Plants not found on Mt Taranaki, such as *Schoenus pauciflorus, Bulbinella hookeri* (Plate 10) and *Coprosma* sp. (p), are locally common. Also present is a prostrate form of *Hebe odora* (Plate 13) which shows a marked tendency to spread by vegetative layering.

Several distinctive "smaller-scale" plant communities are present in the Pouakai tussockland zone. These also contain plants unknown elsewhere in the park. One such type is on an exposed ridge crest to the north of the old Pouakai Hut. Here a small whipcord hebe, *Hebe tetragona* var. [*H. subsimilis* var. *astonii*] (Plate 18) creeps over a turf composed mainly of mosses (*Racomitrium* spp.), comb sedge, and a miniature fleshy-leaved daisy *Abrotanella caespitosa*.

The common tussockland type is absent from the debris fans on the north-western slopes of Mt Taranaki. In its place is a moss–herbfield and mossfield with scattered circular patches of red tussock surrounded by mountain tutu (*Coriaria plumosa*) (see Alpine herbfield).

Alpine herbfield

On the northern, southern, and eastern slopes of Mt Taranaki, above the upper limit of red tussock (approximately 1600 m) and up to about 1675 m a.s.l. in places, the ground is completely carpeted by small plants less than 15 cm high. This class of vegetation (Appendix 7a–7c) includes true herbfield (the type in which herbs are the predominant growth form) as well as mossfield and moss-herbfield, (types in which mosses, e.g., *Racomitrium* spp., are dominant) and cushion-plant field (types dominated by cushion plants, e.g., comb sedge).

In the true herbfield, the most common plants are the mountain daisies, *Celmisia gracilenta* var. and *C. glandulosa* var. *latifolia*, everlasting daisy (*Helichrysum* sp. unnamed, "*H. alpinum*" of Cockayne, 1928), anisotome (*Anisotome aromatica*), and forstera (*Forstera bidwillii* var. *densifolia*). These are the plants which contribute most to the renowned massed flowering displays of mid to late January. The mountain daisies, everlasting daisy, and forstera are taxonomically somewhat of a problem. *Celmisia gracilenta* var. [*Celmisia major* var. *brevis*] (Plate 16) is a variety of mountain daisy endemic to Egmont National Park although other varieties are found throughout New Zealand. *Celmisia glandulosa* var. *latifolia* (Plate 15) is a broadleaved, doubtfully endemic variety of a mountain daisy found throughout New Zealand and characterised by glandular hair-covered leaves. The everlasting daisy (Plate 16) has not been formally named but is a species with close affinities to *Helichrysum bellidioides*. It differs markedly from that species in possessing much larger leaves and capitula. *H. bellidioides* is present in the park but is restricted to parts of Pouakai and Ahukawakawa Swamp. Forstera (Plate 16), a succulent-leaved member of Stylidaceae, is a doubtfully endemic variety of a widespread species. Anisotome (Plate 15), a member of the carrot family, has distinctive dissected leaves which give off a characteristic odour when crushed. Other common species are two

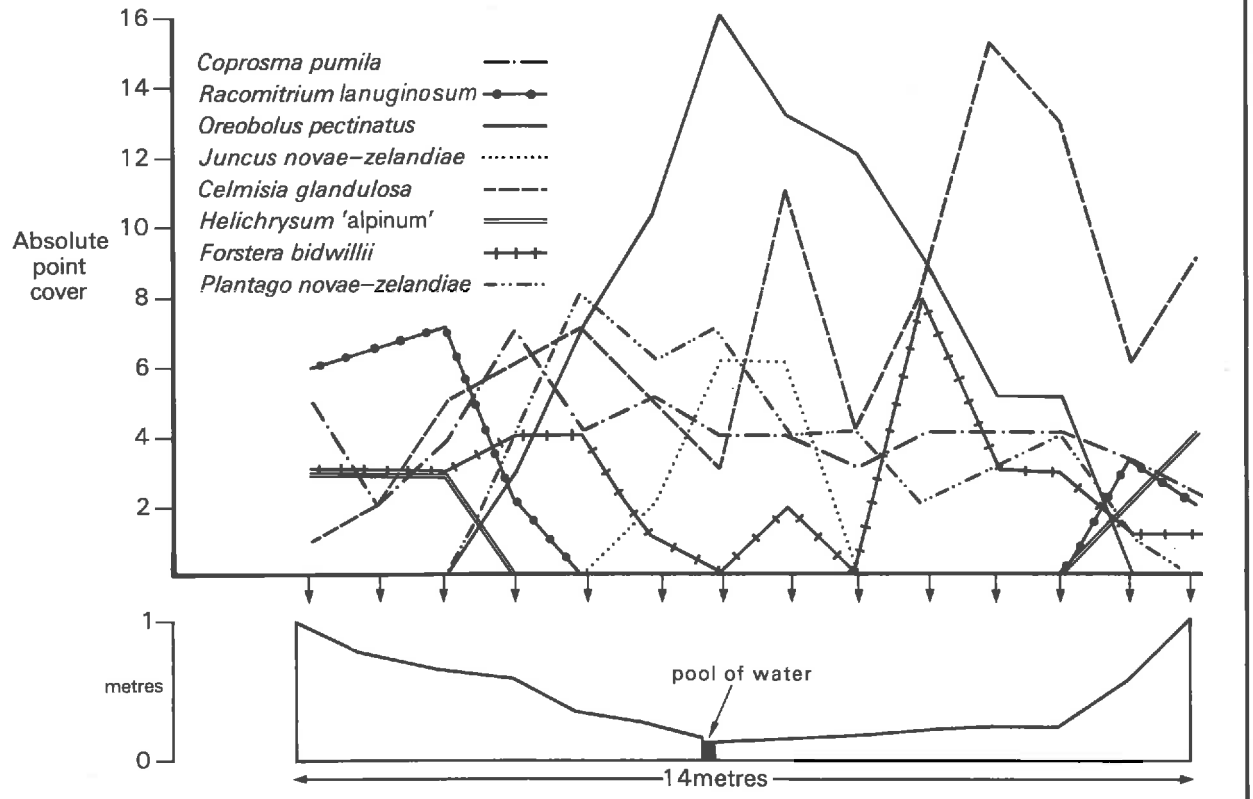
Plate 13 Subalpine and alpine tussockland

1 *Chionochloa rubra*.
(Red tussock)
a spikelet ×4.0.
b leaves and spikelets ×0.6.
c habit of plant ×0.03.

2 *Cassinia vauvilliersii*.
(Mountain tauhinu)
a apical shoot ×3.0.
b flowering branchlet ×0.6.
c branch ×0.6.
d capitulum; also cut vertically to show florets ×3.0.
e floret cut vertically ×6.0.

3 *Hebe odora*.
a flowering shoot ×3.0.
b branch of typical erect form ×0.6.
c apical shoot showing leaf arrangement ×3.0.
d branch of prostrate form ×0.6.

Figure 6



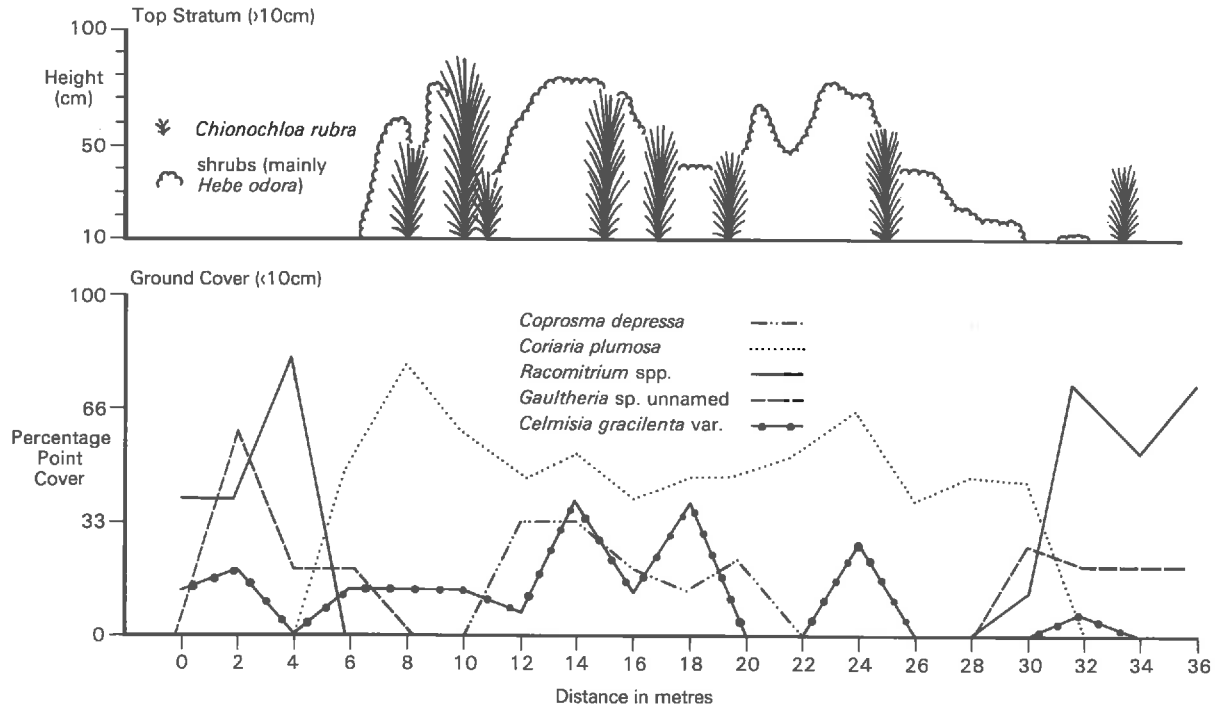
Herbfield composition near Mangahume Hut (1322 m a.s.l.).

dwarf shrubs, creeping coprosma (*Coprosma pumila*) (Plate 15), and *Gaultheria* sp. unnamed [*Gaultheria depressa* var. *novae-zelandiae*] (Plate 16), comb sedge, blue tussock (*Poa colensoi*), a club moss, *Lycopodium fastigiatum* and a moss, *Racomitrium lanuginosum* var. *pruinosum*.

Much of the variation in herbfield composition relates to microtopography and drainage. An example of the pattern, near Mangahume Hut, from Clarkson (1981), is reproduced above (Fig. 6). A miniature rush, *Juncus novae-zelandiae* inhabits the small pools; comb sedge and a native plantain, *Plantago novae-zelandiae*, dominate the hollows. *Celmisia glandulosa* var. *latifolia* and creeping coprosma are most prominent at intermediate sites, and *Racomitrium lanuginosum* var. *pruinosum* and everlasting daisy grow on higher ground.

On the western side of Mt Taranaki, moss–herbfield and mossfield extend down to virtually 1000 m a.s.l., marking the courses of former debris flows. The main mosses are *Racomitrium lanuginosum* var. *pruinosum* (Plate 15), *R. ptycophyllum*, and *R. crispulum*; the first mentioned forming distinctive grey-green hummocks. It was probably moss hummocks like these which, in 1770, caught the attention of the naturalist Joseph Banks as he scanned the mountain with an eyeglass from the deck of Cook's Endeavour. He recorded "many white lumps in companies of fifty or sixty together, which probably were stones or tufts of grass, but

Figure 7



Transect across a shrub ring on the Razorback (1396 m a.s.l.).

bore much resemblance to flocks of sheep". Most of the plants already noted as common in the true herbfield are also present in the moss–herbfield and mossfield but in much lower numbers.

Circular patches ("ring growths") of red tussock surrounded by mountain tutu (*Coriaria plumosa*) are scattered through the moss–herbfield and mossfield. Mountain tutu is well known as a coloniser of new surfaces, an ability enhanced by the symbiotic relationship with nitrogen-fixing organisms in its root nodules. The improved nitrogen status of the soils within the patches encourages the establishment and growth of red tussock and a greater range of herbs and small shrubs than in the surrounding moss–herbfield and mossfield. Circular patches of vegetation like this are clearly visible on aerial photographs of the park and occur elsewhere on Mt Taranaki, although not as extensively, especially at the upper limit of tussockland or on otherwise bare slip faces (Fig. 7).

There are marked seasonal changes in the composition of herbfield and related types; the plants one sees depends greatly on the time of year. Mountain tutu, in particular, dies back during early winter and asparagus-like new shoots reappear in late spring. Similarly, the orchid *Aporostylis bifolia* (Plate 15), often found in poorly drained herbfield, displays its single pair of brown-blotched leaves for about 7 months of the year. The flowers which are fully developed in mid-January are white with yellow markings.


a
1
b
c
d
e
c
b
2
3
a

Alpine gravelfield, stonefield, boulderfield, rockland, snowfield, and icefield

Beyond 1650 m on Mt Taranaki the plant cover becomes patchy, the dominant surface being bare substrate. Depending on the size of the substrate particles, the terms gravelfield, stonefield, or boulderfield are applicable, or in the case of residual lava, rockland. At the lower levels of this class the patches of plants are fairly substantial and include most of the species found in the herbfield, but with increasing altitude the plant cover rapidly becomes sparse and many herbfield species disappear. The vegetation pattern is complex and, apart from altitude, relates to a host of factors, including slope steepness and substrate stability, exposure, and duration of snow-lie.

The most extensive substrate type is gravelfield and most common is blue tussock gravelfield (Appendix 8c) which occurs mainly between 1700 and 1900 m a.s.l. Blue tussock, a dwarf tussock with distinctly bluish-green leaves and straw-coloured sheaths (Plate 16), is scattered through the scoriaceous gravel. Other common plants are anisotome, *Celmisia gracilenta* var., everlasting daisy, and forstera. In gravelfields above 2000 m, the total number of vascular species is usually less than 15 and plants tend to be concentrated in small depressions. A grass with a graceful drooping flowerhead, *Poa novae-zelandiae* (Plate 17), is common, and in the bases of the depressions which lose their snow cover in late summer a dwarf sedge, *Carex pyrenaica* var. *cephalotes* (Plate 17), is abundant. Also common at this altitude is a minute cushion plant, *Colobanthus* sp. unnamed (Plate 17), which has the distinction of being the vascular species which ascends the highest on the mountain, being found above 2400 m a.s.l.

Stonefields (Appendix 8b) of mobile scoria scree which frequently undermine roots and bury leaves and stems are a difficult habitat for plants. Species most commonly found in such sites are everlasting daisy, a red-stemmed willowherb, *Epilobium glabellum*, and a small-leaved trailing herb, *Montia calycina* (Plate 17).

Boulderfields occur mainly at the bases of old lava flow exposures like Humphries Castle and Warwick Castle and in valley and ravine bottoms. Those at Warwick Castle are among the best natural "rock gardens" in the park, with mosses carpeting the lower portions of the boulders and many different herbs, grasses, and ferns growing in the sheltered hollows between (Appendix 8a). In some boulderfields at higher altitude are colonies of the fern *Polystichum cystostegia* (Plate 17), the only substantiated North Island occurrence.

Rockland (Appendix 8d) is found throughout the alpine zone and ranges from vertical cliffs of eroding angular-jointed lava of old flows to intact recent flows such as the Minarapa flow. Some of the plants mentioned above still manage to grow in cracks and crevices, and lichens (*Rhizocarpon, Stereocaulon*) and mosses (*Racomitrium, Andreaea, Grimmia*) grow directly on the rock surface.

Above 2500 m the only plants present are minute mosses and

Plate 14 Subalpine and alpine tussockland

1 *Pterostylis banksii* var. *patens*.
a flowering plant ×0.6.
b front view of flower ×1.2.
c labellum ×2.5.
d side view of flower ×1.2.
e side of flower cut away to display labellum and column ×1.2.

2 *Ranunculus nivicola*.
plant with several flowers and a fruiting head ×0.6.

3 *Ourisia macrophylla* subsp. *macrophylla*.
(Large-leaved ourisia)
a flower head ×0.6.
b habit of plant ×0.4.
c top of flower head showing whorls of flowers at various stages of development ×2.5.

lichens, which can be found growing in sheltered crevices such as those on the Sharks Tooth. Snowfield and icefield are almost permanent features of the summit crater and the only plant recorded in this habitat is a single-celled alga (*Chlamydomonas* sp.) which stains the snow light red.

Miscellaneous classes occupying more than one altitudinal zone

The course of the Stony River, with its braided channel and series of flood terraces, extending from below Bells Falls to the park boundary, supports a complex of successional vegetation types. These range from pioneer types dominated by the mat daisy *Raoulia tenuicaulis* and the lichen *Stereocaulon corticatulum* to intermediate shrubland types in which any one of tutu (*Coriaria arborea* var. *arborea*), manuka, *Hebe* "egmontiana", or *H. macrocarpa* var. is prominent and finally, and most extensive of all, to late successional kanuka scrub and forest. Many plants more common at higher altitude such as silver tussock, mountain tutu (*Coriaria pteridoides*), *Celmisia gracilenta* var., and everlasting daisy are components of the early successional types found down at the park boundary.

Zones of manuka scrub, kamahi forest and rimu-rata/kamahi forest on the western margin of "Potaema Bog".
M.R. Boase.