TAXONOMY, DISTRIBUTION AND ECOLOGY OF *PACHYSTEGIA* (COMPOSITAE): A PROGRESS REPORT

B. P. J. MOLLOY and M. J. A. SIMPSON

Botany Division, DSIR, Private Bag, Christchurch

SUMMARY: A brief preliminary description is given of the taxonomy, distribution and ecology of *Pachystegia* (Compositae), a genus of shrubs confined to the dry north-eastern district of the South Island, New Zealand.

INTRODUCTION

Pachystegia is a genus of small to medium-sized shrubs with thick leathery leaves and daisy-like flowers, first described by Hooker (1855) from material collected by D. Monro along the banks of the Waihopai River, Marlborough. Monro is often credited with its discovery (see Cheeseman, 1914) but Hooker (1889) gives that honour to Captain D. Rough whose name is commemorated by several native plants.

Hooker placed this plant in the genus *Olearia,* calling it *O. insignis,* meaning striking, but he noted that it had several features not typical of other olearias, e.g. the large ovoid flower head with its many overlapping bracts, and the uniseriate pappus of equal hairs, clubbed at the tips.

Later, a form of this daisy, smaller in all its parts, was described as a variety, *O. insignis* var. *minor,* by Cheeseman (1915). However, like Hooker before him, Cheeseman felt that these plants departed widely from typical olearias, and he created the new *genus-Pachystegia* (Cheeseman, 1925). Martin (1932) distinguished four races within *Pachystegia insignis* in Marlborough, including val. *minor,* although he later suggested (Martin, 1938) that the variety *minor* was worthy of specific rank. Allan (1961) followed Cheeseman's treatment and accepted *Pachystegia insignis* and P. *insignis* var. *minor*.

This paper discusses the distribution and ecology of these and other entities in the *Pachystegia* complex.

GENERAL DISTRIBUTION

Tile genus *Pachystegia* is confined to the dry North-eastern Botanical District of New Zealand (Cockayne, 1928), extending from its northern boundary, the Wairau River in Marlborough, almost to its southern boundary, the Hurunui River in Canterbury. These plants, often referred to as Marlborough rock daisies, are frequently found in coastal districts but they also extend inland to a north-south line roughly connecting Molesworth homestead in the Upper Awatere River valley and the township of Waiau. They occur from sea-level up to at least 900 metres, ascending to about 1200 metres 0:1 favoured sites. Frequent associates are two other striking shrubs, *Hebe hulkeana* and *Senecio monroi*.

THE *Pachystegia* COMPLEX

Field work and laboratory study, including flavonoid analyses (Dr J. Hemmingson, pers. comm.), indicate that at least six entities are involved in the *Pachystegia* complex. The following is a tentative arrangement:

Pachystegia insignis s.s. – leaves orbicular to oval, large; peduncles ± nude; capitula large; tomentum yellowish or buff coloured; occurs mainly between the Wairau and Clarence Rivers in Marlborough, but also as disjunct populations south of the Conway and Waiau Rivers in Canterbury.

Pachystegia A – leaves oval to elliptic, smaller; peduncles nude or leafy; capitula smaller than in P. *insignis;* tomentum whitish or yellowish; occurs from Irongate Stream in Marlborough to just south of the Conway River in Canterbury.

Pachystegia B -leaves oval to elliptic, smaller than either above; peduncles ± leafy; capitula smaller than either above; tomentum whitish; occurs inland from the Awatere River in Marlborough to the Leamington Stream in Canterbury.

Pachystegia C - val. (i) included in P. *insignis* as var. minor by Cheeseman (1925) – leaves diamond-shaped, small; peduncles ± leafy; capitula small; tomentum whitish; occurs from

the Clarence to the Puhipuhi Rivers in Marlborough.

var. (ii) – leaves obovate, otherwise similar to var. (i); confined to Ohau Point, Marlborough.

Pachystegia D –leaves ± obovate, larger than *Pachystegia* sp. B or C but smaller than the others; peduncles nude or leafy; capitula small; tomentum reddish; confined to the Haldon Hills, Marlborough.

In chromosome counts from all these entities 2n = 108 (E. J. Beuzenberg, pers. comm.). Plants representing various populations of each entity are cultivated in the Botany Division experimental gardens at Lincoln for continuing study.

Putative hybrids occurring in the wild are:

Pachystegia insignis X *Pachystegia* C var. (i)
- Clarence River.

Pachystegia insignis X *Pachystegia* D
- Haldon Hills.

Further evidence of hybridisation is being investigated in the following sympatric associations:

Pachystegia insignis and *Pachystegia* B
- Awatere River.

Pachystegia insignis and *Pachystegia* A
- Conway River.

Pachystegia A and *Pachystegia* B
- Conway River.

Pachystegia A and *Pachystegia* C var. 0)
- Puhipuhi River.

ECOLOGICAL OBSERVATIONS

Shrubs in the genus *Pachystegia* are rupestral plants usually found on steep bluffs, cliffs and other inaccessible places surrounded by grassland, scrub or forest. Whether they are restricted now in range because of excessive grazing or other depradation of their habitat is unknown. The various entities show distinct distribution patterns which appear to have remained undisturbed.

Parent materials of *Pachystegia* habitats can vary widely. They commonly grow on basic rocks in a community called bluff scrub (Wardle, 1971). Other usual habitats include outwash gravels of Pleistocene age (e.g. Leader R., Haldon Hills), indurated Trias-Jura greywacke (e.g. Mason R., Waihopai R.), Oligocene volcanics (e.g. Whales back, on the inland Kaikoura Road), Paleocene limestone (Kaikoura and vicinity), Miocene conglomerates (Kaikoura coast north of Clarence R.), and haematite (Lowry Peaks Range, North Canterbury).

Associated plants are often other shrub species commonly found in Marlborough, e.g. *Clematis aloliata, Hebe hulkeana. Senecio monroi, Sophora prostrata,* the herb *Linum monogynum* and other shrubs of wider distribution such as *Coprosma brunnea. C. propinqua. Discaria toumatou, Helichrysum aggregatum. Muehlenbeckia complexa. Olearia paniculata. Phormium cookianum* and *Rubus* spp.

The view that such rupestral communities will generally survive grazing, burning, or other forms of land use is barely tenable (cf. Wall, 1927). Fie1d studies show that many populations of *Pachystegia* have been depleted by animal browsing, especially by rabbits *(Oryctolagus cuniculus)* (in the past), sheep *(Ovis aries)* and goats *(Capra hircus),* and probably also deer *(Cervus* spp.) and opossums *(Trichosurus vulpecula).* Other populations have been depleted by road and rail construction and maintenance, and stone quarrying.

Of even greater concern is the encroachment of aggressive exotic plants, including planted trees such as pines *(Pinus* spp.), *wattles (Acacia* spp.) and gums *(Eucalyptus* spp.), on to *Pachystegia* habitats. Broom *(Cytisus scoparius)* in particular is very aggressive on rupestral sites and in some places is outnumbering and outgrowing *Pachystegia.* Because broom is classed as a noxious plant there is pressure from local authorities to eradicate it, usually by chemical means. The end result of herbicide treatment to remove exotic broom can be very damaging to *Pachystegia* and associated native plants such as *Hebe hulkeana, Sophora prostrata,* and native brooms *(Carmichaelia. Notospartium).*

Clearly there is a need to identify key sites for all the *Pachystegia* entities and to pursue a vigorous conservation policy to help protect them now and in the future. Such aspects form a continuing part of this study.

ACKNOWLEDGEMENTS

We thank Mr and Mrs S. R. Kennington and Dr P. G. Simpson for drawing to our attention *Pachystegia* (D) growing in the Haldon Hills, Marlborough, and Dr D. R. Given and Dr P. A. Williams. Botany Division, DSIR for comments on the manuscript. Robin Conway, Botany Division, DSIR prepared the cover illustration of *Pachystegia.*

REFERENCES

ALLAN, H. H. 1961. *Flora of New Zealand.* Volume I. Government Printer, Wellington, New Zealand. 1085 pp.

CHEESEMAN, T. F. 1914. *Illustrations of the New Zealand Flora.* Volume I. Government Printer, Wellington, New Zealand.

CHEESEMAN, T. F. 1915. New species of plants. *Transactions of the New Zealand Institute* 48: 210-15.

CHEESEMAN, T. F. 1925. *Manual of the New Zealand Flora*. Edition 2. Government Printer, Wellington, New Zealand. 1163 pp.

COCKAYNE, L. 1928. *The Vegetation of New Zealand*. Second Edition. Engelmann, Leipzig. 456 pp.

HOOKER., J. D. 1855. *Flora Novae-Zelandiae*. Volume 2. Reeve, London. 378 pp.

HOOKER, J. D. 1889. *Olearia insignis,* native of New Zealand. *Curtis Botanical Magazine*. *Third Series* 45: tab. 7034.

MARTIN, W. 1932. *The Vegetation of Marlborough, Blenheim, New Zealand*. Reprinted from "The Marlborough Express" with illustrations.

MARTIN, W. 1938. Notes on the indigenous flora of Marlborough (New Zealand) with special reference to plant distribution. *Transactions of the Royal Society of New Zealand* 67: 414-25.

WALL, A. 1927. Some problems of distribution of indigenous plants in New Zealand. *Transactions of the New Zealand Institute* 57: 94-105.

WARDLE, J. 1971. The forests and shrublands of the Seaward Kaikoura Range. *New Zealand Journal of Botany* 9: 269-92.