

**DISTRIBUTIONS OF SPECIES COMMON TO THE ALPINE
FLORAS OF NEW ZEALAND AND KOSCIUSKO NATIONAL
PARK, NEW SOUTH WALES, AUSTRALIA**

Joan E. Vickers¹

The alpine (above treeline) flora of mainland Australia is centred at Kosciusko National Park, New South Wales. Thirty-two species (Appendix I) are common to the alpine floras of Kosciusko and New Zealand (Allan 1961, Costin *et al.* 1979, Mark and Adams 1987, Moore and Edgar 1976, Thompson 1981, Wilson 1976).

Most of the plants common to alpine New Zealand and Australia are probably recently (in geological time) dispersed from one land mass to the other, and therefore relatively mobile species. Smith (1986) has proposed the hypothesis that "the bulk of the (alpine) flora has immigrated from remote, extra-Australasian sources by a series of independent seed dispersal events over long distances", in keeping with views of Raven and Raven (1973). In this case, then the group of shared species may contain many recently arrived species with extra-Australasian or cosmopolitan distributions. The group probably also contains species, belonging to genera of either Gondwanan or distant origin, which have evolved either in New Zealand or Australia.

Table 1: Distributions of species common to Kosciusko National Park and New Zealand

Region	No. of spp.
A. New Zealand+Australia +/- Tasmania	15
B. N.Z.+Aust.+/-Tas. + Subantarctic Island(s)	6
C. N.Z.+Aust.+Tas.+/-Subant.Is.+New Guinea+/-Ld.Howe I., Java, Celebes	5
D. N.Z.+Aust.+Tas.+/-Subant.Is. + S. America or Falkland	12
E. N.Z.+Aust.+Tas.+N.Guinea+Japan + S.E.Asia, Phillipines, Malesia	1
F. Cosmopolitan	<u>5</u>
Total	34

Six of 34 shared species (18%) have distributions well outside of the Southern Hemisphere (Table 1). The cosmopolitan element (15%) is

¹ 90 Ludlow Street, Chapel Hill, Queensland 4069, Australia

considerably greater than in either alpine flora alone. Only 6% of the Kosciusko alpine flora occurs well outside Australia (Smith 1986). As 93% of the New Zealand alpine flora is endemic to the New Zealand Biological Region (Mark and Adams 1986), considerably less than 7% of the flora must be cosmopolitan. The relatively high proportion of cosmopolitan species in the group of shared species is consistent with immigration of species and subsequent local differentiation into other species.

Fifteen of 34 shared alpine species (44%) are restricted to New Zealand and Australia +/- Tasmania. Another 18% occur in New Zealand and Australia/Tasmania and also extend to Subantarctic Islands. Twenty-eight of 34 species (82%) occur only in the Southern Hemisphere. Within the Southern Hemisphere, numbers of shared species also extending to other land masses decrease as distance from New Zealand, Australia and Tasmania increases. These data may include many species which have evolved in Australia or New Zealand and dispersed in the Southern Hemisphere.

Because of deficits in information as to direction of dispersal and rates of evolution, no definite biogeographical conclusions may be drawn as to the origins of these common alpine species.

Acknowledgements

Critical comments by J. Thompson have made a worthy contribution to this paper.

References

- Allan, H.H. 1961. Flora of New Zealand Vol. I. Government Printer, Wellington.
- Costin, A.B., Gray, M., Totterdell, C.J. and Wimbush, D.J. 1979. Kosciusko Alpine Flora. C.S.I.R.O./Collins, Melbourne.
- Drury, D. G. 1974. A broadly based taxonomy of *Lagenifera* section *Lagenifera* and *Solenogyne* (Compositae-Asteraceae), with an account of their species in New Zealand. *New Zealand Journal of Botany* 12, 365-96.
- Mark, A.F. and Adams, N.M. 1986. *New Zealand Alpine Plants*. (Second edition) Reed Methven, Auckland.
- Moore, L.B. and Edgar, E. 1976. *Flora of New Zealand Vol. II*. Government Printer, Wellington.

- Orchard, A.E. 1987. A revision of the *Coprosma pumila* (Rubiaceae) complex in Australia, New Zealand and the Subantarctic Islands. *Brunonia* 9, 119-38.
- Raven, P.H. 1973. Evolution of Subalpine and Alpine Plant Groups in New Zealand. *New Zealand Journal of Botany* 11, 177-200.
- Smith, J.M.B. 1986. Origins of Australasian tropicalpine and alpine floras. In Barlow, B.A. (ed.), *Flora and Fauna of Alpine Australasia, Ages and Origins*. C.S.I.R.O. , Melbourne: 109-128.
- Thompson, J. 1981. A Key to the Plants of the Subalpine and Alpine Zones of the Kosciusko Region. *Teloepa* 2, 219-297.
- Wardle, P. 1978. Origin of the New Zealand Mountain Flora, with Special Reference to Trans-Tasman Relationships. *New Zealand Journal of Botany* 16, 535-550.
- Webb, C.J. 1988. Notes on the *Senecio lautus* complex in New Zealand. *New Zealand Journal of Botany* 26, 481-484.
- Wilson, H.D. 1978. *Wild Plants of Mt. Cook National Park*. Field Guide Publications, Christchurch.

Appendix

Alpine plants common to Kosciusko and New Zealand.

A. Shared alpine species (letters following citations refer to distributions as listed in Table 1).

PTERIDOPHYTA

- Blechnum penna-marina* (Poir.) Kuhn (D)
Cystopteris fragilis (L.) Bernh. (F)
Grammitis poepiggiana (Mett.) Pichi Germ. (*G. armstrongii* (J.B. Armst.) Tindale) (B)
Lycopodium fastigiatum R. Br. (B)

ANGIOSPERMAE: Monocotyledoneae

- Caladenia lyallii* Hook. f. (A)
Carex pyrenaica Wahl. var. *cephalotes* (F. Muell.) Kük. (*Carex cephalotes* F. Muell.) (F)
Carex echinata Murr. (F)
Carex gaudichaudiana Kunth (C)
Carpha alpina R. Br. (C)
Deschampsia caespitosa (L.) Beauv. (F)
Empodisma minus (Hook. f.) L.A.S. Johnson et Cutler (A)
Erythranthera australis (Petrie) Zotov (A)
Erythranthera pumila (Kirk) Zotov (A)
Herpoliron novae-zealandiae Hook. f. (A)

Isolepis aucklandica Hook. F.) (*Scirpus aucklandicus* (Hook. f.) Boeck. (C)
Isolepis habra (Edgar) Soják (*Scirpus habrus* Edgar) (B)
Juncus antarcticus Hook. f. (B)
Trisetum spicatum (L.) Richt. (F)
Uncinia sinclairii Boott (A)

ANGIOSPERMAE: Dicotyledoneae

Chionohebe densifolia (F. Muell.) Briggs et Ehrend. (A)
Colobanthus affinis (Hook) Hook. f. (A)
Coprosma sp. (*Coprosma pumila* Hook. f.) (B)
Coprosma niphophila Orchard (A)
Drosera arcturi Hook. (A)
Epilobium tasmanicum Hausskn. (A)
Geranium microphyllum Hook. f. (*Geranium potentilloides* var. *potentilloides* L'Hérit. ex DC.) (C)
Gnaphalium nitidulum Hook. f. (A)
Gonocarpus montanus (Hook. f.) Orchard (*Haloragis procumbens* Cheesm.) (A)
Gonocarpus micranthus Thunb. (*Haloragis depressa* (A. Cunn.) Walp.) (E)
Myosotis australis R. Br. (A)
Muriophyllum pedunculatum Hook. f. (C)
Neopaxia australasica (Hook. f.) Ö. Nilss. (B)
Pentachondra pumila (J.R. et G. Forst.) R. Br. (A)
Scleranthus biflorus (J.R. et G. Forst.) Hook. f. (D)

B. Plants alpine at Kosciusko but occurring at lower levels in New Zealand.

Asplenium flabellifolium Cav.
Carex breviculmis R. Br.
Crassula sieberiana (Schult. et Schult. f.) Druce
Epilobium gunnianum Hausskn.
Isolepis crassiuscula Hook. f. (*Scirpus crassiusculus* (Hook. f.) Benth.)
Lagenifera stipitata (Labill.) Druce
Scleranthus biflorus (J.R. et G. Forst.) Hook. f.
Senecio lautus sens. lat.

C. Plants alpine in New Zealand occurring at lower levels at Kosciusko

Elymus rectisetus (Nees) Löve et Conner (*Agropyron scabrum* (R. Br.) Brown)
Muehlenbeckia axillaris (Hook. f.) Walp.
Ranunculus lappaceus Sm.
Utricularia monanthos Hook. f.

Notes

1. *Senecio lautus* Forst. f. ex Willd. ssp. *alpinus* Ali is listed for Kosciusko, and a range of *Senecio lautus* forms are found in New Zealand (Allan 1961), however Webb (1988) notes a disagreement in the literature as to whether the name *Senecio lautus* is applicable to any Australian plant and suggests that no taxa are shared.

2. *Myosotis australis* R. Br. has a rather different appearance from the plants to which the name is applied in New Zealand (M.J.A. Bulfin, quoted in Wardle 1978).

3. There is apparently disagreement as to the status of *Coprosma* spp. Thompson (1981) lists *C.* sp. (*C. pumila* auct. non Hook. f.) as found at only one alpine locality in Kosciusko National Park. Also listed by Thompson (1981) is *C.* sp., a commonly occurring Kosciusko endemic. Orchard (1987) has named this latter plant *Coprosma niphophila* Orchard, and says that it also exists in the South Island of New Zealand.

4. *Acaena* sp. (aff. *anserinifolia* (Forst. et Forst. f.) Druce) is found in subalpine and sheltered alpine areas at Kosciusko (Thompson 1981); *A. anserinifolia* is lowland to lower subalpine in New Zealand (Allan 1961, Wilson 1978).

5. *G. microphyllum* may also be present in Chile (Allan 1982).

6. *Uncinia sinclairii* is reported by Thompson (1981) and Costin *et al.* (1979) as known only from one site at Kosciusko (near Snowy River Bridge), however J. Thompson has more recently collected this plant from much further up the valley, where it did not appear to be introduced (pers. comm.).

7. *Epilobium gunnianum* is known from 2 localities on the west coast of Nelson, New Zealand, and may have dispersed from Australia to New Zealand (Raven 1973).

8. *Lagenifera stipitata* occurs only in the North Island, and Drury (1974) suggests that it may be adventive in New Zealand.

9. *Erythranthera pumila* is known only from Mt. Northcoate and Mt. Lee at Kosciusko, and could be a candidate for dispersal from New Zealand to Australia.

10. All except *Pentachondra pumila* and *Uncinia sinclairii* have small seeds (most <1mm, the remainder <2mm) or spores (Allan 1961, Costin *et al.* 1979), and Asteraceae and Poaceae (with adaptations for wind-dispersal) comprise 16% (5 of 32).