herbarium management and research, refresh old acquaintances and make new ones. There was time to botanise a coastal (Tasman Peninsula) and an inland area (Clear Hill) while in Tasmania.

Fifty-four percent of the herbarium is now databased (127,506 specimens). With the assistance of Lottery Board funding, databasing of existing specimens has focused on the NZ adventive species. Some 12,500 of these have been databased with many more interim-labelled and ready for databasing.

Fieldwork/Research

In association with the natural history galleries redevelopment a good collection of plant specimens was made from the Craigieburn Ranges to complement a scree-slope diorama.

Acquisitions & donated specimens

Specimens were received from the following: Jessica and Ross Beever, Steve Benham, Gillian Crowcroft, Alan Esler, Peter de Lange, Ross Fergusson, Lisa Forester, Lance Goffart-Hall, Max Goodey, Graham Hambly, Dan Hatch, Bruce Hayward, Janis Komsars, John Ogden, Wendy Patterson, Richard Parrish, Graeme Platt, Karen Riddell, Graeme Taylor, Alan Tennyson, Dick Veitch, Mike Wilcox, Linda Winch, Anthony Wright and Maureen Young.

Staff

Curator	Ewen K. Cameron
Honorary Botanist	Lucy M. Cranwell
Honorary Research Associates	Rhys O. Gardner, Jeanne Goulding
Technician	Douglas B. Rogan
Technician (contract)	Steve McCraith, Maree Johnston (part-time)

Volunteers

Botany volunteers (Chris Ashon, Joan Dow, Kay Haslett, Wendy Patterson, Vic May, Meryl Wright) contributed 1300 hours. They mounted and packeted all new specimens (3,236) and proofed thousands of new databased labels. Rhys Gardner and Peter de Lange assisted with numerous difficult identifications; Jessica Beever, John Braggins and David Glenny identified many bryophytes; and Wendy Nelson assisted with difficult algae identifications.

Visitors

There were 41 visiting researchers, including M. Rixon, P. Thomas and M. Watson from Edinburgh (E). Sixteen special interest groups visited the herbarium, varying 6-55 in numbers. During the Museum open day, 14 September 1997, the herbarium was open to the public.

Statistics

New accessions:		(1996-1997)
30 June 1998	235,866	
30 June 1997	<u>232,630</u>	
	3,236	(4,642)
Records on AKILLES electronic database:		
30 June 1998	127,506	
30 June 1997	<u>118,172</u>	
	9,334	(14,062)
Loans of specimens		
Inwards:	32 [621 spec.] from 16 institutions	(39 [959] from 11)
Outwards:	61 [2,780 spec.] from 17 institutions	(91 [2,872] to 28)
Exchange specimens		
Inwards:	440 specimens from 7 institutions	(382 from 3)
Outwards:	266 specimens to 5 institutions	(630 to 7)
Total number of specimens out on loan = 8,105 (174)		(7197)

E. K. Cameron, Curator of Botany, Auckland Museum, Private Bag 92018, Auckland

BIOGRAPHY/BIBLIOGRAPHY

■ Tribute to pioneer botanist Dr Elizabeth Flint

Dr Elizabeth Alice Flint (b. 1909) was born in London and came to New Zealand as a youngster. She has spent a life-time studying freshwater algae and their relevance to the quality of water, and with Dr Vivienne Cassie Cooper and Dr Vida Stout was among the first in New Zealand to study the latter subject. Between 1956 and 1974 when she officially retired, Elizabeth was employed by the former DSIR which made an annual grant for her part-time work. From 1979 to 1994 she collaborated with the American desmidiologist Emeritus Professor Hannah Thompson Croasdale (b. 1905) who was the senior author in preparing an illustrated account of the Desmids of New Zealand, published in New Zealand in three volumes in 1986, 1988 and 1994 (2,3,4). Elizabeth and her co-authors Hannah Croasdale and Marilyn Racine were all active in research into their old age, Marilyn dying recently at the age of 97.

Elizabeth's early education was at Sandal Dene School, New Malden, Surrey, England. She came to New Zealand in 1921 and attended St Margaret's College, Christchurch then Canterbury University College where she graduated B.Sc. (1934) and M.Sc. (1935) with a thesis entitled "The periodicity of the phytoplankton in Lake Sarah with a consideration of some ecological factors". This pioneering research for M.Sc. was published in the *Journal of Ecology* (5). She completed a Ph.D. at Queen Mary College, University of London (1940). Scholarships assisting in her education and research included the Charles Cook Warwick House Memorial Scholarship (1936), International Federation of University Women Residential Bursaries (held at Crosby Hall, London, 1936-38) and Prince and Princess of Wales Science Award (1989).

During World War II Elizabeth worked as a scientist for the Metropolitan Water Board, London (1939-43), and in the Operational Research Section with the R.A.F. Fighter and Transport Commands (1943-45). Then followed periods of lecturing in botany at Victoria University College (1947), University of Leeds (1948-50) and University of Hull (1950-55). Then from 1956-74 Elizabeth worked part-time on grants from the former DSIR to Soil Bureau and Ecology Division. Since 1987 she has worked as an Honorary Research Associate at the former DSIR's Land Resources and the later Landcare Research at Lincoln.

Elizabeth's persistence and dedication to her research was not encouraged by the difficulties she has had in securing a suitable location for her part-time work. For example, on returning to New Zealand it was necessary for her to work in Christchurch. The Department of Botany, University of Canterbury (then still on the town-site) agreed to her using their scientific equipment but at that time, the only space available for culturing soil algae was the potting-shed, adjoining the glasshouse, near the Students' Union. Then during 1966-71 when the Department moved to Ilam, a room was made available until it was needed for another botanist and Elizabeth had to leave. In the period 1971-87, Elizabeth recalls (1),

"After much searching, reasonable space was made available in Geophysics Division, DSIR at St Elmo Courts [in central Christchurch]. In 1977 the space was needed for a computer terminal and I was moved into what was a store room. In 1986/87 the Geophysics Division was disbanded and through Dr W. Harris [then Director of former DSIR's Botany Division], a room was available at Botany Division [now Landcare Research where she still works]."

Work conditions for part-time researchers in science, especially women, have improved in the last 15 years or so and one favourable outcome of the re-organisation of Government-sponsored science since 1992 might be that part-time researchers will have a more favourable environment and financial support for their work.

Elizabeth in the 1960s was drawing attention to the pollution of lakes by water blooms caused by blue-green algae (6,7,9). Elizabeth's first publication was on her M.Sc. thesis research (5) and then followed 38 publications culminating in three volumes on the Desmids of New Zealand (2,3,4) written with the senior author Emeritus Professor Hannah Croasdale. Elizabeth has also published a general account of Desmids in the *Journal of the Canterbury Botanical Society* (8).

Algae such as Desmids are sensitive indicators of pollution and may reveal changes in water quality before they are detected by chemical analyses. Beyond her formal publications, Elizabeth has been involved in significant consultative work on water quality, where her expertise on freshwater algae has been used as evidence, including: Waikato River, sewage oxidation ponds in North and South Islands; swimming pools in Christchurch; thermal pools; Lakes Forsyth, Ellesmere, and Nelson Lakes; lakes in valleys of Waimakariri and Hurunui River systems; and algae on putting greens, and a football field. Elizabeth has made submissions as an important part of evidence presented at three hearings before the Town and Country Planning Tribunal (1970, 1974, 1975).

A special feature of Elizabeth's career is her continued work in science into her 80s and at 89 she is still working on the Desmids of New Zealand (10). She is included in a notable group of older scientists who are still active in research (10,11,12). It is good to report that Elizabeth's recent hip and cataract operations were successful.

Elizabeth's honours and awards include a Fellowship of the Linnean Society, London (1942), Honorary Life Membership of the N.Z. Limnological Society (1987), the New Zealand 1990 Commemorative Medal, and an O.B.E. (1991) for services to botany.

References

(1) Biographical notes in letter from Dr Flint to A.D. Thomson, 8 August 1992. (2) Croasdale, Hannah and Flint, Elizabeth A. 1986: "Flora of New Zealand. Freshwater Algae, Chlorophyta, Desmids, With Ecological Comments On Their Habitats". Volume I. Wellington, Government Printer. 133 p. (3) _____ 1988: "Flora of New Zealand. Freshwater Algae, Chlorophyta, Desmids, With Ecological Comments On Their Habitats". Volume II. Christchurch, Botany Division, DSIR. 147 p. (4) Croasdale, Hannah; Flint, Elizabeth A. and Racine, Marilyn M. 1994: "Flora of New Zealand. Freshwater Algae, Chlorophyta, Desmids, With Ecological Comments On Their Habitats". Volume III. Lincoln, Canterbury, Manaaki Whenua Press. 218 p. (5) Flint, E.A. 1938: A preliminary study of the phytoplankton in Lake Sarah (New Zealand). *Journal of ecology* 26: 353-358. (6) _____ 1966: Toxic algae in some New Zealand freshwater ponds. *N.Z. veterinary journal* 14 (11): 181-185. (7) _____ 1969: Water blooms of blue-green algae. *N.Z. limnological newsletter* 4: 14-15. (8) _____ 1984: Desmids; what are they? *Journal of the Canterbury Botanical Society* 18: 39-51. (9) McCaskill, L. and Flint, E.A. 1970: Water blooms could become a scourge in New Zealand. *N.Z. women's weekly* 6 April: 16-18. (10) Thomson, A.D. 1996: In praise of the research achievements of older scientists. *N.Z. Botanical Society newsletter no. 44*: 24-25. (11) _____ 1997: Ella Campbell. *N.Z. Botanical Society newsletter no. 49*: 7-8. (12) _____ 1997: Tribute to Mavis Davidson pioneer forester, field ecologist and mountaineer. *N.Z. Botanical Society newsletter no. 50*: 17-19.

A. D. Thomson, Centre for Studies on New Zealand Science History, 5 Karitane Drive, Christchurch 2

■ **Biographical Notes (30): Joseph Crosby Smith (N.Z. Bot. Soc. Newsletter, June 1998)**

Addenda

1912: On 25 September at the Wellington Philosophical Society "Mr Smith exhibited and described a fine series of hand-painted lantern-slides of New Zealand wild flowers" (*TNZI* 45: 429).

1915: On 16 May the Southland Museum Board was formed and Smith was elected Chairman, representing the Southland Education Board. He was also appointed an Honorary Curator together with the teacher, Robert Gibb, who had accompanied him to Lake Hauroko in February, 1910, and the entomologist, Alfred Philpott.

Acknowledgement

I am very grateful to Mr Brian Patrick, Manager Collections & Research, Otago Museum, for drawing my attention to the Southland Museum Board.

Reference

First Annual Report of the Southland Museum Board, 1915-16.

E. J. Godley, Research Associate, Landcare Research, PO Box 69, Lincoln

■ **Biographical Notes (31): Arthur Dendy, D.Sc. (Manchester); Hon. Mem. N.Z. Inst.; FLS; F.R.S. (1865-1925)**

Professor Arnold Wall (1) described Dendy as "a short, dark, bearded man with a habitually gloomy and harassed expression and a sallow complexion"; and contemplation of Dendy's photograph in Hight and Candy's "A Short History of the Canterbury College" (2) tends to support Wall's delineation. But Wall added that Dendy "was really a very humorous person, excellent company, and full of funny stories chiefly about Methodist ministers". He was born at Patricroft near Manchester on 20 January, 1865, the son of the Rev. John Dendy, and was educated at Manchester Grammar School and Owens College (now Manchester University) (3,4).

Dendy's first position was as an Assistant Lecturer in Manchester University, and in 1886 he was awarded a Doctorate of Science by the Victoria University, Manchester (2,3). He then moved to the British Museum and worked on "Challenger" expedition sponges under S.O. Ridley; and when Ridley retired Dendy succeeded him from April-December, 1887 (2,3).

In 1888 (not 1884 as in Britten & Boulger) Dendy was appointed Demonstrator and Assistant Lecturer in Zoology at the University of Melbourne under Professor Baldwin Spencer. Here he

joined forces with A.H.S. Lucas to write "An Introduction to the Study of Botany" which appeared in 1892 (4,5). In 1893 Dendy moved to Christchurch as Lecturer in Biology at Canterbury College and on 1 February, 1894, he became Professor, succeeding F.W. Hutton who had become Curator of the Canterbury Museum (2).

On 2 May, 1894, Dendy joined the Philosophical Institute of Canterbury and was President in 1895-96 and Hon. Secretary in 1897-1901 (TNZI 27, 1895 – 33, 1901). He was interested in sponges, land planarians, the tuatara, peripatus, and the Moriori, but he did not neglect botany. Thus at the Institute on 1 November 1899 he "exhibited a specimen of *Clematis* apparently attacked by a fungus" and on 4 April, 1900 he "exhibited an experiment to show the formation of starch by green plants in the presence of sunlight" (TNZI 32: 435-36); and on 4 July, 1900 he "exhibited a newly imported auxanometer and growth lever, and a clinostat, used for investigations in vegetable physiology, and explained their use" (TNZI 33: 569).

Dendy lived on the Cashmere Hills where he had a block of about 20 acres and a cow (1). A close friend was the botanist, Leonard Cockayne, who had also attended Owens College, and who lived at New Brighton. On 1 April, 1898, Dendy and Cockayne found *Angelica trifoliolata* at Kowai River and Porters Pass (TNZI 31: 33). Later that year, in November-December, Professor Karl von Goebel of the University of Munich visited New Zealand and Cockayne (6) recalled the following incident. "At the head of the Otira Gorge, where we camped for some days, he [Goebel] collected the giant moss *Polytrichum dendroides*, saying he wished to carry out a little experiment as to the power of its vessels to conduct water to leaves. In the small room to the right of the old biological laboratory at Canterbury College the experiment was carried out. Professor Dendy was asked for various stains, none of which he possessed, so the experimenter said: 'We will use ink' and ink he did use. Seated on a low stool, smoking a huge cigar, a small towel on his knees, with a razor in the right hand, he carried all out in the twinkling of an eye."

In 1900 Dendy and Cockayne contributed consecutive articles to "Canterbury old and new, 1850-1900 : a souvenir of the jubilee". Dendy discussed "Plants and animals in Canterbury", with even more authority on plants than on animals; and Cockayne provided "A Glimpse of the Alps of Canterbury", describing mountains, rivers, and lakes. Both articles contained photographs by Cockayne. Dendy later supplied material of *Corallospartium crassicaule* for Cockayne's seedling investigations (TNZI 31: 367); and when Dendy visited the Chatham Islands in January, 1901 (TNZI 34: 1902), he overlapped with Cockayne. Another close friend was Arnold Wall who had arrived in Christchurch in February, 1899 to take up the Chair of English Language and Literature at Canterbury College. Wall (1) gives a good account of a trip that he and Dendy made to Milford Sound about 1902.

Dendy took leave on one-third pay during the 1902 session and visited England (2). He also renewed acquaintance with von Goebel in Munich (7) and it is probably no coincidence that next year Cockayne received an Honorary Doctorate of Philosophy from that University. Dendy had arranged that Charles Chilton would stand in for him during 1902. Chilton was qualified in Zoology and Medicine and was then in practice in Christchurch. But when Dendy resigned in January, 1903, and did not return to New Zealand, having been appointed Professor of Zoology at the South African College, Capetown, Chilton replaced him permanently (2,8).

In 1905 Dendy moved on to become Professor of Zoology at King's College, London. In 1906 he was elected an Honorary Member of the New Zealand Institute, and in 1908 a Fellow of the Royal Society, London, for his work on sponges. From 1907-12 he acted as Zoological Secretary for the Linnean Society. Further details of his later career can be found in (3). He died in London on 24 March, 1925. His excellent textbook "Outlines of Evolutionary Biology" appeared in 1912 and a third edition (1923) was the recommended text for General Biology at Auckland University College in the 1930s.

Eponymy

- 1898 *Dendia* "I have named the new genus *Dendia*, after Dr Dendy, Professor of Biology, Canterbury College, and this species *maritima*, from its being found growing close to the sea". R. Brown ter. TNZI 30: 411.
- 1902 *Olearia chathamica* var. *dendyi* "Hab. Pitt Island. Collected by Professor A. Dendy, after whom I have much pleasure in naming this variety". L. Cockayne TNZI 34: 320.
- 1915 *Cotula dendyi* L. Cockayne TNZI 47: 118.

Acknowledgements

I am very grateful to the late Professor R.E.F. Matthews (Auckland) for the Clark & Kelly article, and to Dr A.D. Thomson (Centre Res. N.Z. Sci. Hist., Christchurch) for the Linnean Society obituary.

References

(1) A. Wall 1965: Long and Happy: an autobiography; (2) J. Hight & Alice Candy 1927: A Short History of the Canterbury College; (3) R. Kirkpatrick 1925: Professor Arthur Dendy *Proc. Linn. Soc. London* 67-71; (4) J. Britten & G. Boulger 1931: British and Irish botanists; (5) R. Clark & M. Kelly 1994: New Zealand, New Zealanders and the Royal Society. *Notes Rec. R. Soc. Lond.* 48(1): 263-281; (6) L. Cockayne 1933: Karl Ritter von Goebel 1855-1932. *TNZI* 63: 389-91; (7) A.D. Thomson 1979: Annotated summaries of letters to colleagues by the New Zealand botanist Leonard Cockayne 1. *NZJB* 17: 392, 393; (8) W.J. Gardner, E.T. Beardsley, & T.E. Carter, 1973: A History of the University of Canterbury.

E. J. Godley, Research Associate, Landcare Research, PO Box 69, Lincoln

PUBLICATIONS

■ Journals Received

New Zealand Native Orchid Group Journal 68

(September 1998; ISSN 1170-4543) Edited by Ian St George. 39 p.

Original papers in this issue are: George Fuller - Burgess Park and *Corybas oblongus*; E.D. Hatch - The New Zealand genera 5 - *Corybas*; E.D. Hatch - Orchids of the Waitakere Ranges; G. Donaghy, G. Jane, I. St George - *Pterostylis* aff. *obtusata* - another vagrant in NZ?; J.B. Irwin - What constitutes a species?; Peter de Lange - Orchids of the Poor Knights and Mokohinau Islands.

Included is the final call for presentations and registrations for NZNOG Conference and Field Days: 4-6 December 1998 at Taylor Memorial Lodge, Ruapehu. Space is limited to 50 places. Deadline is 20 Nov. - contact **Ian St George**, 22 Orchard Street, Wadestown, Wellington.

Editor

■ Publication Announcements

A bibliography of plant checklists and vegetation data sets for areas in Wellington Conservancy. Department of Conservation, Wellington. 1998. By J.W.D. Sawyer.

The Department of Conservation has published a bibliography of over 480 plant checklists and vegetation survey datasets for areas in the Wellington Conservancy. It is a unique reference document to sources of information about plant distributions in Wellington Conservancy.

A description is provided in the report of a standard method for preparing a plant checklist. The report also shows that there are many areas in the region for which detailed plant checklists have never been compiled. Information from checklists and vegetation survey datasets have been applied by the Department of Conservation in various ways which include:

- long-term monitoring of habitat condition;
- evaluation of the relative biological importance of an area;
- determining the conservation status of indigenous plant species;
- design of pest plant control programmes; and
- development of ecological restoration initiatives.

The bibliography is available from Wellington Conservancy (address below) for \$10. Copies of plant lists not already in the bibliography may be sent to DoC for use in further development of the region's plant databases.

John Sawyer, Department of Conservation, Wellington Conservancy, PO Box 5086, Wellington. Tel: 04 472 5821; Fax: 04 499 0077; Email: jsawyer@doc.govt.nz

Etienne Raoul and Canterbury Botany 1840-1996

Edited by Colin J. Burrows. Published July 1998 by Canterbury Botanical Society and Manuka Press. 130 p. ISBN 0-473-04916-3

This book is based on papers given at a symposium, held in Christchurch, NZ in November 1996, to mark the 150th anniversary of publication of the book "Choix des plants de la Nouvelle-Zélande". Its author, Etienne Fiacre Louis Raoul, was a French naval doctor stationed at Akaroa, Banks Peninsula in 1840-43. His was the first account of Canterbury botany and it is valuable to botanists today because it includes the original descriptions and the first illustrations of many native NZ plants.

Although this book focusses on botany, it covers a great deal more. Each chapter has been written by scholars eminent in their fields of study. They show, in informative and interesting ways, how the work of Raoul and other contemporary Frenchmen has impacted on the botany, horticulture and the history and social life of this part of NZ.

The book format is A4, two column with a card cover. There are over 30 black and white drawings and photographs, and 30 photographs illustrating species of *Raoulia*.

Available from: **Manuka Press**, PO Box 12179, Beckenham, Christchurch. Fax: (03) 355 4448. Price: in NZ \$35.00 incl. GST and p&p; overseas \$35.00 plus postage

DESIDERATA

■ Information sought on *Luzula celata* Edgar

Luzula celata Edgar (see cover) is one of four cushion forming *Luzula* species endemic to New Zealand (Edgar 1966, 1970, 1980). An eastern South Island and Stewart Island species (Edgar 1970; Wilson 1987), *L. celata* was described by Edgar (1966) from specimens collected from near the Potts River Bridge in the Rangitata Valley. *Luzula celata* is appropriately named, since it is a cryptic plant of sandy hollows, river terraces, braid bars, and intermontane basins, where it is usually found hidden within or amongst *Scleranthus biflorus* and *Raoulia* mats (mainly members of the *R. hookeri* and *R. australis* aggregates). It is easily distinguished from other cushion forming species of *Luzula* by the sharp-pointed leaf-tips, the inflorescences hidden amongst the leaves, and flowers which have three stamens (Edgar 1966, 1970). In the wild plants form small grey-green, brownish cushions, usually less than 4 cm diameter (although one herbarium specimen at CHR measures c. 12 cm diameter), which are often partially buried within the surrounding substrate, such that the leaf tips and flowers are all that is visible. The illustration presented here (cover) was drawn from a plant collected from Chrystalls Beach. Wilson (1982: 549) also illustrated the species, depicting its distinctive loose, cushion-forming habit. In cultivation this habit is retained, although plants treble their size, probably as a consequence of the different nutrient levels of the potting media used (J.W. Barkla pers. comm.).

Luzula celata has always been considered a very local species, both from the few written accounts that mention this species (Edgar 1966; Wilson 1982, 1987), and from herbarium evidence. Since 1921 there have been 18 herbarium collections lodged in New Zealand herbaria, 4 of these before 1950, 13 between 1960 and 1990, and 2 in the last decade. However, the paucity of herbarium collections may possibly be the result of the elusive nature of this species, since it is easily overlooked unless one is specifically searching for it. Therefore, with a known range from the Awatere Headwaters, Marlborough to Stewart Island, it is likely that the species may have gone undetected from large parts of potential habitat.

Currently *Luzula celata* is considered to be a "Vulnerable" species (Cameron et al. 1995). The low cushion forming habit, and predilection for sites now being invaded by weeds such as *Hieracium*, *Lupinus arboreus*, and *Cytisus scoparius*, may place this species at risk. Because of these problems it is not the number of plants found at any particular site, but the quality of the habitat which is crucial to the long-term survival of *L. celata*. Already, it seems that we have lost *L. celata* from several locations in the northern part of its range, from parts of Canterbury and at

Hoopers Inlet on the Otago Peninsula (J.W. Barkla pers. comm.). As of 1998 *L. celata* has only been reliably reported from three sites, near the Waimakariri River, at Cromwell, and from Chrystalls Beach, on the Otago Coast. Its long-term future is not assured at any of these sites.

The conservation of *L. celata* requires that we have a better understanding of its distribution, co-associates, habitat requirements, and population dynamics. At present one of us (AW) is revising *Luzula* in New Zealand. As part of that research the conservation status of *Luzula celata* is being reviewed. Consequently the authors (AW in particular) would be keen to learn of any other sites of *L. celata* which Botanical Society members may be aware of.

Acknowledgements

Peter de Lange would like to thank John Barkla and Geoff Rogers for their company during a field inspection of Chrystalls Beach. We acknowledge Brian Rance, John Barkla and Brian Patrick for their comments on a draft of this article. We thank the staff of the following herbaria AK, AKU, CANU, CHR, OTA, WAIK, WELT for their assistance.

References

- Cameron, E.K.; de Lange, P.J.; Given, D.R. Johnson; P.N.; Ogle, C.C. 1995: New Zealand Botanical Society threatened and local plant lists (1995 revision). *New Zealand Botanical Society newsletter* 39: 15-28.
Edgar, E. 1966: *Luzula* in New Zealand. *New Zealand journal of botany* 4: 159-184.
Edgar, E. 1970: Juncaceae In: Moore, L.B.; Edgar, E. Flora of New Zealand. Vol. II. Wellington, Government Printer.
Edgar, E. 1980: Juncaceae In: Healy, A.J.; Edgar, E. Flora of New Zealand. Vol. III. Wellington, Government Printer.
Wilson, H.D. 1982: Field Guide: Stewart Island plants. Christchurch, Whitcoulls Ltd.
Wilson, H.D. 1987: Vegetation of Stewart Island. *New Zealand journal of botany supplement*. Wellington, DSIR.

Peter J. de Lange, Science & Research Unit, Department of Conservation, Private Bag 68908, Newton, Auckland; **Aaron D. Wilton**, Landcare Research Ltd, Private Bag 69, Lincoln, Canterbury; **Catherine Beard**, University of Waikato Herbarium, School of Biological Sciences, University of Waikato, Private Bag 3105, Hamilton

FORTHCOMING CONFERENCES/MEETINGS

■ Seed symposium

A one-day seed symposium is to be held at Massey University, Palmerston North on Tuesday, 1 December, 1998. The purpose is to act as a discussion forum for research on all aspects of seed biology in New Zealand including structure, physiology, conservation and production. Key note speakers confirmed so far are: Daphne J. Osborne (Oxford, UK), Peter Chandler (CSIRO, Canberra), Mary Leck (New Jersey, USA), David Fountain (Palmerston North, NZ), and John Hampton (Lincoln, NZ). The cost is \$35 (\$20 for students) with a dinner to be held in the evening at an additional cost of \$33.

If you would like to participate please contact either **Dr Michael McManus** (M.T.McManus@massey.ac.nz) or **Dr Heather Outred** (H.A.Outred@massey.ac.nz) by 30 October

ADDENDA NEWSLETTER 52

■ A new northern limit for *Senecio sterquilinus* (Asteraceae)

This reference was omitted:

de Lange, P.J. 1992: *Senecio sterquilinus* Ornduff in the Wellington Ecological District. *New Zealand Botanical Society newsletter* 29: 16-17.

Peter J. de Lange, Science & Research Unit, Department of Conservation, Private Bag 68908, Newton, Auckland

■ Tribute to Otago botanist Dr Brenda Shore

The article on Otago botanist Dr Brenda Shore was prepared before the article on Brenda by Professor Geoff Baylis was published in "Southern People: a dictionary of Otago Southland biography" edited by Jane Thomson, Longacre Press, Dunedin, p. 452.

A. D. Thomson, Centre for Studies on New Zealand Science History, 5 Karitane Drive, Christchurch 2

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