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Photography by Doris Ryall

RANUNCULUS ANEMONEUS

ALPINE WILDFLOWERS

Contents of this Issue

While this issue is devoted principally to the wildflowers of the alpine areas of the Kosciusko National Park (pages 384-389 describe some wildflowers of Tasmania), the plant communities will be similar to those in other Australian alpine areas. They are grouped in two sections as follows:

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Page 354—Windswept Feldmark. Confined to the most windswept saddles as shown in the sketch below. Wildflowers of this feldmark are shown on pages 352, *Veronica densitolia*—356, *Euphrasia glacialis* and 396, *Epacris serpyllifolia*.

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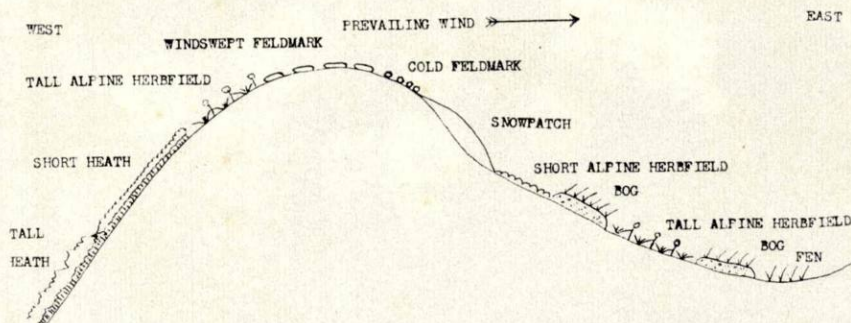
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Shown diagrammatically above is a cross-section through the crest of the range, emphasising how prevailing winds, exposure, drainage and snow accumulation determine the position of many of the plant communities of the alpine area. Page 353 illustrates a typical scene on the east facing side of the Main Range near Mt. Kosciusko.

COVER PLATE—*RANUNCULUS ANEMONEUS*

The Anemone Buttercup is a robust perennial herb with flowering stems 35 cm or more long and large deeply lobed thick leaves. Its flowers, which are borne singly or in twos or threes, are up to 6 cm across. It is confined to the Kosciusko area, usually amongst boulders on damp sheltered sites and is becoming increasingly common in the alpine and subalpine tracts of the Kosciusko National Park.

ALPINE PLANTS

THE ALPINE PLANTS OF THE KOSCIUSKO NATIONAL PARK

by Margaret Parris & D. J. Wimbush

While the massed displays of flowers are the most spectacular feature of the alpine landscape in the Kosciusko National Park in late January and February, the visitor will also notice how much the flora differs from that of other parts of Australia. He will soon be impressed by the way this flora has become adapted to its cold windswept habitat. If he probes a little deeper he will find that some of the plants of this area are very limited in distribution, having become adapted to specialised conditions, while others, particularly the herbs, are much more widespread—either because they grow under a wider variety of conditions or because the particular habitats they require are more widely distributed.

The alpine tract is defined as the area above the tree line. This occurs at about 1800 m elevation. Since it is determined by temperature, aspect and exposure to wind as well as altitude, the tree line is somewhat variable. There are many treeless frost hollows in the subalpine areas where trees do not grow because of cold air pooling and high water tables but these are not part of the alpine tract.

In spring and early summer the alpine landscape is predominantly green and silver as, in the widespread tall alpine herbfield, the silver-leaved Snow Daisy grows in close packed colonies, forming a patchwork with the Snow Grass. A much darker green adds emphasis to the rocky outcrops and other rock strewn areas where shelter from wind provides the habitat for the tall heathland. Dark reds, browns and yellows invade the landscape in autumn but in summer silver and green disappear under a carpet of white, yellow, pink and mauve as herbs and shrubs come into flower and provide the massed displays which reach their peak in late January and early February.

Both the tall alpine herbfield and the heathland are widespread in the alpine regions. In addition to these plant communities growing in well drained conditions are more specialised communities, the location of which is determined by poor drainage—the bogs and sod tussock grassland. More specialised still and with much more limited distribution are the windswept feldmarks of the exposed saddles and ridges and the cold feldmark vegetation which grows at the top and sides of receding drifts on steep slopes. Short alpine herbfield grows only in saturated ground below drifts and a specialised herbfield is restricted to very steep sheltered and rock strewn slopes. The fens are confined to wet, level or gently sloping sites where the water table is high.

The more specialised plant communities are described in Section I and the widespread plant communities and their inhabitants in Section II. Some of the plants may be recognisable from the information provided, but no attempt has been made to provide detailed descriptions. Those who require more information of this kind are referred to "Handbook to Plants in Victoria", J. H. Willis; "Flowers & Plants of Victoria", G. R. Cochrane, B. A. Fuhrer, E. R. Rotherham & J. H. Willis; "The Flora of the A.C.T.", Nancy Burbidge & Max Gray; and "Flowers of the Australian Alps", Nuri Mass. Willis provides a key only. The others have good photographs or drawings and descriptions. More detailed information, including a vegetation map, is available in "Vegetation Mapping in the Kosciusko Alpine Area" C.S.I.R.O. Division of Plant Industry Tech. Paper No. 32 by D. J. Wimbush & A. B. Costin.

I. THE SPECIALISED PLANT COMMUNITIES OF RESTRICTED DISTRIBUTION

Two specialised plant communities occur near the top of the saddles and ridges of the higher peaks of the Main Range, which run south from Kosciusko, and east of north to Mt. Carruthers and north-east to Mt. Tate.

Here the cold feldmarks occur on the sheltered sides of the saddles, and the windswept feldmarks on the tops and just below the tops on the windward side of the saddles and on the exposed ridges.

Other specialised habitats of limited distribution occur at the foot of snow drifts, amongst boulder-streams on steep sheltered slopes and on level or gently sloping sites where the water table is high.

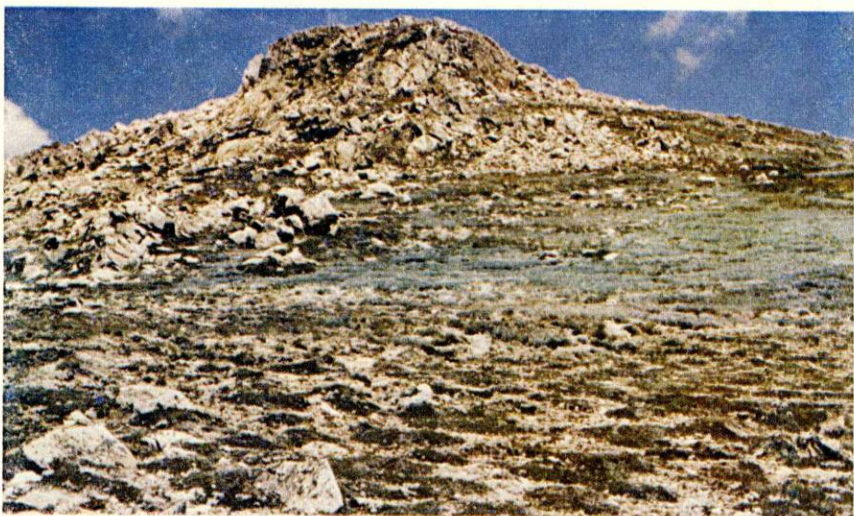


Photography by Janet Ferris

VERONICA DENSIFOLIA

A procumbent shrub confined to the windswept feldmarks (opposite) of the Kosciusko Plateau, this member of the Family Scrophulariaceae, bears conspicuous white, pink or mauve five-petaled flowers about 10 mm across, with leaves which are densely crowded on thick woody stems. It flowers soon after snow melt, which tends to be early in its windswept habitat. It grows nowhere else in Australia and may be endemic.

AN ALPINE LANDSCAPE



(Upper)—ALPINE LANDSCAPE

Photography by Shirley Dent

Here we look towards the eastern face of the Main Range of the western edge of the Kosciusko Plateau above Rawsons Creek. In the foreground *Craspedia* and *Euphrasia* species flower on the edge of a small fen. On the lower slopes in the background the patchwork of the tall alpine herbfield, dominated by *Celmisia astellifolia* and *Poa* spp., grows amongst tall heathland. Just below the area abraded by the compacted snow of big snowdrifts, the short alpine herbfield provides a carpet of bright green. Plants of the cold feldmark grow at the sides and top of the abraded areas.

(Lower) WINDSWEPT FELDMARK

Photography by Shirley Dent

This windswept feldmark is high on the western face of the Etheridge Range, just east of Mt. Kosciusko, below a small saddle and it borders a tall alpine herbfield community. The discontinuous shrub cover is provided by *Epacris microphylla*, *E. petrophila* and *Veronica densifolia*. *Euphrasia alsa* and a dwarfed *E. glacialis* (photograph page 356) grow amongst the shrubs. On its margins *Helipterum albicans* subspecies *alpinum* and a feldmark form of *Leptorhynchus squamatus* are found.

The Windswept Feldmark

This feldmark flora is confined to the most windswept saddles and ridges at the top of the range, and is also found in Victoria and Tasmania in similar situations. Wind is probably the controlling factor in the micro-climate of these areas. The shallow rock strewn soils owe their existence partly to the direct effect of the wind, partly to their emergence from snow cover soon after heavy snowfalls cease, since snow build-up is prevented by wind. They are exposed, therefore, to long periods of frost heave and repeated freeze and thaw cycles. The soil is low in humus as well, since plant particles tend to blow away. The effect of the wind is also to ensure that the plant profile is kept low, and some plants only survive where rocks or the prostrate shrubs of this plant community provide some shelter. The prolonged period of exposure to the freeze and thaw cycle after snow melt inhibits the growth of seedlings and, in fact, only three of the twenty or so plants of this community are annuals. Wind-blown rock particles and gravel add to the difficulties of establishment and survival.

What shelter there is on these sites is provided by low outcrops of rock, loose rock and the prostrate shrubs. Shelter is mainly provided by two species of heath, *Epacris microphylla* and *E. petrophila*, and *Veronica densifolia**. The latter possibly an endemic has mauve, pink or (rarely) white, five-petalled flowers much larger than the tiny crowded leaves. *Drapetes tasmanica*, a close relative of the rice flowers, is too small and cushion-like to provide much shelter, while the Carpet Heath, *Pentachondra pumila*, itself takes every advantage of the shelter provided by rocks in both windswept feldmark and heathland. Its tiny white heath-like flowers appear at the same time as the larger bright red fruits set the season before.

The other plants of this community are herbs. These include a dwarf wallaby grass, *Danthonia nivicola*, a very small species of rush, *Luzula oldfieldii*, two species of *Colobanthus* of which one, *C. affinis*, with grass-like leaves, is more common in the herbfield. The other species forms hard little cushions and has tiny golden flowers. *Scleranthus singuliflorus* forms softer and larger moss-like cushions. The two *Euphrasia* species of these windswept feldmarks are tiny but conspicuous when in flower. *E. alsa*, an endemic, has pale mauve petals veined with navy blue and flowers early. A later flowering species is similar but not conspicuously veined. Another early flowerer is the feldmark variety of the Felted Buttercup, *Ranunculus muelleri*. Its petioles and scapes are both shorter than in the type form. Its leaves are densely clothed in short hairs and are either entire or tri-lobed at the apex, and it is another endemic.

The family Asteraceae is well represented in this plant community. The Australian Edelweiss, the pink or white-flowered *Ewartia nubigena*, forms silvery cushions or mats depending on the amount of shelter available. The blue-flowered *Brachycome aculeata* tends to be a little taller, as is the Alpine Sunray, *Helipterum alpicans subsp. alpinum*, with white papery floral bracts and thick silver-hairy leaves. It favours a less extreme environment where feldmark abuts herbfield.

The windswept feldmarks are often seen to lie on the upper surface of small step or lobe like terraces, several metres in length and breadth and sometimes a metre or so high. The steep face of the step usually follows the contour, dipping slightly on the windward side and may be covered in tall herbfield species, mainly *Poa*. A whole slope below a crest (as for instance on the upper south western face of Mt. Clarke) may be therefore covered by an irregular staircase of alternating herbfield and feldmark. These features are the result of slumping during freeze—thaw cycles when the area was emerging from the last glacial period.

* This species is certainly not a *Veronica* although known as this name to date. The species is under revision.

The Cold Feldmark

On the sheltered side of the saddles and in other sheltered places high on the Main Range, there is a big build-up of snow into long lasting drifts. These areas are abraded by compacting snow and it is difficult for plants to become established there. Exposure to wind is not a factor, but the areas at the top and sides of the receding drifts, where snow melts early, are cold and dry, rock strewn and shallow soiled, as a result of the prolonged freeze thaw cycle. This plant community is apparently not represented elsewhere in Australia.

There are only six or seven species able to survive in this inhospitable habitat. The dominant is a prostrate shrub, *Coprosma pumila*, with bright red succulent fruits, whose male and female flowers are borne on different plants. A species of *Colobanthus* grows here as well as on the wind-swept feldmark. *Epilobium tasmanicum*, with small white flowers, prefers the shelter of rocks, while the feldmark form of *Ranunculus muelleri* is not so particular about shelter. The large white Anemone Buttercup can also be found growing in this cold, rocky habitat, although it produces bigger flowers in the more favourable conditions of the tall alpine herbfield.

The Short Alpine Herbfield

Below the drift the contrast is complete. Here a plentiful supply of icy cold water provides the habitat for the short alpine herbfield, which often appears as a continuous flat carpet of herbaceous plants, although in places the community is discontinuous and rock strewn. Dominant in the short alpine herbfield is a member of the family Portulacaceae, *Neopaxia australasica* and two plantains, *Plantago glacialis* and *P. muelleri* which have flat starry rosettes of triangular leaves with spikes of inconspicuous flowers. They often grow close enough together to form continuous carpets. *Neopaxia* may be white or pink and its fleshy leaves are bright green. A number of sedges grow here and sometimes form a storey above the carpeting plants.

The first of the short alpine herbfield plants to flower is the Alpine Marsh Marigold, *Caltha introloba*, with white (rarely pink) flowers, whose centres are diffused with dark red as they age. The bright green shiny leaves of this plant have distinctive lobes at the base. The closely related snow-loving buttercup, the endemic *Ranunculus niphophilus*, like *Caltha*, has larger flowers than most of this plant community. *Cardamine*, Bitter Cress, has fairly large white flowers and grows here amongst rocks as well as in the type of tall alpine herbfield which often borders it.

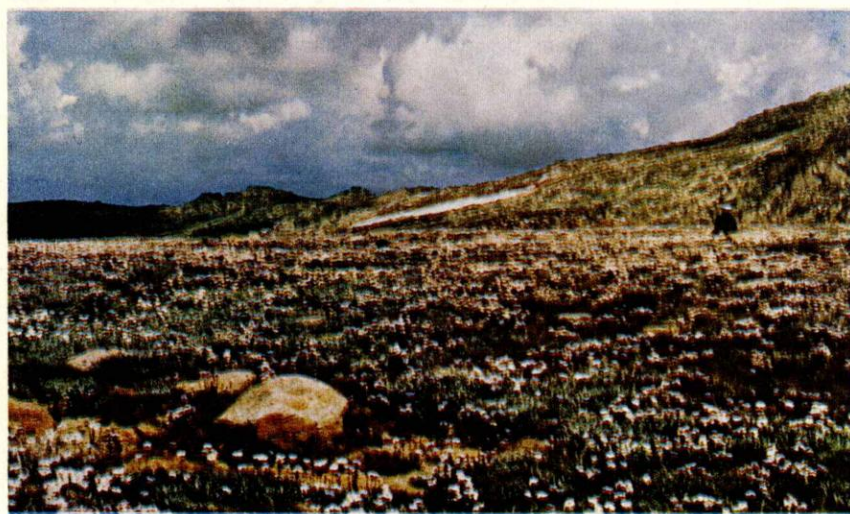
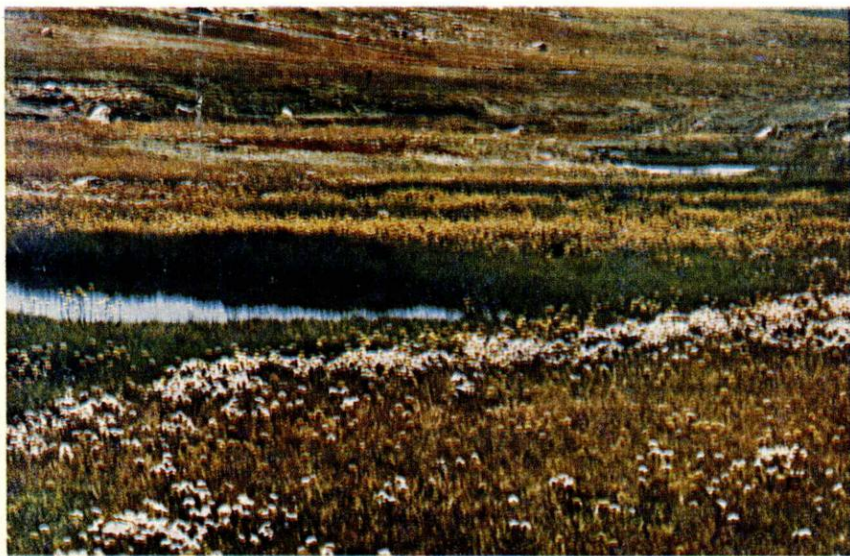
A carpeting plant with tiny but conspicuous scented yellow flowers is *Stackhousia pulvinaris*, also found in moist situations in sod tussock grassland and tall alpine herbfield. Most of the mat plants have very small white, cream or green flowers. These include the tiny *Oreomyrrhis pulvinifera*, whose flowers are white backed by green bracts, *Dichosciadium ranunculaceum* whose slightly larger white flowers are often borne in circlets. Another member of the family Apiaceae, to which the last-mentioned two plants belong, is *Diplaspis hydrocotylea* with inconspicuous green flowers on stems which elongate after flowering. The most distinctive feature of this mat plant is the shape of its small shiny rounded leaves. Four mat-forming members of the family Asteraceae also grow here. Both *Abrotonella nivigena* and *Parantennaria uniceps* are very small plants with creamy flower heads and basal rosettes of small leaves. *Brachycome stolonifera* forms larger mats with taller white flower heads. Like *Erigeron setosa*, a tiny white composite with very hairy leaves, it is endemic to the Kosciuszko Plateau. A mat-forming sundew, *Drosera arcturi* grows here and in the bogs, and has small strap-like leaves and tiny white flowers. It is easily identified by the long sticky hairs on its leaves which glisten in the sun. A specialised small species of *Craspedia* with white flower heads and narrow silvery leaves grows on the border of this community.



Photography by Janet Ferris

EUPHRASIA GLACIALIS—Feldmark Form

A dwarfed form of the widespread alpine *Euphrasia*, *E. glacialis*, is found on the windswept feldmarks. It is a conspicuous plant because of its comparatively large flowers which are up to 15 mm across. Here it grows with a feldmark *Epacris*, *Ranunculus muelleri* var. *brevicaulis* (colour plate page 361) and *Luzula oldfieldii* on phyllites near Mt. Northcote. The last two are also endemic.



(Upper)—ALPINE FEN

Photography by Doris Ryall

Occupying level or gently sloping situations where the water table is high, the alpine fens are a feature of the broad flat-bottomed river valleys of the headwaters of the Snowy River and its tributaries. Here in the valley of Rawson Creek two fens, dominated by the bright green sedges *Carex gaudichaudiana* and *C. hypandra* are seen among the herbfield species of *Craspedia* and *Euphrasia*.

(Lower)—TALL ALPINE HERBFIELD

Photography by Janet Ferris

Celmisia astellifolia—*Poa* spp. alliance

On the Ramshead Range near Kosciusko tall alpine herbfield provides a massed display of *Celmisia astellifolia* and *Euphrasia* spp. In flower in January.

Tall Alpine Herbfield

(*Brachycome nivalis*-*Danthonia alpicola* alliance)

This type of tall alpine herbfield is dominated by *Brachycome nivalis* var. *nivalis*, a white-flowered daisy with finely divided leaves, and a wallaby grass, *Danthonia alpicola*, and is limited to precipitous boulder-strewn slopes on sheltered hillsides. It contains a number of shade-loving species, including four species of fern. The robust *Polystichum proliferum* is the most conspicuous, but equally common is the much smaller creeping *Blechnum pennamarina*. Two delicate ferns *Asplenium flabellifolium*, which is widespread at lower altitudes and the rare *Cystopteris fragilis* are harder to find. An important plant of this community is the large white Anemone Buttercup, *Ranunculus anemoneus*, with white flowers 5 cm. in diameter and large dark green deeply dissected leaves. It is confined to the Kosciusko area.

Other shade-loving plants include *Schizeilema fragoseum*, a fragile member of the family Apiaceae, and *Gnaphalium umbricola*, often found well under overhanging rocks. *Brachycome nivalis* and a species of *Cardamine* like the deep soil of rock crevices, while the more open sites are occupied by Alpine Celery, *Aciphylla glacialis*, growing amongst *Poa* and *Danthonia* species. Alpine Celery bears its large creamy male inflorescence on one plant, its less showy, more slender female inflorescence on another. Both have much divided stiff green leaves. Also out in the open will be found a perennial herb of the Rosaceae, *Alchemilla*, with palmate leaves and heads of green flowers. It grows in great abundance in such locations as Club Lake. *Helipterum anthemoides*, a bushy paper daisy with small white flower heads, grows in the open, but does not extend far into the alpine tract. It can be seen near Hedley Tarn.

Fen

The alpine fen communities are confined to wet, level or gently sloping sites, such as occur along permanent waterways in valleys or on flats where the water table is high, and are somewhat limited in species. They may also occur as pockets within *Sphagnum* bog, though this is better illustrated below the treeline. In both alpine and subalpine areas, there are numerous examples of broad flats which probably once carried fen vegetation, and over which the snow water moved slowly. Now, however, probably due to nearly a century's burning and grazing by both cattle and sheep, the streams have cut down into the fens, the water table is lowered and other vegetative types have appeared. Of the sedges inhabiting the alpine fens, four are species of *Carex* including the common *C. gaudichaudiana* and *C. hypandra*. A few specialised grass species and one rush, *Calorophus minor*, also grow there.

A low growing, matted buttercup with white flowers, *Ranunculus millanii*, is confined to the alpine and subalpine fens. A tiny creeping plant *Haloragis micrantha* has racemes of tiny dark red or purplish flowers followed by minute globular fruits, and occupies both fen and bog. Its close relative *Myriophyllum pedunculatum* is confined to the fens. A less specialised inhabitant of the fen is *Oreomyrrhis pulvinifolia* already mentioned. *Gentianella diemensis*, with white flowers veined with purple, appears in fens and many other habitats. Though uncommon, *Nertera depressa*, a tiny matted plant grows in high altitude bogs and fens, as do two species of *Pratia*, which may be white, blue or (rarely) pink. A conspicuous member of the fen community, in the valleys of the Snowy River near its source and Rawson Creek, is a species of *Craspedia* with small white flower heads and narrow silvery leaves. This species of *Craspedia* appears to be endemic to the fens in this region.

II THE WIDESPREAD PLANT COMMUNITIES OF THE KOSCIUSKO NATIONAL PARK

The notes which follow on the widespread plants of the alpine areas should be sufficient to enable the reader to identify the less restricted plant communities, and they may also assist in species identification.

The Bog

The *Sphagnum* bogs of the alpine areas are specialised communities but few of the plants that grow there are confined to the bogs.

Many of the herbs also grow in the sod tussock grassland which occurs on level or undulating ground in valleys or on broad plateaus. They may also occur in the tall alpine herbfield on better drained or sloping situations or in the heathlands.

The raised bogs of the alpine areas are dominated by the yellow-green cushions of *Sphagnum* moss and by *Epacris* species. One of these occurs with *Kunzea muelleri* in the short heathland. *K. muelleri* is found in heathland but is absent from the bogs. *Epacris paludosa*, which is co-dominant with *Sphagnum* in the bogs, is accompanied in this community by the spiky leaved *Richea continentis*, the only mainland species of a genus which is widespread in Tasmania.

Other shrubs of the alpine bogs are *Olearia algida* with minute leaves and flower heads which have few ray florets, and two heath myrtles, *Baeckea gunniana* and *B. utilis*. Both have pink buds and white flowers resembling tiny tea tree blossoms, but *B. gunniana* is smaller in all its parts and its leaves are not keeled like those of *B. utilis*. These three shrubs are also found in the tall heathland and *Baeckea* often grows flat amongst sheltering rocks.

Herbs of the bogs which have very limited distribution include *Drosera arcturi*, which is found elsewhere only in the short alpine herbfield. *Pratia surrepens* is restricted in the alpine area to bogs and fens while *Brachycome obovata* grows on their margins. *Sphagnum* and perhaps a species of *Craspedia* appear to be the only species actually confined to the bogs.

Two robust lilies which grow on the edge of the bogs may be mentioned here, although they are also found in the tall alpine herbfield. *Astelia psychrocharis* has thick triangular leaves, and short stemmed flowers followed by orange fruits; the leaves of the endemic *A. alpina* are narrower and less silver-hairy and its ripe fruits are red.

Two species of leek orchid grow in the bogs, although they will also be found in the herbfields and sod tussock grassland. The flower spikes of *Prasophyllum alpinum* are about 15 cm. high and bear green and brown flowers. *P. suttonii* is taller and slightly more robust; its flowers are white, tinged with deep pink or mauve. Both have a single basal leaf which sheaths the flower spike when in bud.

A number of other inhabitants of the *Sphagnum* bogs have been mentioned as growing in other plant communities, including plants from the short alpine herbfield. Others grow in the sod tussock grassland and tall alpine herbfield and are mentioned below.

Sod Tussock Grassland and Tall Alpine Herbfield

(*Celmisia astellifolia* syn. *C. longifolia* and *Poa* spp. alliance)

Large areas of the alpine tract of the Kosciusko National Park are covered by tall alpine herbfield dominated by the Silver Snow Daisy, *Celmisia astellifolia*, and snow grasses, *Poa* spp. This herbfield gives distinctive character to much of the high country. The dominants of the sod tussock grassland, which is confined to the lower flat and gently sloping valleys are species of snow grasses, *Poa* spp. and a wallaby grass, *Danthonia nudiflora*.

ALPINE RANUNCULUS

There are seven species of *Ranunculus* in the alpine tract at Kosciusko, five yellow and two white flowered. The white ones are the largest, *R. anemoneus* (front cover) and the smallest, *R. millanii*. This, the Dwarf Buttercup is found most commonly where it is subject to periodic inundation, as in shallow depressions and near bogs and streams. It is a creeping stoloniferous plant whereas the Anemone Buttercup is tall and grows in better drained situations. Of the yellow flowered species, the two varieties of *R. muelleri* are the easiest to distinguish, both having entire or sometimes



Photography by D. J. Wimbush

RANUNCULUS NIPHOPHILUS

This species is an endemic of the short alpine herbfields of the Kosciusko Plateau and it tends to grow in colonies. Its leaves are glabrous or sparsely hairy and ternately lobed, the lobes orbicular or deltoid in outline. Its flowers are borne on unbranched stems about 16 cm high, usually have five petals (rarely six or seven) and average about 25 mm across.

toothed leaves with coarse hairs on the upper surface (see illustration below) The other four species are not so easily distinguished each having deeply dissected leaves. *R. dissectifolius* and *R. granticola* have conspicuous nectary lobes at the base of the petals, the former having a dozen or so petals and the latter usually five. *R. gunnianus* and *R. niphophilus* both lack nectary lobes and the former has much narrower, almost terete, leaf segments. There is considerable hybridization between the species.



Photography by Ann Jelinek

RANUNCULUS MUELLERI VAR. BREVICAULIS

This little buttercup is endemic to the feldmarks of the Kosciusko area in the highest and coldest habitats. The five-petaled flowers, about 2 cm. in diameter, are borne on shorter stems than in the type form; the densely hairy spatulate leaves, which are either entire or trilobed at the apex, have much shorter petioles. It flowers soon after snow melt.

Continued from page 359.

Celmisia asteliifolia, with leaves up to 20 cm. long and large white flower heads on stems twice as long as the leaves, is only one of many widespread daisies which contribute to the massed displays of summer flowers. *Brachycome nivalis* var. *alpina* is a smaller daisy with strap-like leaves, found only in this herbfield. *B. nivalis*, the type form, grows in this herbfield as well as in the steep rocky sites which it dominates. A blue form of this daisy has been recorded from near Blue Lake. Most widespread of this genus are *B. aculeata*, with large blue flowers and crenate leaves, and *B. scapigera* with white or mauve flowers, whose leaves narrow into a long slender base.

Erigeron pappochroma with white flowers is also a widespread composite which is very variable in size. All alpine species of *Brachycome* and *Erigeron* have unbranched flowering stems.

Billy buttons, *Craspedia* spp., occupy many habitats and appear in a number of separate forms which are considered to deserve species status. Leaves vary in size and in colour from a dark green to nearly white, and flower heads also vary in size and colour from orange through yellow to white. Billy buttons will be found in nearly every alpine plant community; some forms are very limited in distribution like the little white *Craspedia* of the fens.

Another widespread member of the family Asteraceae is the Yam, *Microseris scapigera*, with a large golden yellow flower head on a long slender scape and strap-like radical leaves, which grows in small but dense colonies. Another composite, *Podolepis robusta*, grows in the tall alpine herbfield and apparently is not widely distributed in the alpine tract, but is found on the north-west shoulder of Kosciuszko. Its yellow flower heads have papery bracts and grow on stout fleshy branched stems. The smaller Bachelor's Button, *Leptorhynchus squamatus* is widespread in grassland and herbfield. Its flower heads are yellow and its leaves green or silvery. A specialised form grows on the margin of the feldmark.

Helichrysum acuminatum, a high altitude yellow everlasting daisy with stiff papery floral bracts, may not reach the alpine tract, but *H. scorpioides*, with silver leaves and small soft yellow floral bracts is widespread above and below the tree-line. The alpine subspecies of *Helipterum alpicans*, the Alpine Sunray, grows in the herbfield as well as the feldmark, as does the mat-forming *Ewartia nubigena*. These two species are often found in company. *Parantennaria uniceps*, a mat-forming tiny daisy from the short alpine herbfield, also grows in tall alpine herbfield and bog. Two species of *Gnaphalium* form loose mats and have straw-coloured small flower heads. They are widespread at high altitudes and appear in many plant communities.

Two species of bright yellow groundsel are conspicuous daisy plants of the alpine communities. The flower heads of *Senecio pectinatus* are large and borne singly on long scapes, with basal leaves which often form dense mats, as they grow in close packed colonies. The flowers of *S. lautus* are smaller and borne on branched flowering stems; it is the more widespread species.

Amongst the most noticeable of the herbfield flowers are species of *Euphrasia* from the family Scrophulariaceae, which are semi-parasitic on the roots of other plants. They grow in the herbfield, sod tussock grassland, bogs and short heathland. Two dwarf species grow on the windswept feldmark and one of these also grows in the herbfield. The white, pink and mauve flowers of the larger species are a feature of the massed flower displays of January and early February. The taxonomy of the genus is under revision.

Just as widespread are the delicate gentians, *Gentianella diemensis*, whose white flowers are veined with purple and which grow in many flowered clumps in tall alpine herbfield, fen and bog.

One bluebell, *Wahlenbergia ceracea*, with large pale blue flowers is common, but the dark blue *W. gloriosa* is apparently limited in the true alpine tract to areas near Blue Lake although it is common just above the tree line.

The Grass Trigger Plant, *Stylidium graminifolium*, with deep pink flowers and tufted grass-like leaves grows in dense colonies and adds to the beauty of sod tussock grassland, tall alpine herbfield, fen, bog and heathland.

Much less conspicuous are *Viola betonicifolia* with mauve flowers, and *Geranium potentilloides* with small pink flowers, growing in sod tussock grassland as well as herbfield.

Other plants which should be mentioned here are the tall willow herbs, *Epilobium* spp. They are found in all plant communities except feldmarks and have soft leaves and a four-lobed pink or mauve corolla; their long narrow fruits split into four twisted segments when the seeds are ripe. The tiny white-flowered species is confined to cold feldmarks.

The most spectacular member of the family Apiaceae, *Aciphylla glacialis*, grows in both types of tall alpine herbfield and has already been discussed in Section I. *A. simplicifolia* is common in subalpine and alpine areas. Its male inflorescence is much more slender than in *A. glacialis* and its leaves are segmented but undivided and terete. Two species of caraway, *Oreomyrrhis ciliata* and *O. brevipes* are plants with leafy umbellately branching stems and much divided leaves (both radical and stem leaves). The tall, ferny-leaved *Seseli algens* of damp places is an endemic.

For those who go to the mountains around Christmas there are some plants to be seen which will have finished flowering before the massed displays of mid-summer.

The buttercups flower early and three of these have already been mentioned because of their somewhat specialised habitat requirements. The number of *Ranunculus anemoneus* has increased dramatically in the last few years, probably in response to the cessation of grazing. One place to look for it is in the small gullies just above the road between Seamen's Hut and Rawson Pass, but those who walk in the mountains will see plenty of evidence that it is now becoming more widespread both above and below the tree line.

Four alpine species of *Ranunculus* inhabit alpine herbfield and sod tussock grassland. *R. muelleri* is easy to identify from its very hairy spatulate leaves. The leaves of the endemic *R. dissectifolius* are very hairy and pinnately lobed or dissected into numerous narrow-linear segments; those of *R. gunnianus* are similarly lobed or dissected but the leaf segments are terete and glabrous. The leaf segments of *R. graniticolus* are much broader. In all these species the stems are unbranched.

An orchid which also flowers early, *Caladenia lyallii*, is much less common and is confined to only a few in alpine areas and is easier to find in the subalpine woodlands.

The Heathlands

Some of the herbs mentioned above are also found in the heathlands, but the most important members of these communities are the shrubs.

Short Heathland

The short heathland is dominated by *Kunzea muelleri*, a low spreading shrub whose yellow flowers have long yellow stamens. Other low growing shrubs such as *Leucopogon suaveolens* and *Epacris* species may also be present. It is particularly well developed on phyllite slopes west of Mt. Lee.

Two species of grass, two sedges and one rush species, together with moss-like *Scleranthus biflorus*, *Geranium* spp. a plantain and *Asperula gunnii* form an understorey. *Euphrasia glacialis*, *Brachycome scapigera*, the Grass Trigger Plant, *Epilobium* spp., *Craspedia* spp., *Leptorhynchus squamatus* and the Yam, *Microseris scapigera*, grow amongst the shrubs.

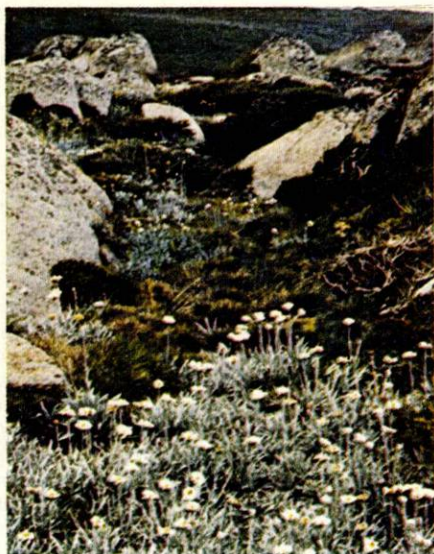
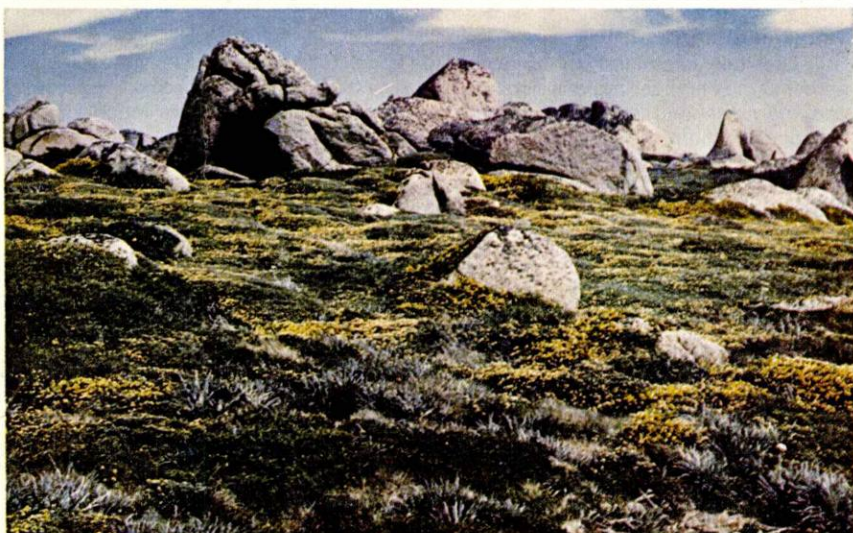
BILLY BUTTONS

Photography by D. J. Wimbush

CRASPEDIA UNIFLORA Sens. Lat.

Many different *Craspedia* species grow in the Kosciusko alpine area including this little species which grows on the edge of fens. It appears to be restricted to the broad valleys of the Snowy River headwaters. It grows about 20 cm high and is the smallest of the Kosciusko species.

This group is in need of complete revision. There are seven distinct alpine forms, four of which may be separate species, one of which probably has four varieties. Two have white or pale yellowish heads, the others yellow or orange. Some have green hairy leaves, others shiny, bright green leaves.



(Upper)—SHORT HEATHLAND

Photography by Margaret Henderson

In the Kosklusko area the short heathland does not seem to require as much shelter as the tall heathland, and is shown here growing near the summit of Dickie Cooper Bogong, where the sheltered habitats are occupied by the shrubs of the tall heathland. It is dominated by *Kunzea muelleri*, a small heathy shrub whose flowers have conspicuous yellow stamens.

(Lower left)—*CHIONOCHLOA* SP.

Photography by D. Wimbush

An interesting endemic inhabitant of the Kosklusko area, is a giant wallaby grass, an unnamed species of *Chionochloa*, a genus with many alpine species in New Zealand. This grass is best developed in high rocky situations on the western fall. Its tall clumps which may be one metre across, bear flowering stems up to 120 cm high. In autumn the leaves turn golden yellow and add colour to a landscape whose silver and green is already being invaded by the dark red of bog heaths.

(Lower right)—TALL ALPINE HERBFIELD & TALL HEATH

Celmisia astellifolia is flowering among *Poa* tussocks in the foreground while the Mountain Plum Pine, *Podocarpus lawrencei* occupies the sheltered habitat provided by granite boulders.

Tall Heathland

The tall heathland forms a broad band extending above the treeline and in the higher regions occurs in areas sheltered by rocky outcrops and moraines and on the rocky fringes of water courses. It is much richer in species than the short heathlands and very few of these species are herbs. At high altitude *Phebalium ovatifolium*, of the family Rutaceae is dominant. It has starry white flowers borne in the leaf axils, and like *Orites* flowers quite early. The *Phebalium* is endemic to the Kosciusko area.

Podocarpus lawrencei, the Mountain Plum Pine, often grows flat on rocks and boulders. This spreading shrub grows as a small tree in subalpine areas and is an extremely slow growing species. Its male and female flowers are borne on different plants; the male flowers are arranged in tiny pink cones, and the inconspicuous female flowers are followed by a green seed, which is borne on the apex of a succulent bright red 'receptacle' which is really an enlarged stem. A shaggy pea, *Oxylobium ellipticum*, is another procumbent shrub, which bears yellow and purple pea flowers. *O. alpestre* also extends into the alpine tract but is of more upright habit.

The other species vary greatly in size depending largely on the amount of shelter available. Those which may grow relatively tall in favourable situations include *Orites lancifolia*, a pale yellow-flowered member of the family Proteaceae, whose flowers are borne in terminal spikes.

Hymenanthera dentata grows in rock crevices at the highest elevations thus taking the greatest possible advantage of the available shelter; its habit makes it a very inconspicuous shrub. Often it has few leaves on its spiky branchlets. Its tiny pale yellow flowers are followed by much larger blue fruits. It is a member of the family Violaceae.

The Alpine Mint Bush, *Prostanthera cuneata*, with large purple throated white flowers and small crowded aromatic leaves, is a widespread medium-sized shrub. A rice flower, *Pimelea axilliflora* var. *alpina* with axillary racemes of deep cream flowers, is about the same size. A little smaller are the alpine *Grevillea australis*, with small scented white flowers, *Baeckea gunniana* and *B. utilis* already mentioned, and two shrubby species of *Helichrysum* with clustered white flower heads. *H. hookeri* has scale-like leaves and golden yellow branchlets while *H. alpinum* has pink or red buds. A larger, more spreading *Helichrysum*, *H. secundiflorum*, bears its flowers in the leaf axils as do the two daisy bushes, which are varieties of *Olearia phlogopappa*. The variety *subrepanda* has smaller more crowded silver-grey leaves than *flavescens*, and both have flower heads with white ray florets. *O. algida*, already mentioned as growing in the bogs, is much smaller.

A small member of the family Epacridaceae is *Leucopogon suaveolens* var. *montanus* with scented white flowers followed by red berries. *Richea continentis*, with spikes of cream flowers, reaches a height of 50 cm., while *Pentachandra pumila*, already mentioned, is completely prostrate. Another very low growing shrub which is often flat on the ground amongst snow grass tussocks is the Alpine Rice Flower, *Pimelea alpina*, whose white or pink flowers follow red buds.

Although fairly uncommon above the treeline, the Alpine Ballart, *Exocarpus nanus* is sometimes to be seen, often sheltering under taller shrubs. It is a small, creeping plant with scale-like leaves and inconspicuous flowers, but becomes more visible when the fruiting pedicels enlarge to about 5 mm. These turn bright red, the berry-like organs being crowned by one or two smaller green or dark red fruit.

An interesting endemic inhabitant of this plant community is a giant wallaby grass, an unnamed species of *Chionochloa*, a genus with many alpine species in New Zealand. This grass is best developed in high rocky situations on the western fall. Its tall clumps which may be one metre across, bear flowering stems up to 120 cm. high. In autumn the leaves turn

golden yellow and add another colour to a landscape whose silver and green is already being invaded by the dark red of bog heaths.

III SOME NOTES ON LOCATIONS

While the massed displays of flowers and many individual species may be appreciated without walking far from the main roads, the student of the alpine flora will find many rewards in following the tracks from the top of the Thredbo chairlift, Charlotte Pass, Seamans Hut or Rawson Pass, when the weather is fine, or in making short excursions from these places to visit the plant communities already described. The tracks mainly traverse tall alpine herbfield dominated by *Celmisia asteliifolia* and *Poa* spp., which should be easy to recognise at all seasons. The tracks also pass through or within a short distance of communities of the widespread heathlands and some of the shrub species will be readily recognisable when in flower. These notes are more in the nature of a guide to where the restricted specialised plant communities can be most easily visited, as there should be no difficulty in finding the more widespread plants near the roads or along any of the tracks. All plants in the Kosciusko National Park are, of course, completely protected.

There are a number of tracks from Rawson Pass, the highest point on the Kosciusko Road, just below the summit of Mt. Kosciusko. The old road to the summit is the start of the Lakes Walk which traverses some of the best developed windswept feldmarks. A walk of at least 6 km. each way is needed to see them. Care must be taken here to walk only on the narrow track which crosses them, so as to avoid damage to this sensitive plant community. It should be possible to find all windswept feldmark plants on or near the path. There are small patches of feldmark on granite on the saddle between Muellers Peak and Mt. Northcote overlooking Lake Albina. The path continues along the western flank of Mt. Northcote, where *Brachycome nivalis* var. *nivalis* and associated plants grow in the crevices of the rock walls beside the track. On the saddles which separate Mt. Northcote, Mt. Lee and Mt. Carruthers are windswept feldmark communities growing amongst the small stones of weathered phyllite.

It will not be possible to examine either cold feldmark or short alpine herbfield on this part of the track, although many examples of short alpine herbfield will have been passed en route, below the long lasting drift on the eastern face of Mt. Kosciusko, and in a small sheltered area on the same face of Muellers Peak.

From Seamans Hut on the road below Rawson Pass, an alternative track leads to the saddle between Muellers Peak and Mt. Northcote across Rawson Creek. As one starts to ascend from the valley towards the saddle, a small lateral moraine carrying another good example of windswept feldmark flora may be visited. This track also gives access to a cold feldmark on the southern face of Mt. Clarke and good examples of fen in the valley of Rawson Creek. Cold feldmark flora is also well developed above Lake Cootapatamba on the eastern face of Mt. Kosciusko with short alpine herbfields between Rawson Pass and the Lake.

A track from Rawson Pass leads down to Lake Cootapatamba and across to the top of the Thredbo chairlift. This track passes near many examples of short alpine herbfield, the best being below the Cootapatamba drift.

The walk to Mt. Townsend, which leaves the Lakes Walk before it reaches Muellers Peak, also crosses areas of short alpine herbfield on the eastern face of Mt. Townsend. Nearly the whole range of alpine plants is encountered on this walk and a descent into the valley of Lake Albina is also rewarding. If the Lakes Walk is followed round past Mt. Carruthers and back to Charlotte Pass, most plant communities will be seen, although good examples of cold feldmark are scarce.



Photography by Ken Gillanders

GENTIANELLA DIEMENSIS

Gentianella diemensis is the only species representing this genus in Australia though it is very variable and may comprise more than one species. It is the only species of the family *Gentianaceae* above the tree line. The Gentian is one of the later flowering species and in some places, for example the flats of Mt. Clarke, grows in dense colonies covering large areas.

THE SNOW DAISY



Photography by Ken Gillanders

CELMISIA ASTELIIFOLIA

A dominant plant of the widespread tall alpine herbfield in the Kosciuszko National Park, the Silver Snow Daisy is a tufted plant which grows in extensive dense colonies. Its linear leaves are silver-hairy on the underside and up to 20 cm long. Its flowerheads grow on unbranched stems up to 40 cm high and may be 5 cm in diameter.

From Charlotte Pass, the walk to Blue Lake takes in part of the Lakes Walk. Around Blue Lake and Hedley Tarn there are particularly fine examples of short alpine herbfield and of tall alpine herbfield dominated by *Brachycome nivalis* var. *nivalis* and *Danthonia alpicola*. If one continues on to Mt. Twynam along the track used for soil conservation work, windswept feldmarks are again traversed and cold feldmark vegetation can be seen on the steep slopes above Blue Lake.

An easy way to see the specialised plant communities of the sheltered side of the higher slopes is to walk from Rawson Pass or Seamans Hut to the southern end of the Etheridge Range where there is a long lasting drift on its eastern face. Just before the Etheridge Range starts to level out southwards towards the saddle which divides it from the Ramshead Range, the drift will be found at the head of a small steep valley with large granite boulders on either side. At its top and sides all the plants of the cold feldmark vegetation are displayed. Just below the drift the short alpine herbfield grows in profusion and in places there is a continuous upper storey of various grasses and sedges above the usual mat plants of the community. On either side of the short alpine herbfield great granite boulders on a precipitous slope provide the ideal habitat for *Brachycome nivalis* var. *nivalis*, *Danthonia alpicola* and associated plants.

As the valley widens and flattens towards the bottom of the slope, the more widespread tall alpine herbfield dominated by Snow Daisy, *Celmisia asteliifolia*, and species of *Poa* is encountered, together with heathland and the occasional bog. On the flat valley of the Snowy River, near which one can return to the road at the Snowy Crossing, good examples of fen are to be seen. If the area is very wet it is wiser to return to Seamans Hut or Rawson Pass on higher ground on the slopes of the Etheridge Range. If one keeps to the western side some windswept feldmarks may be seen.

On many of these walks small bogs will be encountered, and these can easily be recognised from the presence of the yellow-green cushions of *Sphagnum* moss. A typical location would be at the headwaters of the Snowy River.

In some areas, as for example at the head of Wilkinsons Valley on the saddle between Mt. Kosciusko and Muellers Peak, which is traversed by the Lakes Walk, it is possible to see the moss returning along the edge of eroded areas which have once been bogs. It is impossible to tell whether these were burnt right out in the 1939 fires or were destroyed by the trampling of grazing stock. In any case, under present ungrazed conditions gradual recolonisation by bog plants appears to be under way.

The visitor to the Kosciusko National Park should bear in mind that many of the alpine flowers can be seen before the massed displays of the alpine tract are at their peak.

Most of the shrubs of the heathland will flower early below the tree line where they not only form part of the understorey in the subalpine woodland, but also appear in the heathlands of the frost hollows and exposed slopes and plateaus. As they grow here with shrubs which do not extend above the tree line the general appearance of the community is somewhat different. Many of the alpine herbfield plants are also found in the subalpine woodland and sod tussock grassland below the tree line. The combination of flowering shrubs and herbs may provide just as colourful a display in early summer below the tree line as will be seen later in the alpine tract.

GROWING ALPINE PLANTS

EXPERIMENTS IN GROWING ALPINE PLANTS IN COOMA, N.S.W.

by Margaret Parris*

The Monaro & Snowy Mountains Group of the Society for Growing Australian Plants, with permission from the N.S.W. National Parks & Wildlife Service, has for some years been experimenting in a small way with the growing of alpine and sub-alpine plants in Cooma gardens—mainly in decomposed granite soils with good drainage and a good water supply.

The Cooma climate poses a problem, as winters are dry and frosts severe, and many of the plants must do without the snow cover to which they have adapted. Summers are also in the main dry, and drying winds are a feature of spring and summer, as well as winter. Both drying winds and high temperatures must be countered by regular watering. The real problem is to simulate in our dry climate the conditions of the mountain habitats which are kept moist by snow melt, frequent rain, mists and regular heavy dews.

Certain plants are very restricted as to habitat within the Snowy Mountains, and it is not possible to simulate the conditions under which they grow.

These include the tiny plants of the short alpine herb-fields (as defined by A. B. Costin in the "Ecosystems of the Monaro Region") which occur just below snow drifts, and have, for weeks or even months, plenty of icy cold water running through them. Many of the plants which grow there occur nowhere else, although some also grow in the sphagnum bogs. The starry white (or pink) *Neopaxia australasica* is, however, widespread as a coloniser, and the yellow stars of the mat-like *Stackhousia pulvinaris* are also found on stream banks. The only inhabitant of the short alpine herbfield which has responded to our attempts to grow it in Cooma, is *Neopaxia australasica*, which, however, disappears if allowed to dry out.

Equally specialised, but growing in the very driest and hardest conditions, are the plants of the feldmarks. The feldmark flora occurs on dry windswept saddles and shoulders of hills, where snow cover is light and snow melts early as a result of the wind's action.

Dryness and exposure to wind promote a specialised community of prostrate shrubs and small herbs. They include the very floriferous *Veronica densifolia* with large mauve or white flowers, the Australian Eidelweiss (*Ewartia nubigena*) with minute white and brown daisy flowers and silvery foliage. None of the plants of these communities has been successfully grown in Cooma gardens.

On the lee-side of the main range, where snow drifts last into the summer another type of feldmark vegetation grows on the edge of the areas abraded by the drifts. These snow patch plants grow above and to the sides of the receding drifts where the cold conditions and the short growing season between final snow-melt and the first snowfalls makes it difficult for plants to establish a foothold. No attempt has yet been made to grow any of the few species which inhabit these cold feldmarks. We should at least try to grow *Coprosma pumila* whose flowers are followed by brilliant red berries.

More widespread and less specialised than the plants of the short alpine herbfield, and two types of feldmark are those of the tall alpine herbfields, heathlands and sub-alpine woodlands. Apart from the herbaceous plants, this is where our efforts have been most rewarding, although some present special propagation difficulties.

* Editor's Note: This periodical is produced by a Society comprising home gardeners wishing to grow some of the more showy wildflowers in their gardens and Margaret Parris is Secretary of the Snowy Mountains Group of this Society. There is a report on page 390 of experiences in cultivation the same plants mentioned above, in Victoria.

The most successful shrub has probably been the Alpine Mintbush (*Prostanthera cuneata*) already known to nurserymen. Its white (occasionally mauve) flowers with purple blotches in the throat are large enough to be conspicuous against the small crowded dark green foliage. This shrub is to be found at high elevations to above 7,000 ft. and appears to be very versatile, although it does not like hot dry conditions unless watering is consistent.



PROSTANTHERA CUNEATA

Shown here in full splendour growing in a large pot.

The prostrate Mountain Plum Pine (*Podocarpus lawrencei*) is slow growing in Cooma and may be ideal for tub culture or experiments in Bonsai. It can be grown from cuttings, and may sometimes be obtained from native plant nurseries. Others from high altitudes include the small flowered white Grevillea (*G. australis*) with which native plant growers may be familiar and *Baeckea gunniana*—with pink buds and a profusion of white flowers. *Kunzea muelleri*, whose flowers are yellow, will grow and flower in Cooma, but the alpine Phebalium (*Phebalium ovatifolium*) has proved more difficult.

The Royal Grevillea (*G. victoriae*) from the sub-alpine woodlands is very showy in Cooma, with bright orange-red flowers carried through the winter frosts. This shrub has also been successfully planted at Thredbo and is a better shrub for hard winters than its more widely grown variety (*G. victoriae* var. *tenuifolia*).

A number of *Olearias* have been successfully grown in Cooma including *O. phlogopappa* and *O. megalophylla*, both from the sub-alpine woodlands. *Olearia subrepanda* from higher altitudes has been less successful. More experiments are needed with the Rice Flowers (*Pimelea*) including the sub-alpine *P. ligustrina* and two species which extend into alpine areas, *P. axiflora* var. *alpina* and the prostrate *P. alpina*.



Photography by Dorris Ryall

BRACHYCOME ACULEATA

The most versatile of the *Brachycomes* in the Kosciusko area, this species is found on windswept feldmarks as well as in the herfields. It has a well developed rosette of radical leaves which are spatulate and crenate, up to 10 cm long and decreasing in size as they ascend the unbranched flowering stem. Its flowerheads have 40-60 mauve (rarely white) ray florets.

Boronia algida is another versatile plant which grows best in and just below the sub-alpine woodlands and is also found on the *Casuarina nana* heathlands to the east of the Monaro. It is successful in Cooma gardens but hard to propagate from cuttings. *Westringia lucida* which grows in heath and in woodlands to about 5000 ft. is, on the other hand, easy to propagate, but our experience of its adaptability to Cooma conditions is limited.

A number of *Veronicas* grow in the sub-alpine tract. The soft-wooded *V. nivea* is easy to propagate, but may not be long-lived. *Parahebe* (formerly *Veronica*) *derwentiana* and *P. perfoliata* can be easily propagated from root cuttings and flower well in Cooma. *P. perfoliata* is particularly useful as a rocky plant. It is found locally in granite outcrops and extends as high as the sub-alpine woodlands.

More work could be done on the propagation of the pea-flowers of the Kosciusko National Park. The purple Hovea and yellow *Oxylobium* (*O. ellipticum* and *O. alpestre*) are widespread in the mountains and should be adaptable. In fact, apart from some success with *Oxylobium ellipticum*, we know little of their ability to survive and flower in Cooma. *Oxylobium alpestre* is a widespread plant in the Monaro and some forms have been propagated from cuttings.

Some of the shrubs which require damp conditions, usually on the edge of bogs, have been surprisingly successful in Cooma. These include the yellow-flowered *Callistemon sieberi* and *Olearia algida* which has scale-like leaves and ragged white flowers. However, the heath family is widely represented in and around the mountain bogs and propagation difficulties have limited our experiments with these. *Leucopogon suaveolens* var. *montanus* and *Pentachondra pumila* present a challenge with their bright red fruits and their liking for the well-drained hillsides.

This brings us to the plants which excite the interest of most visitors to the mountains, denizens of the herbfields, the Daisies, the Buttercups, Billy Buttons, Mountain Eyebright and other herbs which provide the massed displays of the herbfield in late January, and the Groundsels, Gentians and Trigger Plants which follow a little later.

Our difficulties here are perhaps illustrated by the experience of recent hot dry summers where the mountain flowers have either not flowered in these unusual conditions or have flowered and set their seeds very quickly, denying visitors the massed displays which are a feature of the normal cool moist summers.

Cooma may not be the best place to experiment with alpine herbs because of its dry climate, which cannot be altogether counteracted by regular watering, and results have not been encouraging. Many of the species of *Ranunculus*, including the large white flowered *Anemone* Buttercup *R. anemoneus* favour moist conditions, while the closely related *Caltha introloba* grows only at the foot of melting snow drifts and in eroded bogs.

The snow Daisy (*Celmisia asteliifolia*), tends to die out if grown in full sunshine, and not to flower in shade or partial shade. If you can persuade it to survive and flower, the flowers will diminish in size year by year. Many of the plants and particularly Billy Buttons (*Craspedia uniflora*) and *Podolepis* spp. won't stand up to the ravages of slugs and snails, while the cause of the failure so far to grow successfully other members of the Daisy family, the *Brachycomes*, the *Erigerons* and the Yam (*Microseris scapigera*) has not yet been pinpointed.

One of the most colourful plants of the herbfield, the Mountain Eyebrights (*Euphrasia* spp.) is especially difficult as it is a root parasite. This pink, mauve or white flowered plant comes in a number of forms and sizes down to the tiny fieldmark species with mauve flowers striped in navy blue.

The delicate Mountain Gentian (*Gentianella diemensis*), its white flowers striped with maroon, may be the subject of insect or snail attack. The more robust Trigger Plant (*Stylidium graminifolium*) also proves difficult and may miss the constant dampness of its usual habitat. Bluebells (*Wahlenbergia*

spp.) are short lived in Cooma gardens except for the local grassland species which die out with cultivation but spring up in unexpected places from time to time.

Compensation for many failures has been provided for those who have experimented with ferns. *Blechnum penna-marina*, a small fern growing over a broad altitudinal range, and the larger *Polystichum proliferum*, both of which can be found in the shelter of rocks at high altitudes, grow well and spread rapidly in Cooma gardens.

We have just skimmed the surface of the problem of growing alpine plants in Cooma. We know that alpine plants are being successfully grown in Victoria and that some N.S.W. members of the Society for Growing Australian Plants are experimenting with alpiners in climates very different from that of Cooma. The results of these varied experiments may give some clues to the climatic and soil requirements.

I wonder if this is the place to suggest that our alpine plants which are, we hope, so well conserved in the Kosciusko National Park, might have some special virtue if they were to remain unique to such areas; if the only way they could be seen was by a long journey into this beautiful mountain area. Perhaps our efforts would be better directed towards ensuring that their habitat within the Kosciusko National Park is not disturbed.

While we continue to experiment with these plants we might well bear in mind the possibility that another feature of this strange continent may prove to be that its unique mountain flora will only survive in its own specialised habitat, so different from the rest of Australia.

SUMMER FAIRYLAND

A series for the young in spirit by Nuri Mass

SEPTEMBER: Here in Australia, the traditional beginning of spring. But way up in the Snowy Mountains, you could never imagine it, for everything is still heavily blanketed, there, in the magical snows of winter. And so it goes on, usually until November, when the snows at last begin to thaw, and another kind of magic takes over—the fairy-like enchantment of alpine flowers.

Nowhere else in the world do snowland flowers grow in such masses over such large areas, for whereas the Alps of Europe are sharply cut and mainly rocky, here in Australia they have much more soil, and are mostly like rolling hills rising gently from huge tablelands—and there seems to be no end to the numbers and varieties of the flowers that bloom upon them in these made-to-order conditions.

Most of them are softly coloured flowers, except for the bright pink Trigger Plants and the bright golds among the Buttercups and in the Daisy family. Huge stretches of Alpine Mint¹ look exactly like sprinkled snow; from amongst its ferny leaves, the Alpine Celery² raises showers of tiny white blooms; and the little crocus-like Gentians³, delicately veined with purple, are a sort of transparent white.

Greenish-yellow⁴ and heliotrope⁵ Orchids bloom profusely among the snow grasses⁶. Sometimes you'll come across whole fields of Bluebells⁷, and almost everywhere you look there are pink, white or heliotrope Eye-brights⁸. The waxy-looking Candle Heath⁹ flowers are creamy-coloured. There's a low-growing shrub with hosts of little pink-and-white Teatree-looking flowers¹⁰, which enjoys spreading itself over rocks, its branches, as they die off, becoming "driftwood" in the most fantastic forms.

1, 2 3, etc.

It would spoil the flow and appeal of this article to provide botanical names of the species mentioned. However there are many adults who also read and enjoy this series of articles and for them and to conform to our policy of not giving common names without the full botanical name, the botanical names may be found at the end of the article.

In parts there are such dense thickets of *Kunzea*¹¹ that the whole place looks as if it has been dusted over with pale yellow. And then, there are the Buttercups—about a dozen different kinds of them, some tall and rather stately¹², others of middling height¹³, some yellow-centred¹⁴, others black¹⁵, and one little curiosity¹⁶ that likes growing under water near snowbanks, and whose colour is white instead of “buttercup” yellow.

There's the glorious Alpine Anemone¹⁷, one of the real snow-flower treasures, large, sparkling white, and very closely related to the Buttercups. And there's another close relative, the Alpine Marsh Marigold¹⁸—a beautiful little flower indeed, also radiantly white, that actually starts blooming underneath only-just-melting snowbanks in the heights of the mountains. And it grows in such vast numbers that its emerald-green foliage forms veritable alpine lawns.

Which reminds us of all those other small plants that grow no higher than mats over the ground, amongst them one with very sweetly-scented ivory-coloured flowers¹⁹, another with flowers²⁰ as white as the melted snows, another with tiny bright-red fruits²¹, and a strange, very insignificant little one with greyish-coloured flowers which is known by the rather grand name of Australian Edelweiss²². Actually, this belongs to the Daisy family, which absolutely abounds all over our snow mountains, and doubtless the miniature Edelweiss has the distinction of being its smallest member there.

The Daisy family abounds, in fact, the world over, since its flowers produce so many seeds and have such excellent ways of spreading them around. It happens like this: First of all, the name of the family is Compositae, since the flowers belonging to it never grow singly, but many together in “composite” arrangements.

The familiar “daisy” arrangement has a large number of tiny, usually yellow flowers at its centre (disc florets), surrounded by many “petals” each of which is actually a whole separate flower (or ray floret). So think of the number of seeds that each Daisy is able to produce! Then, each of these seeds, when ripe, lifts off into the breeze on a beautiful little silky-hairy parachute which can carry it over great distances, the parachute having grown from a ring of hairs that the flower produces instead of sepals. So it isn't any wonder that Daisies, and all other members of family Compositae are to be found far and wide.

Sometimes, instead of both disc and ray florets, we find flowerheads of only disc ones. (The famous Billy Buttons²³ of the Snowy Mountains are some of these). Other times flower-heads will consist of only ray florets (like the Dandelions and Blackfellow's Yams²⁴ which also abound in our beautiful Alps). And other times again, we find the usual centre of disc florets surrounded by “petals” which are actually little scales or bracts, often crinkly-papery—as in all the millions of Everlastings²⁵ which cover large areas of our Snowy Mountains with their white or yellow loveliness, making soft little whispering sounds as the blowing winds shuffle them against one another.

But to think of our Alps in summer-time is to think, before anything else, of the Snow Daisies²⁶ which, particularly in the higher parts of the mountains, grow more abundantly than any of the other flowers, as though trying with their whiteness to imitate the snows of winter. They rise up on woolly stems from tufts of narrow grass-like leaves, so thickly covered with silky white hairs underneath that they have a silvery look—and in fact, where Snow Daisies grow most thickly, the whole of the ground itself looks silver.

Then, immediately after the Snow Daisies, we remember the Billy Buttons²³—countless thousands of them everywhere—those gay, puffball-looking flower-heads in almost every shade of orange and yellow, down to almost white, their leaves fairly smooth in the lower parts of the mountains, but softly furry in the higher parts.

Next, after the Everlastings, we might perhaps remember the dainty, sparkling white Mountain Daisy²⁷ with its bright-green ferny leaves, sheltering so prettily among rocks in the higher reaches—and the two bright-yellow Senecio²⁸ daisies, both with ferny leaves, but one with clusters of small flowers whilst the other has a much larger flower on a single stalk. And, as happens with so many of the alpiners, both of these may be quite tall in some parts and quite short in others.



Photography by S. Dent.

SENECIO PECTINATUS

Ferny leaves, purple stalks, wide awake golden flower-heads.

Not like the little white daisy²⁹ of the Brachycome group which seldom grows taller than one-and-a-half inches, from a rosette of small, narrow leaves, which loves swampy parts way up high in the mountains, and which is nowhere else to be found except here in Australia.

There's a very pretty golden-yellow alpine³⁰ (a *Podolepis*) that looks as if it couldn't make up its mind whether to be a Billy Button or a Dandelion—with curious results: with a great spreading display of disc florets surrounded by a few deeply serrated ray florets. And there's another³¹ (one of the *Helichrysums*) that looks as though it's pretending to be clusters of Wattle, though of course each little "ball" is a group of disc florets supported by a cup of tiny bracts.

But the Compositae of the Snowy Mountains are not all pom-pom Billy Buttons, daisies-on-the-ground, or variously-shaped flowers on slender bushes. Several of them are quite sizeable woody shrubs, often so massed with flowers that you can scarcely see their leaves. There's a beautiful *Olearia*³² whose leaves are very pretty indeed—dark green on top, and covered with silky brown hairs underneath, but when its huge numbers of lovely, large white "daisy" flowers are in bloom, there's often nothing else of the plant to be seen.

Another *Olearia*³³ of the Alps is quite different, however, with tiny leaves and flowers, the flowers being vast enough in numbers to make up for their slightly ragged appearance, with only a very few, unevenly-spaced ray florets for each little flower-head.

Two other woody shrubs become completely smothered, during the Alps' short summer, with tiny "everlastings"—one with almost greyish flowers³⁴, the other with white ones³⁵ accompanied by little red bracts. There are very few touches of red indeed amongst our alpine flowers, but this is one of them—and very pretty it is, too.

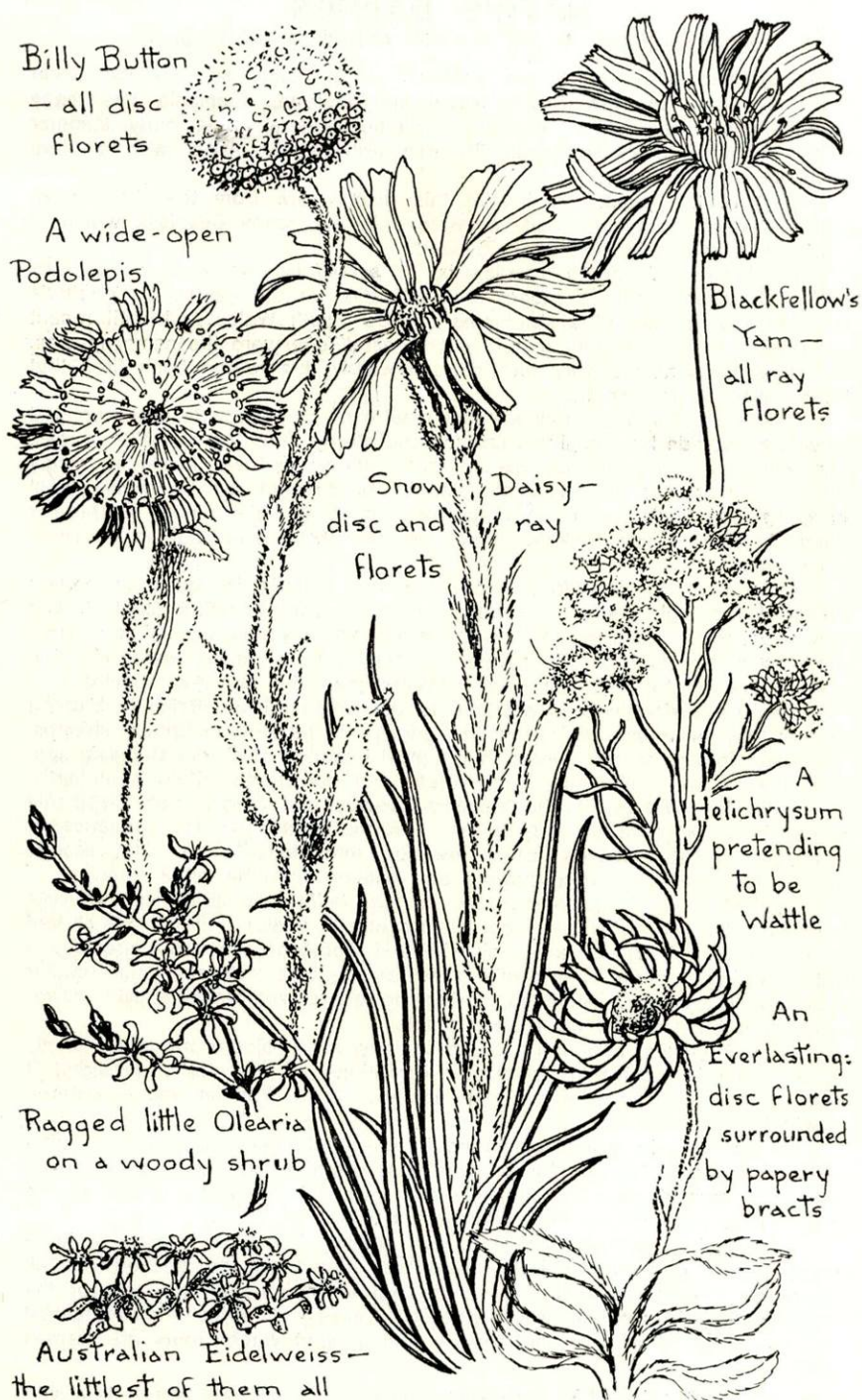
Then, there's a *Cassinia*³⁶ shrub with narrow, crowded, sticky leaves, and with large clusters of little greenish-yellow flower-heads which, strange to say, never open wide; so that, if you glanced only casually, you might easily think that these bushes were always in bud.

And so the Compositae story in our Snowy Mountains goes on and on—among the rocks and snow grasses, in low-lying swamps, along roadsides, and way out over the far-flung hills. Indeed, for all of the numbers and varieties mentioned, what we have talked about here is really only the beginning of the story, which goes on as far as the mountains themselves do, and which is surely one of the most enchanting ever told in the language of flowers.

Our alpine winter magic
Is the magic of the snow—
A fairyland all canopied
In sparkling white. But oh!
The magic of its summer
Is the magic of the most
Bewitching flowers that
Anywhere did grow.

REFERENCES TO BOTANICAL NAMES

1. *Prostanthera cuneata*—colour page 372.
2. *Aciphylla glacialis*
3. *Gentianella diemensis*—colour p. 368.
4. *Prasophyllum alpinum*
5. *Prasophyllum suttonii*
6. *Poa* species
7. *Wahlenbergia ceracea* and *W. gloriosa*
8. *Euphrasia glacialis*—colour page 356.
9. *Richea continentis*
10. *Baeckea gunniana*
11. *Kunzea muelleri*
12. *Ranunculus dissectifolius*
13. *R. niphophilus*—colour page 360.
14. *R. graniticols*, *R. muelleri* and *R. dissectifolius* may have yellow centres when young, darkening as they mature.
15. *Ranunculus millanii*
16. *Ranunculus anemoneus*—cover plate
17. *Caltha introloba* (pinkish centre as it ages).
18. *Stackhousia pulvinaris*
19. *Neopaxia australasica* (sometime pink)
20. *Pentachondra pumila*
21. *Ewartia nubigena*
22. *Craspedia uniflora* (and other species)
23. *Microseris scapigera*
24. (White) *Helipterum albicans* var. *alpinum*, *H. anthemoides*
25. *Celmisia astellifolia*
26. *Brachycome nivalis* var. *nivalis*
27. *Senecio lautus* and *S. pectinatus* resp.
28. *Brachycome stolonifera*
29. *Podolepis robusta*
30. *Helichrysium semipapposum* (not above treeline)
31. *Olearia megalophylla* (sub-alpine)
32. *Olearia algida*
33. *Helichrysium secundiflorum*
34. *Helichrysium alpinum*
35. *Cassinia uncata*
- 36.



NATIVE DAISIES

SOME DAISIES OF THE ALPINE* AREAS by Ken Gillanders

Australian alpine areas are confined to the high parts of the Great Dividing Range in New South Wales and Victoria. Tasmania has many mountainous areas which abound in alpine vegetation. In early summer many of these areas spring to life and provide the visitor with a floral spectacle hard to equal.

Most of the plants sharing in this display are from the *Compositae* and the most spectacular and widespread is the genus *Celmisia*, which is confined to Australia and New Zealand.

The most widespread species is *C. asteliifolia*, which was generally called *C. longifolia* till a recent reclassification of the genus. *C. longifolia* is only found in the Blue Mountains of New South Wales and until recent examination it was thought that it and *C. asteliifolia* were the same species. *C. longifolia* is now a very rare plant, possibly due to the bush fires that have ravaged its habitat.

Celmisia asteliifolia forms a basal rosette of grey-green to silver pointed leaves. It spreads by creeping rhizomes and slowly forms clumps 1'-2' across. The white daisy-like flowers are up to 2" across and are produced singly on firm scapes up to 12" high. These are covered with a dense wool covering. The buds are often quite rosy-red as are the backs of the ray florets in some forms. Pink flowered specimens have been sighted on some occasions.

A form of *C. asteliifolia* known as *var. latifolia* is found in certain areas of the high plains in Victoria and is a very beautiful plant. It has leaves up to 9" long by 1¼" wide, silvery when young becoming a deep green with age and on the reverse covered with a dense white felt. The scapes are up to 18" with larger flowers than the previous species.

Celmisia sericophylla is endemic to the Bogong High Plains in Victoria and is always found colonising the edges of the tiny mountain streams. The silver foliage of this species is the most beautiful of all our *Celmisia* spp. The flowers are similar to *C. asteliifolia* but not produced so abundantly.

Celmisia saxifraga is the smallest species and comes from Tasmania where it is fairly widely distributed. It forms tight little 1½" rosettes of silver-grey pointed leaves, which develop into dense mats. The scapes are 6" high and the white flowers are smaller than the other species.

Cultivation of *C. asteliifolia* and its *var. latifolia* is quite easy in cool climates. They do not resent root disturbance in winter and can be shifted with ease. A well-drained acid soil with leaf mould or peat moss provides a good growing medium. They dislike heavy or clay type soils and enjoy regular watering in summer. Although spring flowering, *var. latifolia* will flower throughout the year on established plants.

C. sericophylla, although growing in very wet positions naturally, seems quite happy in cultivation in similar conditions to the others, provided it gets some shade from the hot afternoon sun in the summer and is watered regularly.

C. saxifraga is more demanding in its requirements and a very gritty acid soil mix with the addition of peat moss seems to be best. Coarse gravel should be spread over this to allow air movement under the foliage of the plant which suffers from the dampness in winter.

All species propagate from seed, which should be fresh. A large proportion is generally infertile. Seedlings should not be pricked out till about 6-9 months old and only in the warmer months of the year or the fleshy roots will rot. All will divide very easily or strike from detached rosettes which should be inserted in coarse sand where roots are formed rapidly.

* As used in this article alpine areas refer to areas at high altitudes whereas in a strict sense 'alpine' is above the tree line as used on page 351 defining the alpine tract.

Another genus of Compositae, mainly Australian, is *Brachycome*. Many species of this are found only in the alpine areas.

Brachycome scapigera is a striking plant found in New South Wales and Victoria. It forms clumps with basal rosettes of deep green leaves. The numerous 6" scapes each have a single many rayed flower of white or sometimes mauve.



Photography by Ken Gillanders

BRACHYCOME SCAPIGERA

Brachycome nivalis is another dainty species to be found in the same area. Its fresh green deeply cut and divided foliage makes tight rosettes that are attractive even when it is not in flower. Individual rosettes are only 2"-3" across but form colonies, often filling rock crevices. The 4"-6" scapes each hold a yellow edged white 1" daisy. *B. nivalis* var. *alpina* is a form with entire leaves.

Brachycome aculeata occurs in sub alpine conditions as well as in alpine areas in New South Wales and Victoria. The Tasmanian *B. scapiformis* appears to be no different and is most likely a synonym. It forms prostrate rosettes of deep green cuneate leaves toothed on the margins. The unbranched scapes rise up to 12" and each has a single $\frac{3}{4}$ " lilac or bluish-mauve flower. See colour plate page 373.

Brachycome decipiens, unlike most of the alpine *Brachycome*, favours positions where there is light shade. On the high plains it can be seen in abundance growing among the scattered low snow gums—*Eucalyptus niphophila*. The rosettes of very deep green leaves lie flat on the ground and the 4" scapes each hold one white flushed blue $\frac{3}{4}$ " daisy.

Brachycome rigidula is another very showy little plant that is also found at lower altitudes, particularly in Tasmania but reaches its perfection on the higher peaks. It has many branched stems and narrowly very divided foliage. It produces a profusion of finely rayed white, mauve or bluish flowers up to $\frac{3}{4}$ " in diameter. This plant will often spread by slender rhizomes.

In cultivation all these species will grow in a soil similar to that for *Celmisia* sp. *B. nivalis* and *B. decipiens* appreciate some light shade. Many *Brachycomes* are attractive to slugs and snails, particularly *B. decipiens* and *B. scapigera*. Care must be taken to bait these or plants can quickly be eaten. Propagation is easy from seed which germinates quickly and plants should flower in about 12 months. Division is possible but not advisable with the species mentioned except *B. rigidula*.

Senecio and *Podolepis* are two genera which are represented in this area and produce showy golden flowers. *Senecio* is one of the largest genus of plants in the world—Australia having many species.

Senecio pectinatus is a stoloniferous herb with basal oblong notched leaves. The reddish 4"-8" scapes each have a single yellow or orange 1" flower. It frequently grows in moist positions and along streams and requires a moist position in cultivation with protection from afternoon sun. Propagation is by seed or division. See colour plate page 377.

There are several species of *Podolepis* that are very showy. The flowers perhaps are not typically daisy-like but are very similar. *P. longipedata*, *P. robusta* and *P. jaceoides* are all common on the mainland alps and *P. jaceoides* also occurs in Tasmania.

Of course, there are many other native plants suitable for the rock garden besides alpine plants. These, if placed correctly will grow in the same conditions. The following list of native alpine plants will be found reasonably easy to grow.

Aciphylla glacialis
Asterolasia trymalioides
Baeckea gunniana
Blandfordia punicea
Blechnum penna-marina (fern)
Brachycome aculeata
B. decipiens, *B. nivalis*
Celmisia asteliifolia var. *latifolia*
Coprosma moorei, *C. nivalis*
Diplarrhena moraea
Diselma archeri
Ewartia nubigena
Geranium sessiliflorum
Helichrysum acuminatum
H. backhousii, *H. bracteatum*,
H. dealbatum, *H. hookeri*
Helipterum albicans, *H. anthemoides*

Hibbertia procumbens
Hovea longifolia
Kunzea muelleri
Microcachrys tetragona
Nertera depressa
Oxalis lactea
Pernettya tasmanica
Podocarpus lawrencei
Podolepis jaceoides
Prostanthera cuneata
Ranunculus muelleri, *R. pascuinus*
Scaevola hookeri
Scleranthus biflorus
Stylidium graminifolium
Trachymene humilis
Trochocarpa clarkei
Viola hederacea
Wahlenbergia gloriosa, *W. saxicola*

AN ALPINE ROCK GARDEN

Construction of a rock garden with the view to planting alpine plants, including our native alpenes, involves thorough preparation if successful results are to be obtained. Most alpine plants like to grow in full sun, however when brought down to low altitudes, positions in full sun are far hotter than those experienced on mountain tops. Some plants will tolerate this if well watered but many will require some light shade, preferably from the hot afternoon sun. A slope facing east is ideal but any slope or even a level area can be used.

A rock garden with bad perennial weeds in it will create a never ending chore for the owner, so particular care should be taken to make sure that no sorrel, couch grass or such is in the prospective area or in any brought in to fill beds. Although drainage on a slope is usually good, always make sure that the area is sufficiently drained. Bad drainage will be fatal.

An attractive rock garden can be constructed on level ground by building a mound, up to 2' high, of good soil and placing rocks to create pockets and small level beds on it. The choice of rock will be governed by what is available in different districts but the best is unbroken weathered rock or stones. These will blend in to give a natural appearance to the finished rock garden. Sandstone is a very good choice, if available, but dolerite and volcanic rock etc. look well also. The size of the rocks is important. Some large stones should be used. Although hard to move, they will give a variation in height to the garden and provide shade for small plants. A variation of rock sizes will give natural looking results.

A variety of soils, as long as they are acid, should be satisfactory but heavy clay base soils should not be used. Sandy soils are good but do tend to dry out very quickly, so the addition of good quantities of leaf mould or rotted compost would be beneficial. An ideal soil would be one that is acid—about 5.5-6.5 on the pH scale and that when watered and squeezed in the hand will not compact but will remain friable.

In the placement of rocks there are two aims—to create a natural appearance pleasing to the eye and to create pockets and areas that will be favourable to the plants growing in them. For this reason, the rocks should not be arranged in any symmetrical position or way. Most rocks seen in their natural condition will be found to have a large area beneath the ground. This should be borne in mind when placing rocks.

When working on a slope, it is far better to have flat or nearly flat beds using rocks to build up in front of each area. This may not work in with the idea of a completely natural setting but is essential in the cultivation of the plants. It will be found that beds left at sloping angles will shed water too quickly in summer and the plants will suffer.

The soil when being placed in among the rock should be firmed by stamping with the foot or ramming in between the rocks to eliminate any air pockets. Planting between rocks can be done as the soil is placed but generally it is far better to let the whole area settle for a few weeks after construction before planting. Mulching the surface of beds with coarse gravel or screenings can help retain moisture and restrict weeds.

Upkeep of the rock garden is easy—weeding being the main chore. As mentioned before prevention is far easier than the cure. Make sure all perennial weeds are eradicated before you start.

Regular watering is important for alpine plants. Australian alpine regions receive regular rains through the summer months and these conditions should be imitated. No heavy feeding is necessary on most soils, a light annual dressing of blood and bone should be sufficient.

These plants love the conditions in a rockery which may be created as described opposite.

NEW PLANT DISCOVERIES IN TASMANIA

by David and Ann Ratkowsky

(Photography: Ann Ratkowsky)

It is reputed that many new plants are likely to be found in Tasmania's southwest, the region being characterized by high rainfall density, often impenetrable vegetation, and relative inaccessibility. However, even in the more accessible areas of Tasmania such as its eastern half, it is still possible to find new plants. In the past year the authors had the satisfaction of discovering three plants completely new to Tasmania and rediscovering one which was only poorly known in the past.



The most exciting find involves a cushion plant, which was seen in flower on Hamilton Crags, within a mile of the ski development in Ben

Lomond National Park. Tasmania already has five known cushion-plant species of four different families, three of which (*Pterygopappus lawrencei*, *Abrotanella forsterioides*, *Dracophyllum minimum*) are endemic, and two of which (*Phyllachne colensoi*, *Donatia novae-zelandiae*) are shared with New Zealand. Dr. Winifred Curtis identified the new plant as belonging to the genus *Pygmaea* (Scrophulariaceae), a genus of six species not previously recorded in publication as occurring outside New Zealand. In fact, one other species of *Pygmaea* does occur at the highest elevations of the Kosciusko Plateau on the Australian mainland, but its close affinities with the New Zealand *Pygmaea* have only recently been recognised (Dr. B. G. Briggs, *pers. comm.*).



A species of *IXODIA* yet to be named

This plant is not of the highlands as are all other species in this issue but is mentioned in the article following and recorded here at the request of the authors.

Specimens of the Tasmanian plant were sent to N.Z. and botanists there have declared it to be conspecific with *Pygmaea ciliolata* var. *fiordensis*, a plant of the high-rainfall Fiordland district of the south island. Tasmania thus now has three cushion-plant species which it shares with N.Z., adding yet another link between the flora of these two regions. Although the authors have searched other parts of the Ben Lomond range, they are yet to find it anywhere else and for the moment the plant must be considered to be local to Hamilton Crags.

The second completely new plant was found growing abundantly on both sides of Franklins Road, a forestry track north of Kelleve in south-eastern Tasmania. The plant, a member of the Compositae, is a tall, rigid shrub up to 2 m. high having narrow-linear leaves 1.5 mm. wide, up to 2 cm. long, green above and grooved at the midrib, spreading at right angles to the stems which are covered with a yellowish exudate. The flower heads are terminal in dense corymbs, each head having phyllaries with spreading white tips and containing about five florets, surrounded by white-tipped scales, pappus absent. These latter features indicate that the new species should be assigned to *Ixodia*, an Australian genus of two species, one of which (*Ixodia angusta*) is endemic to Tasmania and grows in the same region as the new species. The other species (*Ixodia achilleoides*) is found in South Australia and western Victoria, and is polymorphic.

The third new plant, a willow-herb, was found growing in three locations along a water supply pipe-line track on Mt. Wellington near Hobart. The leaves are round and have rather longer stalks than other Tasmanian species of *Epilobium*. Specimens of the plant were sent to Dr. P. H. Raven, an authority on this genus, and he identified the plant to be *Epilobium rotundifolium*, otherwise known only from New Zealand and surrounding islands. Dr. Raven believes that the plant may be an introduction into Tasmania, and points to the fact that it can spread very easily by its plumose seeds.

The fourth plant found is a rediscovery, a daisy bush *Olearia persoonioides* var. *lanceolata*, the previous surviving record being a single specimen from the Rodway Herbarium now housed at the University of Tasmania. The authors have now found this plant growing in four different localities in the southeast. It is a stout, erect shrub, branched or unbranched, up to 150 cm. high, with elliptical or elliptical-lanceolate leaves up to 7 cm. long, densely covered beneath with a thick brown tomentum, the upper surface being characterized by an upraised, reticulate venation. The large, showy flowers occur at the end of the main stem on branched, densely tomentose peduncles. The achenes are essentially glabrous except for some tufts which may appear just below the point of attachment of the pappus. The plant is strikingly different in appearance to *Olearia persoonioides*, and will probably, upon further study, have to be accorded specific status.

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Curtis, W. M. "The Student's Flora of Tasmania", Part 2, pp. 304, 343 (1963).

STUDY GROUPS

Study Groups comprise readers scattered all over Australia who engage in work co-ordinated by a leader through correspondence. The aim is for members of the group to exchange notes, seeds and sometimes plants of species in a particular genus. The only qualification necessary is to be keen to grow plants and observe results. Some groups appear to have difficulty functioning possibly due to the difficulty of obtaining plants. However, not enough practical activity is being undertaken and people who are keen and determined to work and not just try a few plants in a casual manner are urgently needed.

DRYANDRA STUDY GROUP

Are there enough members interested in forming a Dryandra Study Group? There is very little information readily available on this fascinating genus and this, coupled with a chronic lack of seed and propagating difficulties has led to the current situation where, apart from a few species, Dryandras are virtually unknown in gardens and are largely impossible to obtain from nurseries.

I would be interested in hearing from people who are cultivating Dryandras with a view to exchanging information, seeds, cutting material and even plants. I will answer all letters and, providing there is enough interest, will look into the setting up of a Study Group—Mr. Tony Cavanagh, 2 Wilkinson Street, Ocean Grove, Vic. 3226.

SEED COLLECTION

COUNTRY WILDFLOWER LOVERS—WILL YOU ASSIST?

There is little doubt that efforts to cultivate our wildflowers and to understand their needs is being severely hampered by the availability of good seed. Commercial supplies have good stocks of some species and can meet the demand. This publication has made every effort to help them in this necessary work and will continue to do so. The following scheme will attempt to work in with them, stimulate their demand and not compete with them.

We have called for seed collectors in the past with disappointing results. These were to work with the commercial suppliers on a basis to be agreed between them. The range of desired species is still not big enough. It is probable that there are many who would enjoy a quiet ramble through the bush collecting seed but who do not know what to collect, how to collect it or the names of the species from which they collect seed. If you would like to do this and learn more of our wildflowers then the following scheme may interest you.

The area in which you will collect will probably be restricted to a few square miles. Collect a specimen of the flower, the fruit or capsule where the flowers are finished and a few leaves and send these with a short description of the plant to the Government Botanist, Botanic Gardens, of the Capital City of the State in which you reside. Number the specimens and keep a pressed specimen for your own guidance. When the seed matures you can collect it and by this time you will have a reply to your queries. When sending in the specimens ask for advice on what restrictions exist against limited seed collection and for which species the restrictions apply in your State.

Do not collect from National Parks or reserves, or near road sides and do not collect protected species. Very few of the species you will want to collect from are protected and your first collection of specimens will only be of a few pieces. Do not pull the plants up by the roots and make clean cuts so that you are in effect pruning the bush.

The position varies a little from State to State. In Western Australia the specimens will need to be sent to the Herbarium, Dept. of Agriculture, Jarrah Road, South Perth. Some form of licensing may be necessary eventually but the initial collection will be of educational value—for you to learn more of the wildflowers in your area.

When you have compiled a list of species in your area that you can identify with confidence, keep the seed in sealed envelopes and sent a list of the names only to the Editor, "Australian Plants".

We shall see what response we get and advise you how to proceed next. If you would like some remuneration for the work, we shall put you in contact with a commercial seed supplier who may handle your collections if he does not already have stocks and feels there is a demand. We shall not proceed in our scheme with species available commercially but the rest will be offered through a marketing scheme yet to be announced. Collectors will receive some recompense for expenses.

The scheme is a genuine attempt to:

- (a) educate those who ramble in the bush to know their plants;
- (b) provide a worthwhile interest for those who would care to participate;
- (c) make available to those who are anxious to cultivate a wide range of wildflowers, a more reasonable range of seed. Those involved in study groups or cultivation studies from which results will be reported will be given first choice of the seed that will be sold at market prices.

TASMANIAN CUSHION PLANTS

Their Cultivation by Ken Gillanders, Woodbank Nursery, The Basin, Vic.

The following notes on growing cushion plants apply to *Pterygopappus lawrencei*, *Dracophyllum minimum* and *Donatia novae-zelandiae*. However, there is no reason why *Phyllachne colensoi* and *Abrotanella forsterioides* cannot be grown in the same conditions.

Pterygopappus lawrencei is a member of the Compositae and is endemic to the high mountain areas in Tasmania. Like all the cushion plants it forms hard dense mounds, often growing with the other plants mentioned. These mounds are up to 2' in diameter and several yards across when mixed with the other cushions and are so hard that they can be walked and stamped upon without marking them. This is quite amazing because the tops of these mounds can be up to 12" above the surface of the soil. The small leaves are sage-green and densely covered with white hairs. The stems, beneath the surface are clad in persistent dead leaves and have roots descending from them through the closely packed dead leaves that act as a sponge soaking up moisture and are continually wet. The flowers are small and insignificant but this does not matter as the plant is beautiful in its character and colour. Stems detached and placed in sharp sand in spring, summer or early autumn will root easily. Plants can also be divided with care at the same time of the year.

Dracophyllum minimum. An epacrid, is also a Tasmanian endemic and grows on mountains in the central and west of the state at altitudes over 4000'. Cushions of this plant can be up to 3' in diameter and are very hard and a deep green. The leaves are almost ¼" long, narrow and pointed with a sheathing base and are often like little rosettes on the ends of the tightly packed stems. The white flowers are stalkless and are a tube with spreading rounded lobes. It can be propagated from seed, divisions or as a last resort, cuttings which do not appear to be easy.

Donatia novae-zealandiae. Previously included under Styliaceae, it is now classified into the genus Donatiaceae which has only 2 spp. This beautiful plant is native to Tasmania and New Zealand and is found growing in similar areas as the other plants mentioned. Individual cushions can be up to 3' across, hard and dense. The foliage is very similar to *Dracophyllum* and is a bright green. Leaves beneath the surface are brown and tightly compacted with adventitious roots descending between them. The whole centre of the plant is like a huge sponge and full of moisture. The stemless solitary white flowers are ¼" in diameter and are like upturned bells in shape with 5 pointed sepals. Propagate from cuttings in summer or autumn which root easily, division at the same time or seed.

These plants grow in a very acid peaty soil, in fact, pure peat in many cases. They have abundant permanent water at the roots and are exposed to full sun, frost, snow and winds. To grow these plants in cultivation, it is essential to try to imitate these conditions. I have had some success with the following method. First a hole was dug, the size of the bed being made, in my case about 5' round. The centre of the hole was 3' deep tapering up to the surface, in fact, a cone shaped hole. In this was placed a heavy gauge plastic sheet. Drainage holes were pierced in the sides about 18" from the bottom and peat moss was placed in the hole up to this depth. The hole was then filled to the surface with a mixture of peat moss, soil and sand in equal proportions. This creates a small sump of water beneath the bed, keeping the soil continually moist as long as it is watered regularly in dry weather. The excess plastic above the surface can be cut away or tucked beneath rocks. Although growing in full exposure in their habitat, they may require some light shade in cultivation, depending on the climate—a cool climate is best, of course.



Photography by Ken Gillanders

DONATIA NOVA-ZELANDIAE A Tasmanian Cushion Plant

GROWING ALPINE FLORA

The advice given opposite on the growing of Cushion Plants may be readily extended to growing other plants, especially the alpine flora. Will readers please charge out into the garden and try this method. Those who wish to join a Study Group on the alpine flora should write to the editor.

Other study groups are as follows:

- Acacia* (Wattles)—A new leader is shortly to be announced.
- Banksia*—A new leader is shortly to be announced.
- Blandfordia* (Christmas Bells)—Don McNair, 42 Ingall St., Mayfield, N.S.W. 2304.
- Boronia*—Alan Ward, 66 Cecil St., Gordon, N.S.W. 2072. Dedicated workers only.
- Dryandra*—Tony Cavanagh, 2 Wilkinson St., Ocean Grove, Vic. 3226.
- Eremophila*—Ken Warnes, "Waldon", Owen, S.A. 5460.
- Eucalyptus*—Ted Daniels, 23 Dorking Road, Cabarita, N.S.W. 2137.
- Fabaceae*, Pea Flowered Plants—Ross McDonald, 6 Evon Ave., East Ringwood, Vic. 3135.
- Ferns*—Steven Clemesha, 18 Wesson Road, West Pennant Hills, 2120.
- Hakea*—Royce Raleigh, 23 Arlie Crescent, Montrose, Vic. 3765.
- Insectivorous Plants*—Steven Clemesha, 18 Wesson Road, West Pennant Hills, 2120.
- Iridaceae*—Miss K. Shadgett, 122 Sussex St., North Adelaide, S.A. 5006.
- Native Orchids*—Brian Muffet, 23 Marulda St., Aranda, A.C.T.—Keen members are urgently required in this now very active group.
- Prostanthera*, Mint Bushes—Keith McIntyre.

GROWING ALPINE PLANTS

A report by Ken Gillanders on his experience in the cultivation in Victoria of the plants mentioned in the article on page 371

Neopaxia australasica (syn. *Montia australasica*). Portulacaceae. A creeping plant with small fleshy leaves usually green but sometimes glaucous. The waxy white or pink $\frac{1}{2}$ " flowers are produced in profusion creating sheets of colour on the ground. Tends to grow rank in cultivation and should be grown in full sun. Seed germinates easily. Cuttings root readily and division of the creeping stems does not check the plant at all. Vic., N.S.W. and Tas.

Stackhousia pulvinaris. Stackhousiaceae. A mat forming prostrate plant with densely crowded small bright green leaves. The solitary fragrant star-shaped yellow flowers are produced in such profusion as to hide the foliage. It does not like to dry out and must have a sunny position to grow well. Propagate from seed or cuttings. Vic., N.S.W. and Tas.

Ewartia nubigena Compositae. Commonly named Brown Edelweiss. A creeping prostrate plant with small silvery-grey hairy foliage. Its flowers are light brown and held just above the foliage. This plant only grows on open windswept plains or summits, where it can be seen among and over rocks, forming mats up to 4' across. It will grow well in cultivation in a sunny well-drained position. It must be watered regularly. Care must be taken that excess moisture does not lie in the plant or sections will brown off. A good idea is to place small stones or gravel around it to grow over. This allows air circulation. Propagation is easy from cuttings and division in spring, summer or autumn. N.S.W. and Vic.

Coprosma pumila Rubiaceae. A prostrate creeping plant with small shining light green fleshy leaves. It forms a dense mat favouring cool moist positions. Coprosmas are generally dioecious which is the case with this plant. The flowers are insignificant and are followed by $\frac{1}{4}$ " round orange-red shining fruits on the female plants. It will grow in a shaded position if well watered. I have flowered it regularly but have never fruited it, as I have only the one sex. It can be propagated easily from cuttings or division. Vic., N.S.W. and Tas.

Podocarpus lawrencei (syn. *P. alpina*). Podocarpaceae. The mountain Plum Pine is a spreading conifer with grey-green yew-like foliage. It can grow up to 8' but is generally lower and can be found creeping over boulders, some ancient trees being 20' in diameter with picturesque gnarled branches. The male cones are small with crimson scales and the greenish-black seeds are on large red succulent bracts. It can be grown easily in any reasonable soil and can be struck from cuttings inserted in sand. Vic., N.S.W. and Tas.

Grevillea victoriae. Proteaceae. The Royal Grevillea grows up to 10' and has deep green lanceolate leaves up to 5" long. The young foliage often is a rich bronzy hue. The bright red flowers are in pendant clusters. It grows easily in cultivation but will not be free flowering till well established. Some forms are obviously freer flowering than others. Propagation is best from cuttings as they strike easily and seed is usually hard to collect. Vic. and N.S.W.

Baeckea gunniana. Myrtaceae. The alpine form is a creeping low shrub usually a few inches high with fine fern foliage. The white or pink flowers are produced in profusion so as to hide the leaves. It can be grown in a sunny position that receives regular watering. Propagate from cuttings, it will also layer itself and these can be detached with care. Vic., N.S.W. and Tas.

Kunzea muelleri. Myrtaceae. A spreading shrub often completely prostrate, rooting as it creeps along. It has fine dull-green foliage and a profusion

of dense clusters of yellow flowers with conspicuous protruding stamens. Cultivation and propagation the same as *Baeckea gunniana*. Vic. and N.S.W.

Olearia megalophylla. Compositae. A shrub up to 4' with large dark green leaves up to 6" long, covered on the back with a dense felted mat of brown hairs. The white daisy-like flowers are in loose heads. It is an interesting and beautiful plant in foliage and flower and can be grown easily in cultivation. Propagation is easy from cuttings taken with a heel in the autumn and inserted in sand. Vic. and N.S.W.

Veronica nivea. Scrophulariaceae. A slender plant with several ascending stems clad with fine divided foliage. The pale lilac-blue flowers are in loose racemes or near the terminals. In its native habitat it favours moist positions, but in cultivation, it will grow well in sun with normal watering. Unfortunately it tends to grow a bit rank, the weak stems being unable to support the extra growth it makes when brought down to lowland conditions. Regular pruning will help to counteract this. Propagate by seed or cuttings which root readily in sand. Vic., N.S.W. and Tas.

Oxylobium alpestre. Papilionaceae. I have grown this prostrate plant from cuttings collected on the Dargo High Plains. It grows quite well but seems to be shy flowering.

Ranunculus anemoneus. Ranunculaceae. This magnificent Buttercup is only found on Mt. Kosciusko and adjacent peaks. It has rather fleshy stems and large dissected leaves. The glistening white flowers are up to 2" in diameter with a cluster of yellow stamens in the centre. Flowers can be solitary or several to a stem which are up to 12" in height. To cultivate this plant is very difficult and the only success I have had is to plant it in a bed like that mentioned for cushion plants.

Caltha introloba. Ranunculaceae. Marsh Marigold. A prostrate herb with rather fleshy leaves with two appendages attached to the top of them. These form rosettes in very moist positions, particularly along water courses. It flowers as soon as the snows melt, and the star-like flowers vary from white to cream. It requires a cool moist position and would only flower in a cool climate. Seed sent to England were raised and it grows and flowers well there. Propagation from division is easy. Vic., N.S.W.

Gentianella diemensis. Gentianaceae. A small clump forming herb with deep green or olive-green leaves. A very variable plant, sometimes perennial and in some forms an annual. The flowers are in loose heads and are white or white veined blue and appear from summer to autumn. Seed provides the best method of propagation and needs to be kept at a low temperature for a period for a good germination. A good peaty soil in sun or semi-shade would suit it best. Vic., N.S.W. and Tas.

Stylidium graminifolium. Stylidiaceae. The Trigger plant has a very wide distribution from sea level to the tops of our highest mountains. The alpine form is by far the lovelier plant, being much smaller and having much brighter coloured flowers. The pollination mechanism of the plant is very interesting. Insects visiting the flowers to collect nectar brush against the base of the column, which is bent over like a spring. This triggers it and it springs back, hitting the insect lightly and in so doing, deposits some pollen from the anthers on it. The stigma of the flower at this stage is not ripe but the insect visiting another flower, that has developed further and the stigma receptive, will brush against it, thereby pollinating it. The foliage is grass-like and stiff, often taking on reddish tints and is in the form of a rosette. The flowering stems rise up to 12" in the alpine form with racemes of rosy-red flowers. Seed provides the best method of propagation but clumps can be divided with care in winter. It seems to grow reasonably well in sun or semi-shade but not as easily as the lowland forms.

PESTS—THE AUSTRALIAN SCALE

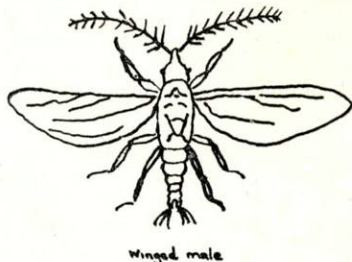
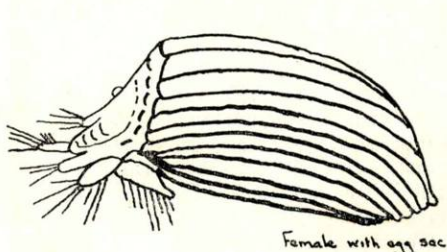
An Interesting Host Record by John Scarvelis

The Australian Scale *Icerya purchasi* (cottony-cushion scale) has been recorded on some ornamentals and is well known in the citrus industry. After positive identification and research I believe that this is the first time it has been recorded on *Lechenaultia biloba*.

The scale was first noticed on a three year old plant of *Lechenaultia biloba* in early September 1973 after dieback of one twig of the previously very healthy plant. The twig was removed with secateurs. The plant slowly deteriorated until death, with the increase in numbers of characteristic, white fluted cylindrical structures on the twigs and leaves.

Oddly enough this was the only plant in my entire garden which became infested. It was the only plant of *Lechenaultia* I had at the time.

The conspicuous part of this scale insect is the large, white, compact, fluted cottony egg sac which is excreted by the adult female, and which is up to 2½ times larger than the scale insect itself. Each sac usually contains hundreds of red oblong eggs. The larvae hatch out in periods ranging from a few days to 1-2 months depending upon climatic conditions. The three larval stages have a shiny, translucent red or reddish-brown colour. The mature females are relatively long (7.35 mm), and have a sturdy yellowish orange or brown coloured body which is often covered by a layer of wax. The winged male is rarely seen.



The history of the control of cottony-cushion scale in the commercial citrus industry is a classical story of biological control. The spectacular control of cottony-cushion scale by an Australian ladybird, *Rodolia cardinalis* (vedalia beetle) marked the first subjugation of a pest by the introduction of a natural enemy. The cottony-cushion scale was introduced into California in the latter part of the nineteenth century. *Rodolia* was found to control biologically the scale in Australia and so was introduced into California. As a result the Californian citrus groves were almost completely freed of the scale within eighteen months.

Man's indiscriminant use of insecticides has made it difficult for useful insects like *Rodolia* to survive. These insects prey on aphids or scale insects or mealy bugs in both their larval and beetle stages maintaining a natural ecological balance.

Rodolia has since been noticed in the garden although it was not looked for at the time of the infestation. I have recently planted *Lechenaultia biloba* and *Lechenaultia formosa* and will be watching them with keen interest. The plants are growing in a raised sand bed at O'Sullivan Beach, an Adelaide southern suburb.

Editor's Note: This article is possibly the only one not strictly applicable to this issue on wildflowers of Australia's high country although scale is a problem on most plants. It is included to remind readers that the use of insecticides is usually not necessary and often harmful. This scale can be removed manually using an old toothbrush, quicker than it takes to prepare a spray.

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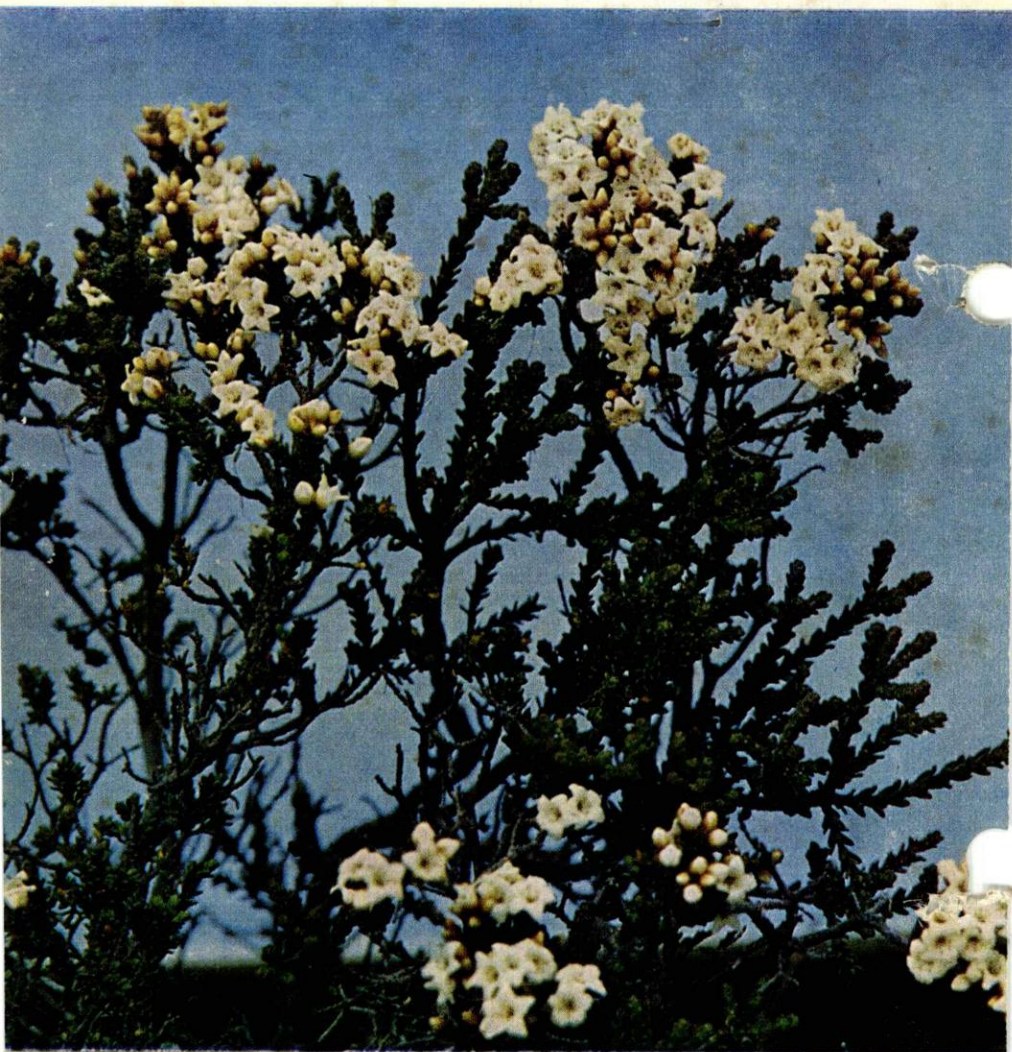
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AN AUSTRALIAN ALPINE HEATH



EPACRIS SERPYLLIFOLIA—THYME HEATH

The mountain heaths, of which there are more than half a dozen species in the Snowy Mountains, generally grow in damp and infertile situations. The thyme heath, a small shrub about one foot high, can be distinguished by its small, pointed, stem-clasping leaves. Its white flowers are sweet-scented, and the foliage turns red in autumn.