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Wildflowers Of The High Country

Recent issues of Australian Plants have moved from the tropics, to plants of temperate areas, and now to plants of the high or cold areas. There have been numerous issues on this theme, each presenting the problems and the joys from diverse aspects using different groups of plants. Our most recent issue on this subject was No. 96 and readers are advised to refer to that issue to round off this subject.

CONTENTS

To meet the widest range of interests and provide a future reference:

1. Our professional botanists publish the results of their scientific research in their journals, usually very "heavy" reading. They often describe new species of plants or change names of species, information that is required by many. The article opposite summarises a sizeable book on the subject. Still too technical for many? Then skip to the following:
2. A glimpse of high country scenery and beautiful flowers should bring pleasure to all. Nowhere else will you see wildflowers as featured in this and other issues of Australian Plants — exceptional value for this alone.
3. A scene at the top of Mount Field in Tasmania (page 337) also features the unique "cushion plants". For description and cultivation. see pages 349 and 352.
4. Experienced horticulturalists in Tasmania present the results of years of competent observation as indexed below. They are presented at the rear of this issue so that they may be associated with the supporting colour plates; many would say they are of major interest.
5. "Cuttings — Vegetative Propagation" presented in a detailed, practical, easily followed manner. Previous issues have given details of simple methods of propagation by seed. References to propagation by cuttings have been snippets of experiences possibly implying some deep mystery, special technique or competence; or that special facilities are necessary. This article puts it all together, why not try it yourself?

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Australian Plants — Your Journal

Australian Plants is produced on a non-profit-making basis by honorary officers. While SGAP NSW Ltd is responsible for this task they do so with every sense of responsibility to produce a periodical of which members throughout Australia, indeed all Australians, could be proud. This not only involves the need to produce a beautiful product but one that is accurate, and a significant contribution to the understanding and preservation of our Australian flora.

Regrettably many issues have been late. We have been more concerned that they are accurate and to the highest possible standard in every respect, rather than on time. However every effort is being made to meet these high standards and produce the product on time and with your help we expect to be able to do this in the future.

We need articles or comments on aspects of cultivation and propagation of wildflowers. What have you been successful with or what are your problems?

We need good colour slides. If you have a few that you consider are good, send them to the editor for inspection. If you are a good photographer, then why not take up the challenge and see how you can help?

COVER PLATE

Euphrasia gibbsiae ssp. *pulvinestris*

Photography by W. R. Barker

A small perennial whose glabrous branches with erect few-toothed leaves topped by clusters of imperfectly lined white flowers are crowded together. It forms a striking display on the cushion plant expanses on the western part of the Mt Field massif, Tasmania, its only known location. Colour plates on page 337 show the habitat of this species on the highlands of Tasmania, and the type sub-species of *Euphrasia gibbsiae*.

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Euphrasia

The Australian Eyebrights

by W. R. Barker, State Herbarium, Adelaide
Botanic Gardens, Adelaide.

The Australian eyebrights must rate among our most attractive herbaceous plants, in keeping with their many common garden relatives in the Scrophulariaceae in the fox-gloves, monkey-flowers, snapdragons, hebes and veronicas, calceolarias and so on. The flowers of the 18 Australian species are pollinated by native bees, the two-lipped corollas ranging from white to lilac, sometimes with a large yellow to orange blotch in the mouth. With *Euphrasia scabra* and *E. orthocheila*, the corolla is yellow. The corolla lobes in several groups of species are marked vividly in purple lines. The dark box-like anthers are united in a rigid horse-shoe arrangement under the corolla hood, with a series of awns projecting down into the mouth. These awns presumably catch on the bee visiting the flower for pollen and nectar, promoting a trickle of pollen through the hair-lined slits of each anther cell onto parts of the bee. The pollen is transferred to the stigma of another flower by the bee.

Despite their showiness, and apart from some short-term success at transplanting from the wild to the garden, there is no record of successful propagation of the Australian species. Germination trials, commenced recently at the Adelaide Botanic Gardens, at their initial stages seem to confirm indications from my own earlier efforts that a strict set of environmental conditions will be required for germination. A preliminary report of these trials is presented in an article on page 347. In searching for the secret to germination and subsequent propagation, two characteristics of *Euphrasia* may prove important.

First, the fine rootlets of all species bear tiny nodules (haustoria). These haustoria provide connections with water-conducting tissues in the fine roots of other plants. *Euphrasia* is one of about 20 genera making up the tribe Rhinanthae, which, with another tribe, the Gerardieae, are able to benefit from parasitising a variety of plants while still being able to manufacture their own carbohydrates through the process of photosynthesis because of the presence of the green pigment chlorophyll. As such they form an intermediate group between the free-living Scrophulariaceae and the closely allied, fully parasitic broom-rapes (Orobanchaceae).

Second, the species and subspecies of *Euphrasia* in Australia often show narrow ecological requirements, sometimes occupying adjacent habitats, as for example seen in the subspecies of *E. collina* around the summit of Mt. Kosciuszko. There, in the alpine regions, ssp. *lapidosa* occurs in bare stony ground (fjaeldmark) and ssp. *glacialis* in short wet turf, while ssp. *diversicolor* occupies the extensive tall alpine herbfields. This last subspecies also grows in margins of subalpine bogs, with ssp. *paludosa* extensive in surrounding sub-alpine grasslands. The genus, spread through most temperate and alpine regions of both hemispheres, shows perhaps its greatest morphological and ecological diversity here in Australia. Is it possible that for successful propagation from seed, a number of ecological characteristics of the habitat must be duplicated? Time will tell.

Would-be propagators must take heed of another characteristic of *Euphrasia* in Australia. Most species and subspecies are rare. Some indeed have become extinct or face extinction. It is highly undesirable for those not authorised to attempt to propagate rare or endangered species.



Euphrasia caudata (above)

Photography by W. R. Barker

A slender glandular-hairy annual to over 30 cm tall, mainly in sub-alpine parts of the Australian Alps. Its many-toothed leaves and bracts have a long apical lobe and the flowers are usually violet to pink with an orange nectar guide on the lower side of the throat.

Euphrasia gibbsiae* ssp. *gibbsiae (opposite top & bottom)

Photography by W. R. Barker

This species is commonly found within alpine heath. It is shown here among cushion plant expanses on Mt Field West, together with its common associate *Astelia alpina* (pineapple grass). The clusters of showy white flowers lined prominently with yellow nectar guides in the mouth and deeper in the throat are shown in the close-up of a head of flowers from a plant on the Rodway Range. Note how the bracts and leaves are conspicuously glandular hairy and many-toothed.

Cushion Plants

Featured also in the scene on Mt. Field, Tasmania (top left), are the cushion plants. Which species are shown are pointed out in a special caption on page 352.



This means that the choice for propagation is limited to a few non-glandular hairy perennials with white to lilac corollas, e.g. *E. collina* ssp. *paludosa* and ssp. *collina*. Species with striated corollas are generally at best rare and confined to reserved areas, mainly alpine; the few that are not endangered (e.g. *E. striata*) are easily confused with others which are. Care should be taken to establish the identity of plants first by recourse to your State's Herbarium, and to remove seed only from large populations.

Euphrasia — Groups or Sections

For a genus of plants containing many species, it is often convenient to group them into botanical sections based on similar features.

Of the 14 sections of *Euphrasia* in the world, Australia is represented by six, distinguished as follows:

- 1a. Anther backs glabrous [*Perennial*.]
 - 2a. Rearmost pair of anther awns (1.5)2.5-3.2 mm long, as long as or longer than anthers, needle-shaped or sometimes twisted or flattened and erose the tip. Corolla lacking striations [*Branches or shoots on main inflorescence-bearing axis occurring at widely spaced groups of consecutive nodes.*] **Sect. *Phragmostomae***
 - 2b. Rearmost pair of anther awns 0.2-0.8 mm long, shorter than anthers, needle-shaped, entire. Corolla partially to extensively striated.
 - 3a. Branches or shoots on main inflorescence-bearing axis(es) developing in basipetal sequence in consecutive axils from 1-few nodes below inflorescence. **Sect. *Cuneatae***
 - 3b. Branches or shoots on main inflorescence-bearing axis(es) developing in no fixed sequence, not consistently in consecutive nodes if high above ground level, often only near ground level **Sect. *Striatae***
- 1b. Anther backs of at least posterior pair of stamens, hairy.
 - 4a. Corolla striated. **Sect. *Lasiantherae***
 - 4b. Corolla lacking striations.
 - 5a. Perennial. Branches or shoots on main inflorescence-bearing axis(es) developing in no fixed sequence, not consistently in consecutive nodes if high above ground level. Upper corolla lobes coplanar, facing forward. **Sect. *Australiae***
 - 5b. Annual. Branches or shoots on main inflorescence-bearing axis developing in basipetal sequence in consecutive nodes high above ground level from 1-few nodes below inflorescence. Upper corolla lobes facing to side or coplanar. **Sect. *Scabrae***

Section *Cuneatae*

Euphrasia ramulosa is the only Australian species in this section. It is the one species in north-eastern New South Wales with prominently striated corollas. By its perennial, much-branched habit (Fig. A-1) and subpetiolate leaves it is considered to be a relict of *Euphrasia* as it existed millions of years ago.

Section *Phragmostomae*

Euphrasia phragmostoma, only recently rediscovered on the cliffs of the Tasman Peninsula, is the sole member of this section. A particularly luxuriant perennial with subpetiolate leaves (Fig. A-5) showy flowers and peculiar long-awned anthers (Fig A-14), its restricted range and habitat place it at risk.

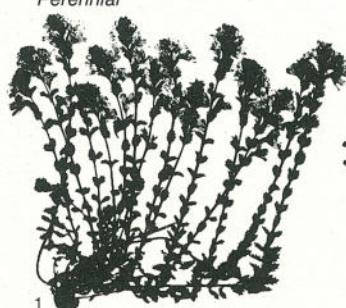
Section *Striatae*

Apart from an outlying subspecies of *E. gibbsiae* on Mt. Baw Baw in Victoria's eastern highlands, this section of perennials is confined to Tasmania, where it may be distinguished by its usually prominently striated corollas (Fig. A-11) and glabrous anther backs. Well known to mountain trampers will be *E. striata* and the more common subspecies of *E. gibbsiae*. *E. semipicta* and *E. sp. 'Southport'*, two relatives of *E. striata*, are restricted to parts of south-east lowland Tasmania. *E. hookeri*, rare in alpine blanket-bogs, has leaves (Fig. A-8) which are strangely hand-like.

The colour plates on pages 333, 334, 337, 345 and 348 show these Tasmanian species in their natural habitat together with close-up detail photographs of the flowers.

DURATION AND BRANCHING PATTERN

Perennial



1
Branching at ground level,
simple above

Branching above ground
level and sporadic



2



Branching above ground level,
basipetal, in consecutive nodes

Annual

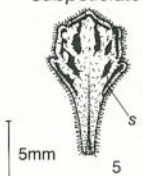


4

3cm

LEAVES

Subpetiolate



5mm

5

Sessile



6

Serrate

s



7



8

Teeth finger-like

COROLLA

Lacking prominent lines



9

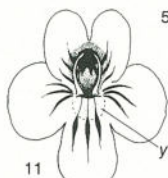
Lower lip
lacking blotch



10

Lower lip
with blotch

Striated



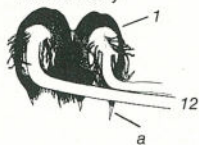
11

5mm

y

ANTHERS

Backs hairy



12

1mm

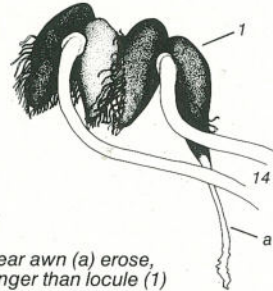
Rear awn (a) sharp-pointed,
shorter than locule (1)

Backs glabrous



13

a



14

a

Rear awn (a) erose,
longer than locule (1)

Key characters for identifying *Euphrasia* in Australia. (1, *E. lasianthera*; 2, 9, *E. collina* ssp. *osbornii*; 3, *E. ramulosa*; 4, *E. eichleri*; 5, 14, *E. phragmostoma*; 6, *E. collina* ssp. *diversicolor*; 7, 11, 13, *E. gibbsiae* ssp. *subglabrifolia*; 8, *E. hookeri*; 10, 12, *E. caudata*.) s = sessile gland patches on lower side of leaves; y = yellow blotch.) (Drawings by L. Dutkiewicz).



Euphrasia collina ssp. *diversicolor* △ *Euphrasia collina* ssp. *tetragona* ▽





Euphrasia collina* ssp. *diversicolor (opposite, top) Photography by W. R. Barker

This plant presents massed summer displays of varied colours in tall alpine herb-fields which abound on the summit regions of the Snowy Mountains, here shown with *Celmisia* sp. (silver snow daisy) with which it is frequently associated.

Euphrasia collina* ssp. *tetragona (opposite, bottom) Photography by W. R. Barker

In the sand-heaths on calcareous sands across southern Australian occur rare localised populations of this non-glandular hairy subspecies. Shown is the lilac-flowered Kangaroo Island variant with broad sparingly toothed leaves, it is confined to coastal sites.

Euphrasia collina* ssp. *collina (above)

Photography by W. R. Barker

This widespread subspecies forms localised populations in the understorey of sclerophyll forests of Victoria and Tasmania. Its non-glandular leaves and bracts have usually only one pair of teeth, and its striking flowers, varying from white to deep lilac are not striated.

Section *Australes*

This section of perennials with non-striated corollas contains two very rare, proposed relictual species in eastern Australia in the Blue Mountains (*E. bowdeniae*) and the McPherson Range (*E. bella*). Morphologically diverse and ecologically widespread *E. collina* is the *Euphrasia* most commonly seen in Australia. It has 14 closely related subspecies, some very restricted in range and habitat. Three of these subspecies are shown in the colour plates over, one showing its typical habitat. *E. collina* ssp. *glacialis* is featured in a colour plate in Volume No. 7, Issue No. 60 (page 356), an issue devoted to Alpine Wildflowers. In the Mt. Hotham-Bogong region of the Victorian Alps occurs *E. crassiuscula* whose calyx and bracts have woolly margins; its three subspecies differ in characteristics separating sections *Australes* and *Striatae* and as a result it is considered to have originated by hybridization.

Section *Lasiantherae*

The three geographically restricted striated-flowered species belonging to this section, one floriferous perennial (*E. lasianthera*) and two annuals (delicate *E. eichleri* and tiny *E. alsa*), reach the alpine heights between Mts Buller and Kosciusko in the Australian Alps. *E. lasianthera* is shown in the colour plate on page 345.

Section *Scabrae*

This last section contains five slender annual species with unusually elongated, non-striated corollas; but for *E. scabra* once widespread across Southern Australia, all occur in lowland to subalpine sites in eastern Australia. Yellow-flowered *E. scabra* and *E. orthocheila* are close to extinction. Amongst the lilac-flowered species this fate has possibly already been met by *E. arguta*. Occurrences of *E. caudata* (colour photograph on page 336) and *E. ciliolata* in less accessible subalpine habitats may help explain their survival in greater numbers to date.

REGIONAL KEYS TO *EUPHRASIA* IN AUSTRALIA

The following keys to the 42 named species and subspecies of *Euphrasia* in Australia are a guide only, owing to their close relationship and overlapping character differences, and also the possibility that you may have an unnamed taxon or intergrade. To ensure accurate identification the detailed keys in the *Euphrasia* revision should be used, all characters being determined and given equal weight.

Euphrasia of Queensland, north and central New South Wales

- 1a. Annual.
 - 2a. Corolla yellow.
 - 3a. Upper leaves entire or with 1 pair of teeth. (Northern montane N.S.W., south Qld).
 - 4a. Plant glandular hairy (? Endangered). *E. orthocheila* W. R. Barker ssp. *orthocheila*.
 - 4b. Plant lacking glandular hairs (? Endangered). *E. orthocheila* W. R. Barker ssp. *peraspera* W. R. Barker
 - 3b. Upper leaves usually with 2-3 pairs of teeth. (Central N.S.W. and southwards; ? extinct in region). *E. scabra* R.Br.
 - 2b. Corolla lilac.
 - 5a. Upper leaves with 1-2 pairs of teeth. (Northern montane N.S.W.; ? rare). *E. ciliolata* W. R. Barker
 - 5b. Upper leaves with 3-4 pairs of teeth (Central N.S.W.; ? extinct). *E. arguta* R.Br.
- 1b. Perennial.
 - 6a. Corolla white, with purple lines. Anther backs glabrous. (Northern montane N.S.W.; rare). *E. ramulosa* W. R. Barker
 - 6b. Corolla white to lilac, without prominent lines. Anther backs hairy.
 - 7a. Upper leaves entire or with 1 pair of teeth. (Blue Mtns.; ? endangered). *E. bowdeniae* W. R. Barker
 - 7b. Upper leaves with 2 or more pairs of teeth.
 - 8a. Leaf subpetiolate, base gradually long-attenuated. (McPherson Ra; ? endangered). *E. bella* S. T. Blake
 - 8b. Leaf sessile, base cuneate to rounded.
 - 9a. Calyx and bracts glandular hairy. (Northern N.S.W. and southwards; ? rare) *E. collina* R.Br. ssp. *speciosa* (R.Br.) W. R. Barker
 - 9b. Calyx and bracts $\pm$ glabrous, lacking glandular hairs.

Euphrasia of Queensland, north and central New South Wales—cont'd

- 10a. Upper leaves with 2-4 pairs of teeth. Base of plant usually without glandular hairs. (Throughout region; not at risk). *E. collina* R.Br. ssp. *paludosa* (R.Br.) W. R. Barker
 10b. Upper leaves with 4-6 pairs of teeth. Base of plant glandular hairy. (Nandewar, Warrumbungle Ranges, N.S.W.; ? vulnerable). *E. collina* R.Br. ssp. *nandewarensis* W. R. Barker
 9c. Calyx and bracts covered with eglandular hairs. (Once widespread, now endangered) *E. collina* R.Br. ssp. *muelleri* (Wettst.) W. R. Barker

Euphrasia of Southern mainland Australia

- 1a. Annual.
 2a. Corolla white with purple lines.
 3a. Plant up to 6 cm, rarely 7 cm tall. Upper leaves with 1-3, usually 2 pairs of teeth. (Mainly alpine, Snowy Mtns, N.S.W.; rare). *E. alsa* FvM.
 3b. Plant 7-16 cm, rarely 4 cm tall. Upper leaves with 2-5, usually 3-4 pairs of teeth. (Alpine-subalpine tracts, Mt. Bogong to Dargo High Plains, Vic.; vulnerable). *E. eichleri* W. R. Barker
 2b. Corolla lilac. (Montane-subalpine Australian Alps, not at risk; an allied sp. in Blue Mtns. ? extinct). *E. caudata* (J. H. Willis) W. R. Barker
 2c. Corolla yellow. (Extinct in most of montane to lowland southern Australia, now only in W.A., Tas.; endangered). *E. scabra* R.Br.
 1b. Perennial.
 4a. Corolla white to lilac, with prominent purple lines. (Alpine-subalpine tracts, eastern Vic.).
 5a. Calyx and bracts lined by white eglandular hairs, outer surface lacking glandular hairs. (Mt. Bogong-Mt. Featherstump; rare). *E. crassiuscula* Gandoger ssp. *eglandulosa* (J. H. Willis) W. R. Barker
 5b. Calyx and bracts externally glandular hairy, without prominently eglandular hairy margin.
 6a. Leaves with 1-7 pairs of teeth. Anther backs hairy. (Mt. Buller-Mt. Howitt; rare). *E. lasianthera* W. R. Barker
 6b. Leaves with 1-2 pairs of teeth. Anther backs glabrous. (Mt. Baw Baw; ? vulnerable). *E. gibbsiae* Du Rietz ssp. *subglabrifolia* (Du Rietz) W. R. Barker
 4b. Corolla white to lilac, not prominently lined.
 7a. Calyx and bracts glandular hairy.
 8a. Plant branched to well above ground level.
 9a. Upper leaves with 0-2, usually 1 pairs of teeth. (Eastern and western Vic., southeast S.A.; ? vulnerable). *E. collina* R.Br. ssp. *trichocalycina* (Gandoger) W. R. Barker
 9b. Upper leaves with 1-8, usually 3-6 pairs of teeth. (Central-southern S.A.; endangered). *E. collina* R.Br. ssp. *osbornii* W. R. Barker
 8b. Plant branched near ground level only.
 10a. Upper leaves with 0-3, usually 1-2 pairs of teeth. Corolla white. (Alpine turf, Snowy Mtns., N.S.W.; vulnerable). *E. collina* R.Br. ssp. *glacialis* (Wettst.) W. R. Barker
 10b. Upper leaves with 1-8, usually 2-4 pairs of teeth. Corolla white to lilac.
 11a. Upper internodes shorter than leaves. Plant 3-11 cm tall. Corolla lilac, yellow-blotched. (Alpine fjeldmark, Snowy Mtns., N.S.W.; vulnerable). *E. collina* R.Br. ssp. *lapidosa* W. R. Barker
 11b. Upper internodes longer than leaves. Plant 10-50 cm tall.
 12a. Corolla white to lilac, with yellow blotch. Seed 0.9-1.9 mm long. (Tall alpine herbfield, subalpine bogs, Snowy Mtns., N.S.W.; not at risk). *E. collina* R.Br. ssp. *diversicolor* W. R. Barker
 12b. Corolla lilac, ? lacking yellow blotch. Seed 0.4-1 mm long. (Lowland, montane southeast Aust.; ? rare). *E. collina* R.Br. ssp. *speciosa* (R.Br.) W. R. Barker
 7b. Calyx and bracts externally lacking glandular hairs.
 13a. Calyx and bracts externally covered with eglandular hairs. (Once widespread in southeast mainland, now endangered). *E. collina* R.Br. ssp. *muelleri* (Wettst.) W. R. Barker
 13b. Calyx and bracts externally glabrous (but not margins).
 14a. Calyx and bracts lined by dense long white eglandular hairs. (Alpine-subalpine, Mt. Bogong-Mt. Hotham, Mt. Buffalo, Vic.).
 15a. Base of plant glandular hairy. Corolla lilac. (? vulnerable). *E. crassiuscula* Gandoger ssp. *glandulifera* W. R. Barker
 15b. Base of plant lacking glandular hairs. Corolla white to lilac. (Rare). *E. crassiuscula* Gandoger ssp. *crassiuscula*
 14b. Calyx and bracts with marginal eglandular hairs, if present, sparse and/or short.
 16a. Lower corolla lobes externally glabrous. [Leaves with usually 1-2 pairs of teeth.] (Sand-heath or coast, Vic. to W.A.; not at risk). *E. collina* R.Br. ssp. *tetragona* (R.Br.) W. R. Barker
 16b. Lower corolla lobes externally hairy, at least in part.
 17a. Upper leaves with 0-2 pairs, usually 1 pair of teeth. (Rare in southeast mainland). *E. collina* R.Br. ssp. *collina*
 17b. Upper leaves with 1-3 or more pairs of teeth. (Montane-alpine N.S.W.-eastern Vic.; rare in west Vic., extinct in S.A.) *E. collina* R.Br. ssp. *paludosa* (R.Br.) W. R. Barker



Euphrasia lasianthera △

▽ *Euphrasia striata*





Euphrasia lasianthera (above & opposite top)

Photography by W. R. Barker

Possibly the showiest of all the Australian eyebrights, this luxuriant glandular-hairy perennial is confined to a small group of mountains in Victoria's eastern highlands. The striations lining the flowers are often very intense and, unlike other species, focus attention on two yellow nectar guides central within the unusually open throat at the base of the stamens. The hairy anther backs are unusual in striated-flowered perennial species.

Euphrasia striata (opposite, bottom)

Photography by W. R. Barker

The most common and widespread striated-flowered eyebright, this almost glabrous perennial of Tasmania's mountain summits never reaches 20 cm high, but forms attractive clumps in grassy openings in heath vegetation.

Lowland, montane Tasmania

- 1a. Annual. Corolla yellow. (North and east; endangered) *E. scabra* R.Br.
- 1b. Perennial. Corolla white to lilac.
 - 2a. Leaves subpetiolate, the base attenuate. Rearmost anther awn longer than anther locule, flat and twisted at tip. (Cliffs, Tasman Peninsula; endangered). *E. phragmostoma* W. R. Barker
 - 2b. Leaves sessile, base rounded to cuneate. Rearmost anther awn shorter than anther locule, sharp.
 - 3a. Calyx, bracts and upper leaves glandular hairy.
 - 4a. Corolla with purple lines. Anther backs glabrous.
 - 5a. Branches and leaves near ground level glandular hairy. (Southport; ? extinct). *E. gibbsiae* Du Rietz ssp. *psilantherea* (F.V.M.) W. R. Barker
 - 5b. Branches and leaves near ground level lacking glandular hairs. (Button-grass plains, west and southwest; not at risk). *E. gibbsiae* Du Rietz ssp. *kingii* (W. M. Curtis) W. R. Barker
 - 4b. Corolla not prominently lined. Anther backs hairy.
 - 6a. Glandular hairs on calyx and, if present, on plant base very short (less than 0.1 mm). Upper leaves with 1-2 pairs of teeth. (East coast; vulnerable). *E. collina* R.Br. ssp. *tasmanica*
 - 6b. Glandular hairs on calyx and, if present, on plant base moderately long (0.1-0.5 mm).
 - 7a. Upper leaves usually 2-3 mm wide, with 1, rarely 2 pairs of teeth. (Launceston, Hobart; ? endangered) *E. collina* R.Br. ssp. *gunnii* (Du Rietz) W. R. Barker
 - 7b. Upper leaves usually 3-6 mm wide, with 1-2, rarely 4 pairs of teeth. (East coast; vulnerable). *E. collina* R.Br. ssp. *deflexifolia* (Gandoger) W. R. Barker
 - 3b. Calyx, bracts and upper leaves lacking glandular hairs.
 - 8a. Corolla at least partly lined in purple. Anther backs glabrous to hairy.
 - 9a. Cleft between upper corolla lobes 1-2.5 mm deep; lower lip 5.5-9 x 10-15 mm. (Tasman Peninsula; ? vulnerable). *E. semipicta* W. R. Barker
 - 9b. Cleft between upper corolla lobes 0.5-0.6 mm deep; lower lip 2-4 x 5-6 mm. (Southport; ? endangered). *E. sp. 'Southport'*
 - 8b. Corolla not prominently lined. Anther backs hairy.
 - 10a. Lowest corollas of main inflorescences 6.5-9 mm long along upper side. Capsules 4.5-7 mm long. (? Endangered). *E. collina* R.Br. ssp. *'Northwest Tasmania'*
 - 10b. Lowest corollas of main inflorescences 8.5-13.5, rarely 7.5 mm long. Capsules 7-9.5 or more, rarely 6 mm long.
 - 11a. Lowest lobes of corolla externally glabrous. (North coast; ? extinct there). *E. collina* R.Br. ssp. *tetragona* (R.Br.) W. R. Barker
 - 11b. Lowest lobes of corolla externally hairy, at least in part.
 - 12a. Plant branched in upper 4/5. (Lowland-montane east; not at risk). *E. collina* R.Br. ssp. *collina*
 - 12b. Plant simple in upper 4/5. (Upper montane, east and north; many variants, some possibly at risk). *E. collina* R.Br. ssp. *diemenica* (Sprengel) W. R. Barker

Alpine, subalpine Tasmania

- 1a. Corolla not prominently lined. Anther backs hairy. (Widespread with local races, some possibly at risk). *E. collina* R.Br. ssp. *diemenica* (Sprengel) W. R. Barker
- 1b. Corolla prominently lined in purple, at least partially. Anther backs glabrous.
 - 2a. Upper leaves hand-like, with finger-like teeth in 3-7 pairs along apical margin. (West and southwest, in cushion plants; ? vulnerable) *E. hookeri* Wettst.
 - 2b. Upper leaves with 1-4 pairs of teeth.
 - 3a. Calyx and bracts lacking glandular hairs. (Widespread; not at risk). *E. striata* R.Br.
 - 3b. Calyx and bracts glandular hairy.
 - 4a. Base of plant glandular hairy.
 - 5a. Glandular hairs on lower parts of branches long, usually 0.3-0.4 mm or more. Upper leaves usually 6-9 mm wide. (Widespread; not at risk). *E. gibbsiae* Du Rietz ssp. *gibbsiae*
 - 5b. Glandular hairs on lower parts of branches short, usually 0.05-0.2 mm. Upper leaves usually 4-6 mm wide. (Mt. Wellington; ? vulnerable). *E. gibbsiae* Du Rietz ssp. *wellingtonensis* W. R. Barker
 - 4b. Base of plant lacking glandular hairs.
 - 6a. Plant branched to well above ground level. Upper leaves with 1-2, rarely 3 pairs of teeth, longest tooth 0.8-1.5 mm. (Buttongrass plains, west and southwest; not at risk). *E. gibbsiae* Du Rietz ssp. *kingii* (W. M. Curtis) W. R. Barker
 - 6b. Plant branched only in lower parts.
 - 7a. Upper leaves with 2-3, rarely 1, pairs of teeth.
 - 8a. Upper leaves widely spaced, the longest tooth 0.5-1 mm long. (? Buttongrass, Cradle Mtn.-King William Ra.; ? vulnerable). *E. gibbsiae* Du Rietz ssp. *microdonta* W. R. Barker
 - 8b. Upper leaves usually overlapping, the longest tooth 0.8-2 mm long. (Heath, southwest; not at risk). *E. gibbsiae* Du Rietz ssp. *comberi* (Du Rietz) W. R. Barker

Alpine, subalpine Tasmania—cont'd

7b. Upper leaves with 1-2, rarely 3 pairs of teeth.

9a. Corolla white with striations only partly extending onto lobes. Upper leaves often spaced apart. (Cushion plants, western Mt. Field massif; ? vulnerable). *E. gibbsiae* Du Rietz ssp. *pulvinestris* W. R. Barker

9b. Corolla white to lilac with striations extending fully onto lobes. Upper leaves usually overlapping. (Heath, rocky sites, west and southwest; ? vulnerable). *E. gibbsiae* Du Rietz ssp. *discolor* W. R. Barker

FURTHER READING

Barker, W. R. (1983). Taxonomic studies in *Euphrasia* L. (Scrophulariaceae). A revised infrageneric classification, and a revision of the genus in Australia. *J. Adelaide Bot. Gard.* 5, 1-304. — Enquiries for purchase at \$20 to, The Director, Botanic Garden, Adelaide, S.A. A book for the botanist.

Costin, A. B., M. Gray, C. J. Totterdell and D. J. Wimbush (1979). "Kosciusko Alpine Flora", (CSIRO, Melbourne/Collins, Sydney). Available from Editor, Australian Plants for \$29.00. An excellent colour illustrated book.

Kuijt, J. (1969). "The Biology of Parasitic Flowering Plants". (Univ. California Press, Berkeley).

Stones, M. & W. M. Curtis (1967-78). "The Endemic Flora of Tasmania", (Aerial Press, London).

Propagation of Australian Eyebrights

Preliminary notes by W. R. Barker and T. J. Christensen, Adelaide Botanic Gardens, North Terrace, Adelaide 5000.

European species of *Euphrasia* differ from the Australian species in their ready propagation. Studies, notably by Dr Peter Yeo of Cambridge Botanic Gardens, indicate that they germinate readily from seed and establish easily. The European species are annuals which in contrast to those from Australia are considered to have evolved gradually in step with man's influence on their habitat, e.g. under pressures of grazing and mowing.

Initial trials on germination and establishment of the seedlings of Australian species have met with limited success. Seed of *Euphrasia collina* ssp. *diemenica* from the alpine zone of Mt Wellington, Tasmania (West 4870) showed good, if slow, germination at constant temperatures with and without treatment with gibberellic acid (GA_3). Results are summarized in tables 1 & 2. Washing entailed use of distilled water for 24 hours; inhibitors would appear to have been removed. Germination commenced after 4 weeks at each temperature in the absence of GA_3 , and 2½ weeks under its influence.

Table 1: Proportion of seed of *Euphrasia collina* ssp. *diemenica* germinated after four months in darkened incubators at a range of constant temperatures. No germination occurred at 20°C or higher.

Treatment (n = 50)	Temperature (°C)		
	5°	10°	15°
Unwashed	4%	50%	10%
Washed	42%	66%	28%

Other batches of seed from the same or other taxa have failed to show significant germination.

The seedlings from the above trial have shown almost no growth in the several months since potting out with a variety of host plants; most seem unlikely to survive. Mr Rodger Elliott of Montrose, Victoria, reports some success with striking cuttings of *E. collina* from the Mornington Peninsula, but they too failed to grow on.

Obviously a number of unknown factors, requiring further investigation, are involved in both germination and establishment.

Table 2: Proportion of seed of *Euphrasia collina* ssp. *diemenica* germinated after 3 months in a darkened incubator at 10°C in different concentrations of gibberellic acid.

Treatment (n = 25)	Gibberellic acid concentration (p.p.m. or mg/litre)			
	50	200	400	1,000
Unwashed	48%	56%	52%	36%
Washed	76%	76%	80%	68%



Euphrasia gibbsiae* ssp. *discolor

Photography by W. R. Barker

A beautiful plant, rare on mountain tops in western Tasmania; like ssp. *pulvinestrifolia* its leaves are few-toothed and without glandular hairs but the flowers differ in their variable colour from white to deep purple and in their prominent striations.

***Euphrasia* — Further Notes**

Because of illness another article of special general interest on these fascinating plants has had to be deferred to a future issue. This was unfortunate as, to many, the above article could be regarded as "too technical". When you come to learn more of our wildflowers you will find the above an excellent reference. — Editor.

Other Wildflowers For Gardens In Cold Areas

Articles on cultivation of our wildflowers in colder areas would normally follow the one opposite. However to associate them with good colour plates it was necessary to present them later in the book adjacent to the colour pages.

Cushion Plants

Cushion plants derive their popular name from the unique moss-like growth which develops into slowly spreading, dense mats or cushions.

In Australia, the subalpine regions of Tasmania provide ideal conditions for the growth and proliferation of such plants. It is here that *Abrotanella forsteroides*, *Chionohebe ciliolata* var. *fiordensis*, *C. densifolia*, *Donatia novae-zelandiae*, *Dracophyllum minimum*, *Phyllachne colensoi* and *Pterygopappus laurencei* are commonly found. Although these plants have similar growth habits and form co-extensive colonies, only two are related. *Abrotanella forsteroides* and *Pterygopappus laurencei* are members of the Asteraceae family.

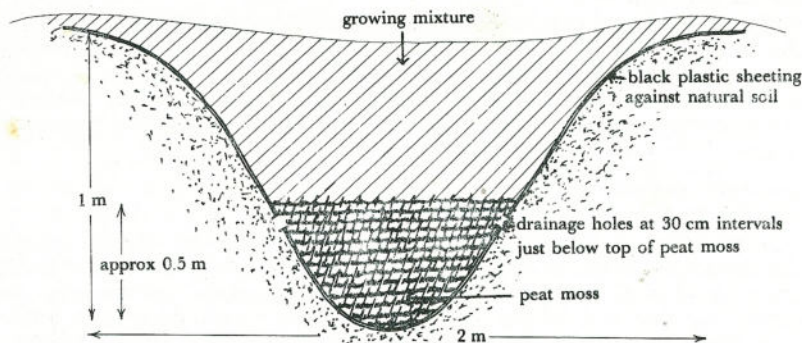
The N.S.W. and Victoria subalpine area also has plants which are sometimes grouped collectively under the name of cushion plants. The species are *Colobanthus nivicola*, *C. pulvinatus*, *Ewartia nubigena*, *Juncus antarcticus* and *Oreomyrrhis pulvinifica*. *Scleranthus biflorus* also occurs in this region, as well as being recorded from Queensland and Tasmania, and is now widely grown as a rockery and container plant in southern Australia.

Some of the species mentioned also occur in other regions such as New Zealand and the south of South America, e.g. *Donatia novae-zelandiae*, *Phyllachne colensoi* and *Chionohebe ciliolata*. Their natural habitat is the mountain summits above 1,300 m, where snow lies for many months of the year. The roots find anchorage in acid, peaty soil deposits that are continually moist. The moss-like growth of the different species provides an undulating surface that can cover large areas.

These intriguing plants have horticultural potential, not only for their ornamental foliage, but also in some cases for the floral display, which can be most decorative, e.g. *Donatia novae-zelandiae*.

There has been some success in establishing these slow-growing plants in cultivation by simulating the conditions of their natural habitat, which provide constant moisture in the area of the root system.

"Encyclopaedia of Australian Plants" — Vol. 3
— by Roger Elliott & David Jones*



* Just released, and available from the Editor, Australian Plants, for \$49.95 post free, Volume 3 of the series "Encyclopaedia of Australian Plants" is a book of immense value. This series has become the most complete reference to the wildflowers of Australia, at least to the extent published, for all genera from letter "A" to "Er". As a guide to the style of presentation, the above section has been reprinted with permission. To date 3,800 species have been described in this fashion. You will also need Volume 1 for \$40.00, a large volume devoted to the cultivation and propagation of wildflowers, and Volume 2 for \$45.00 describing the first 2,100 species in genera A to Ca.

One such method is to prepare a cone-shaped hole to a depth of about 1 m, with a diameter of about 2 m. (These dimensions could be varied, depending on the area required and/or available). The hole is then lined with heavy-duty black plastic sheeting, and drainage holes are provided at about 0.5 m deep. Peat moss is placed in the hole to the depth just above the drainage holes, and the hole is filled with a mixture of equal parts of good quality loam, sand and peat moss. Regular watering during hot weather may be required to provide a constant moisture level for the root systems.

Bog gardens or other situations which are constantly moist can also provide suitable conditions for cultivation of cushion plants.

These plants are best suited to temperate regions. In areas of high temperatures, it is necessary to provide some shade over the plants.

The cultivation of these intriguing cushion plants in containers, with a constant supply of moisture being provided by capillary action from water trays, is well worth trying.

Abrotanella forsteroides

Cushion Plant

Tasmania — 0.05 m x 0.1-1 m, flowering in Dec.-Feb.

Dwarf perennial *herb*, cushion-like, *stems* erect; *leaves* about 0.2 cm long, sheathing base, crowded, margins serrulate, apex pointed, medium green; *flowers* small, white, tubular, terminal.

One of the alpine cushion plants, not well known in cultivation. Difficulty in establishing plants has been experienced, both in Australia and in England. Propagate from cuttings or division.

Chionohebe ciliolata var. *fiordensis* (bearing a few long cilia; from fiords)

Tasmania — Flowering in Dec.-Feb.

Cushion Plant

Cushion plant forming dense, compact, round cushions; *branchlets* spreading, much-branched; *leaves* 0.2-0.4 cm x 0.15-0.2 cm, narrow-ovate to broadly spatulate, stiff, overlapping and rosette-like near the apex of the branchlets, greyish green, the apex nearly acute, with a few long hairs near the tip; *flowers* about 1 cm across, white, open-petalled, tubular at the base; *capsule* about 0.2 cm long.

This New Zealand cushion plant has recently been discovered on Hamilton Crags in south-west Tasmania. It grows in bare rocky places in subalpine areas. Its response in cultivation is virtually unknown; however, it could prove to be an excellent container plant or for a rockery in areas with cool to cold climates. Would require a well structured, organically rich soil. Propagate from cuttings or by division.

Chionohebe densifolia

N.S.W. 0.1-0.3 m x 0.3-0.6 m, flowering in Nov.-Jan.

Prostrate shrub forming dense mats; *stems* prostrate, rooting at the nodes; *branchlets* erect, to 10 cm high, hairy; *leaves* 0.4-0.7 cm x 0.2-0.3 cm, obovate to oblong, thick and leathery, sessile, opposite, overlapping, the margins thickened and fringed with hairs; *flowers* 1.5-2.5 cm across, white, pink or violet, in the upper axils; *capsule* 0.4 cm x 0.3 cm, glabrous or hairy.

A beautiful little subalpine plant found in New Zealand and also Mount Kosciuszko, where it forms dense mats in high areas. It is a very colourful and showy plant that has excellent potential for containers or as a rockery plant in cold districts (it needs cold winters to flower freely). It likes an organically rich, well structured soil in a sunny position and must be kept moist over winter. Propagate from cuttings which strike easily.

Colobanthus nivicola

Soft Cushion Plant

N.S.W. 0.05 m x 0.1-0.3 m, flowering in Dec.-March.

Dwarf cushion *plant*; *leaves* to 0.5 cm x up to 0.1 cm, subulate, imbricate, more or less held erect, forming a dense, moss-like mat; *flowers* small, cream, solitary; *sepals* usually 5; *petals* none; *fruiting peduncles* about 1 cm.

A recently described cushion plant from Mount Kosciusko area. It grows in situations where it is covered by deep snow during the winter. Not well known in cultivation but has potential for growing among boulders and as a groundcover plant. Should do best in moist, well drained soils with a high organic content. Worth trying as a container plant. Propagate is from seed or cuttings and possibly by division.

Differs from *C. pulvinatus* F. Muell., which has harsh, broad leaves and shorter fruiting peduncles.

Colobanthus pulvinatus

Hard Cushion Plant

N.S.W. 0.05 m x 0.1-0.2 m, flowering in Dec.-March.

Dwarf cushion *plant*; *leaves* to 0.5 cm long, subulate, rigid, spreading, ending in sharp point, forming a dense mat; *flowers* small, cream, solitary; *sepals* usually 5; *petals* none; *fruiting peduncles* about 0.5 cm long.

A cushion plant from Mount Kosciusko, where it usually occurs at lower elevations than *C. nivicola*. It is important in its natural habitat for colonizing bare areas.

Donatia novae-zelandiae

Cushion Plant

Tasmania — prostrate x 0.5-1 m, flowering in Oct.-Jan.

Dwarf, perennial *herb* forming a hard cushion-like mat of foliage; *branches* with adventitious roots; *leaves* about 0.5 cm long, linear-subulate, sessile, erect and appressed, bright green; *flowers* about 0.6 cm diameter, white, terminal, solitary, scattered over the plant.

This interesting species frequents mountain peaks, in wet and exposed areas where snow persists for several months of the year. Not commonly cultivated, but certainly has potential for alpine gardens, or as a container plant. Propagate from cuttings.

Dracophyllum minimum

Cushion Plant

Tasmania — prostrate x 0.3-1 m, flowering in Nov.-Jan; also sporadic.

A compact, dwarf, cushion-like *shrub*; *branches* many, short, erect; *leaves* to 0.5 cm long, narrow, sheathing base, imbricate, slightly concave, tapering to an acute point, rigid, margins slightly serrulate; *flowers* small, tubular, white, solitary, terminal, sessile, surrounded by leaves; *fruit* initially crimson, becoming brown and hard when ripe.

One of the quaint cushion plants that are common at altitudes above 1,200 m. It grows in association with plants of similar character. Cultivation experience with this species is very limited. It requires very well drained, light to medium soils that have ample organic material to retain moisture. At the same time they require plenty of light. Propagate from seed, cuttings or by division.

This species is very similar to *Abrotanella forsteroides*, which has small daisy-like flowers.

Cushion Plants — Further Notes

Volume 3 of "Encyclopaedia of Australian Plants" finishes at the genus *Erythroxylum*. Previous issues of Australian Plants have featured these unique plants and to complete the record the following brief notes are included — Editor.

Ewartia nubigena, The Australian Edelweiss, has white and pink flowered forms, the plants forming silvery cushions or mats depending on the amount of shelter available in the Windswept Feldmark of the Australian Alps. Volume 7, page 354.

Juncus antarcticus, Cushion Bush, is a dwarf densely tufted perennial usually growing as cushions or sparse mats among mosses in short alpine herbfield and subalpine tracts of the Kosciusko area, N.S.W. and the Bogong High Plains of Victoria — Kosciusko Alpine Flora*.

Oreomyrrhis pulvinifolia, Cushion Carroway, is a small mat-forming perennial herb found in the Australian Alps, mostly above the treeline, being a characteristic component of the short alpine herbfield. It occurs also in damp sites in tall alpine herbfield — Kosciusko Alpine Flora*.

Phyllachne colensoi is the only cushion plant in the plant family Stylidiaceae. This very densely tufted perennial plant is very similar in vegetative details to other species of "cushion plants in Tasmania". Volume 5, page 225.

Pterygopappus lawrencii is a very densely compacted perennial herb. The leaves differ from other cushion plants in that they are sage green in colour instead of bright green. Volume 5, page 224.

Scleranthus biflorus is found throughout a wide range of altitudes in N.S.W., Victoria and Tasmania. The compact, mat-forming habit has led to its successful use in rock gardens. It propagates readily from pieces thrust into loose moist soil and when established, can withstand quite rigorous conditions if the soil beneath can be kept moist.

Scleranthus singuliflorus is superficially similar to *S. biflorus* but is usually more spreading and less compact. ■

* "Kosciusko Alpine Flora" by Costin et al, is available from the Editor for \$25.00 post free.

The Cushion Plants of Mt. Field, Tasmania

Notes by Jeanette Closs

The colour plate on page 337 shows a scene on Mt. Field, Tasmania, intended to illustrate the habitat of *Euphrasia gibbsiae*. It also shows other species of Tasmanian wildflowers, especially the unique cushion plants. The numerous grey/green mounds in the foreground are *Pterygopappus lawrencii*. Dark bright green mounds also found in the same area and very similar, superficially, when without their small white daisy flowers, are *Abrotanella forsteroides* but it is uncertain whether any are in this photograph.

Among the alpine pineapple grass, *Astelia alpina*, in the near background are bright green mounds topped with "snow" — masses of white flowers. These are probably the white fleshy flowers of *Donatia novea-zelandiae* — or are these cushion plants *Dracophyllum minimum* another cushion plant so superficially similar — or are they *Phyllachne colensoi* as suggested by one botanist? All are a delight to behold and excellent alpine rockery plants. ■

Cuttings

Vegetative Propagation

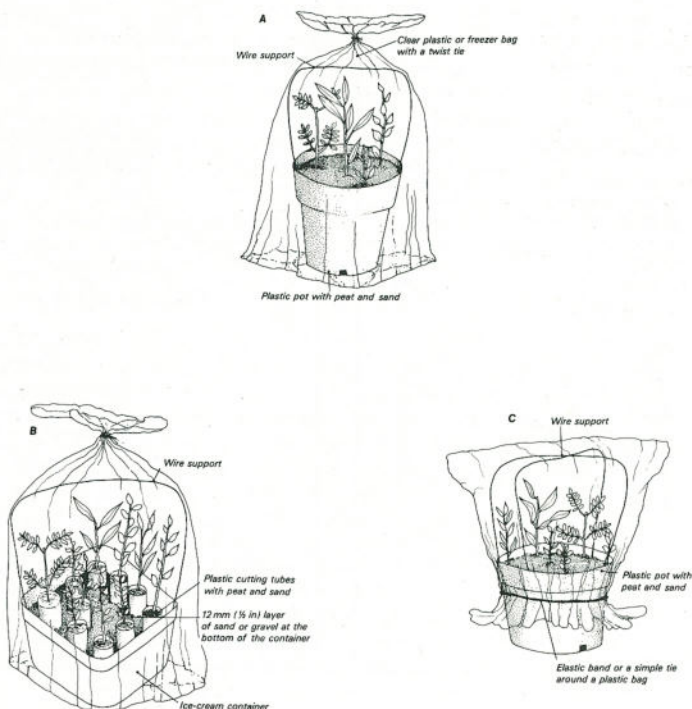
by Alec Blombery*

Propagation from pieces of the stem (or roots in some cases) is the most common way of reproducing an existing plant.

Equipment

A certain amount of equipment is usually required for propagating cuttings but most of it is very simple. Various sophisticated automatic misting systems, although effective for handling large numbers of cuttings, do not make plants form roots more readily than a jam jar placed over a cutting.

You can handle small numbers of cuttings quite simply using a position protected from wind and in the shade of trees and shrubs or buildings. A



*Practical Gardening & Landscaping

Alec Blombery

The above article has been reprinted with permission from the latest book by Alec. The title is exactly what it means. Alec Blombery has written many books of great value over the last 20 years. In each his approach has been very practical and the advice well presented. How well presented can be judged from the above article. What makes this book different and of special value to the new home gardener is that, starting from scratch with a new house on a bare block of ground, you can build your landscape containing tastefully presented gardens or floral-scapes by following the step by step practical advice; know your plants and your plot (soil conditions, etc.), landscape planning and design, garden construction (drainage, paths, terraces, steps, pools, etc.). Bush houses and glasshouses, etc., etc. Yes, the lot in a very practical manner from laying out string lines, mixing cement, laying bricks and rocks, etc., the lot. Of course the last sections nominate the plants that will succeed. Available from the Editor for \$24.95 including postage.

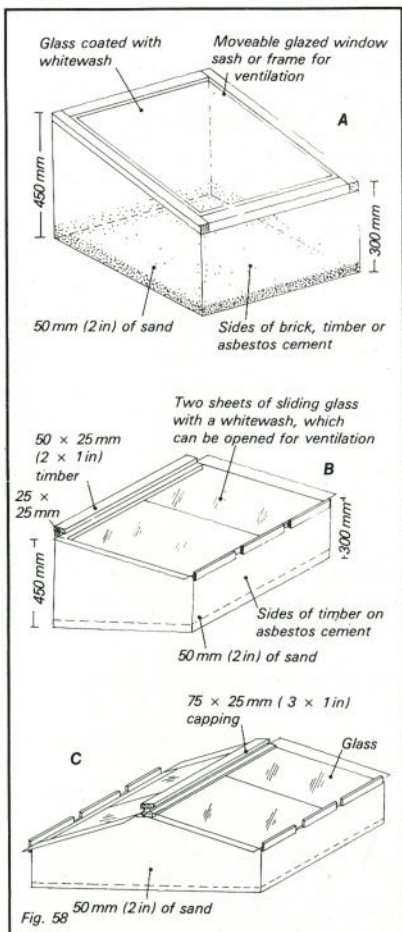
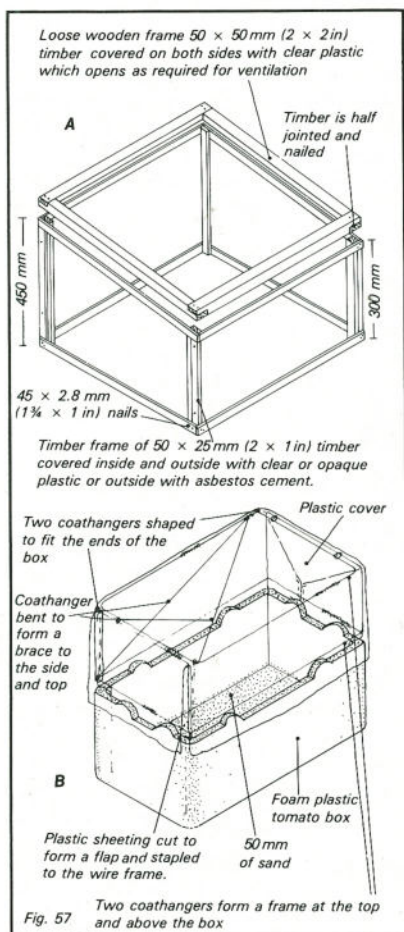


Fig. 57 — A simple frame for propagating cuttings.

A. Cutting frame made from timber and covered with sheeting.

B. Simple cutting frame made of five coathangers, a used plastic tomato box, a sheet of plastic and thin tie wire.

Fig. 58 — Some cutting frames.

A. Conventional cutting frame with a minimum length and width of 450 mm (18 in.).

B. Cutting frame with sliding glass cover, 450 mm (18 in.) minimum length and width 25 x 25 mm (1 x 1 in.).

C. Cutting frame similar to the one above with double sides.

plastic bag placed over the container gives excellent results. Larger numbers of cuttings are often put in a cutting box or frame, or in the shade of a bush house if available. Cuttings propagated in glasshouses need considerable care and attention, and fungous diseases in them can cause trouble.

Basic growth factors

These simple characteristics of plant growth will help you understand the propagation of plants from cuttings.

- New shoots arise only from the junction of a leaf and stem, known as a leaf axil or a node.
- Roots develop from the cambium layer — that part immediately under the bark — of the stem of most plants when conditions are satisfactory.
- Root formation is preceded by a growth of callous tissue, which can take place from any part of the stem in contact with a moist medium, although it usually grows from the base of the cuttings or a node.
- Leaves transpire moisture at all times and it is essential that cuttings do not dry out when they are removed from a plant.
- When you are preparing cuttings, leave the maximum number of leaves on the cuttings. But the number left must not transpire more moisture than can be absorbed through the stem in contact with the moist medium. The surface area of a large leaf, for example, can be reduced by cutting off the upper half of the leaf.
- Growth is governed naturally in the plant by hormones which bring about particular types of growth. By selecting cuttings at the correct stage, you can obtain better results.
- Artificially produced plant hormones are used to stimulate root growth.

Types Of Cuttings

A new shoot or stem passes through various stages of growth. In its early stage the shoot is soft and usually extends rapidly; as growth develops and additional woody tissue is formed, the shoot becomes stiffer and more hardened. When the shoot becomes hard and mature, it grows more slowly and new buds and shoots develop from the leaf axils. As the stem becomes woodier, further shoots do not usually develop from it. When referring to various stages of growth, the term 'wood' is given to that section of the stem removed from a plant. Depending upon the stage of growth the wood has reached, it may be conveniently classified into the following types:

Soft wood or tip cuttings. The growth is new, soft and brittle.

Hardened wood. The new shoots have hardened to the stage where the growth is stiff but still flexible.

Green hardened wood. The shoots have become hard and new growth has developed from the leaf axils, but the stem is still green, vigorous and stiff and breaks when bent.

Hardwood. The growth has become hard and woody as found on the lower parts of the branch, but it is no longer producing new shoots and the bark has turned brown. This type of wood is generally unsatisfactory for use in propagating evergreen plants, but may be used for deciduous species.

Although some plants, particularly many herbaceous ones, propagate readily from wood of various types, most species require a particular wood for satisfactory results. The time of the year influences the type of cutting to be used. If you are using cuttings in late winter when growth is much slower, they need to remain in the 'striking' medium for longer and you must use more mature wood than in spring to early autumn when growth is more active.

Generally speaking, in late winter or autumn green hardened wood should be used and in spring to autumn hardened wood is best. Herbaceous species will grow successfully in spring to autumn from the firm tips of the plants.

When To Take Cuttings

To select the best time for taking cuttings, keep the plant under observation; when new growth is about to begin (that is, when growth buds are swelling and becoming active in the leaf axils) and immediately after flowering are the best times to take cuttings. When the new growth is rapidly extending, the plant produces hormones for the formation of cells. When the new growth is about to commence, the plant hormones are more generalised, and the undifferentiated cells — that is, the plant cells before they are changed to form a particular part of the plant such as stem or leaves — are more readily able to develop into roots.

Factors Influencing The Rooting Of Cuttings

Cuttings root more readily when the cutting medium is acid. You can use 1-2 teaspoons of vinegar to 4 litres of water to acidify the striking medium. In areas where the water is alkaline and the cuttings are being watered daily, keep the soil acid by applying the vinegar solution periodically. But avoid using too strong a mixture.

It is important that the moisture content of the striking medium be constant. A humid, warm atmosphere around the cuttings is important to reduce transpiration from the leaves, but it should not be too hot as overheating damages the cuttings. A constant soil temperature of about 19-22°C (66-72°F) assists roots to develop and can be achieved by the use of bottom heat. To provide the necessary moisture, you can enclose the cuttings in plastic bags, glass jars, propagating boxes or glasshouses, or use a misting system. The method you use will depend on your needs and the number of cuttings being handled. To prevent overheating, ventilation is necessary for cuttings exposed to the sun. But a small, entirely closed system, such as a sealed plastic bag kept in a cool position, does not need ventilation.

Cuttings often die of stem and root rot, so cleanliness and prevention of the fungi which cause root rot are most important. Remember that the conditions for the propagation of cuttings are conducive to the growth of all plants including fungi.

Handle cuttings carefully with clean hands and clean sharp instruments: bruised stems are easily infected by fungous growth and dirty implements can pass disease from one plant to another. If you are watering the cuttings daily or misting them in a glasshouse, apply a fungicide such as Terrazole or Captan at two-week intervals. The cutting medium should be sterilised and must permit free drainage. Avoid deep containers.

Hormone powders do not make plants form roots more quickly but encourage much stronger root growth.

Time Required To Root Cuttings

The period required for cuttings to form roots varies according to the species, type of cuttings and stage of growth at the time of use. Herbaceous plant cuttings may develop roots within a month of setting, while most cuttings take two or three months and some six months or more. Do not get impatient when cuttings appear not to grow, as the roots require time to form. Cuttings often begin to develop new shoots a few weeks after setting, but do not take this as an indication that roots have formed.

If a number of cuttings have been in a container for six weeks or more and you want to find out whether roots are forming, water the cutting medium well and gently pull a cutting. If it feels firm, roots (for callousing) are develop-

ing. Take care not to pull the cutting too hard or you will break the roots. If no roots have formed, the cutting comes out of the soil easily and should be replaced. The percentage of cuttings which develop roots varies from one species to another and may be 100% or as low as 5%.

Selecting Cuttings

Suitable vegetative growth may be used as cuttings at most times of the year, but you will obtain better results from late winter to early autumn. Spring, when growth begins, and early autumn, when new growth has hardened and buds are developing in the leaf axils, are the best seasons.

Select cuttings from plants which show the best characteristics and form of growth and are free from disease and insect attack. Cuttings taken from plants growing in containers frequently root more readily than those from plants growing in the wild.

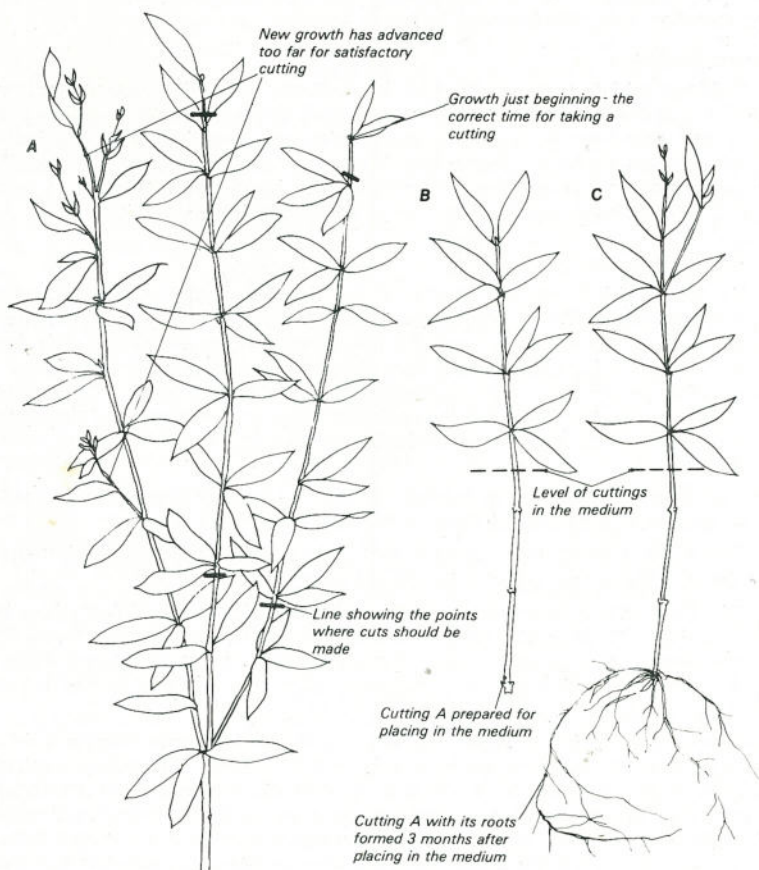


Fig. 59 — A branch of *Grevillea speciosa* showing suitable cuttings and the roots formed on a prepared cutting.

Taking Cuttings

Cuttings may be of side or lateral shoots, growing ends or leading shoots. They should be approximately 7-15 cm (3-6 in) long. The larger the leaves, the longer the cuttings should be. Remove them from the plant with sharp secateurs, scissors or a knife.

Another kind of cutting is a heel cutting which consists of a side shoot removed where it joins the stem. Pull the cuttings off carefully or cut them off with a sharp knife, taking care not to damage the bark at the base, then carefully trim the base or heel. As you collect the cuttings, place them in a plastic bag to prevent them drying out, taking care not to bruise the leaves or stems.

The number of leaves on each cutting should be reduced to make transpiration from the leaves equal the amount of moisture the stem can absorb from the cutting medium. It is important, however, to keep as many leaves as possible, because they are necessary for photosynthesis when the tissue necessary for root development is being formed.

Storing Cuttings

Cuttings which you cannot use immediately or which you collect away from the garden should be wrapped in moistened newspaper, placed in a plastic bag and kept in a cool place, preferably a refrigerator. Alternatively, you can put them in a plastic bag blown up and sealed at the top. Next day push the air out, roll up the plastic bag gently and store it in a cool place. Cuttings should not be held for much longer than a week.

Preparing Cuttings

Having decided on the length of the cutting, make a cut immediately below a leaf node. For a heel cutting, trim the base of the cutting carefully to remove any loose bark. Then cut the leaves from about half the length of the cutting. Take care not to tear the bark while pulling the leaves off. Remove the growing tip and remove or cut back the small side shoots. If you are using a hormone cutting powder, you can remove a thin slice of bark on one side to a distance of 15-20 cm (6-8 in.) to increase the area for root formation.

The cutting is now ready for use. It may be placed directly in the cutting soil or treated first in one of three different ways.

(a) Place the cutting in a dish of water to which 10 drops of Formula 20 have been added, and soak it for 30 minutes.

(b) Dip the cutting into water to which Captan, Zineb or Thiram has been added at half the strength recommended by the manufacturers. Then dip it into hormone cutting powder using strength one for soft cuttings and three for hardwood cuttings. (Strength two hormone cutting powder is useful for most purposes.) Shake off surplus powder.

(c) If you wish to go to more trouble, a solution of indole butyric acid and naphthalene acetic acid dissolved and then mixed with 50% ethanol (alcohol) and 50% distilled water to a strength of 250 to 500 parts per million may be used as a dip instead of prepared hormone powder. Immerse the lower end of the cutting to a depth of approximately 6 mm ($\frac{1}{4}$ in.) for five seconds if using a strength of 250 parts per million and two seconds for a strength of 500 parts per million. These solutions are unstable and are best made up when required. Prepared liquid hormone solutions are becoming available, but have a more limited life than prepared hormone powders and must be stored in a refrigerator.

Rooting Individual Cuttings

Fill a pot about 6 cm (2½ in.) across and 10-12 cm (4-5 in.) deep with potting soil. Make a small hole in the soil, slightly less than the depth of the cutting, with a piece of stiff wire or a thin, clean stick. Push the cutting gently into position the same way up as it was growing on the plant, firm the soil and water well. Do not compact the soil by pressing it down tightly, as this can lead to rot. Place the container in a protected, partly shaded position until the cutting has rooted. Water it with a fine spray once or twice a day or more often in hot, dry weather.

Leschenaultia, Daisy species, *Prostanthera*, *Sollya* and many others may be rooted in this way.

Rooting Cuttings In The Ground

If your garden soil is light and sandy and there is a protected, partly shaded position with adequate light, you can root cuttings in the ground. Dig the soil in the area to spade depth and remove the roots of adjoining plants. Form a small bed raised above the adjoining soil. Water it well, then set the cuttings in the soil as described for individual cuttings above. If you have one cutting, place a broad-necked, clear jar about 7 cm (3 in.) wide and 15 cm (6 in.) deep over it and push it gently so that it stands firmly on the soil surface. Water the soil around the edge of the jar without removing it from the cutting. After heavy rain and watering, break the seal of sand which forms at ground level by pushing the jar back and forth several times.

If you have a number of cuttings, a tent of clear plastic supported on a wire frame may be used instead of a jar for each cutting. During warmer weather the plastic should be coated with whitewash to reflect heat. More care is required with watering as fungous infestation can occur. Spray the cuttings fortnightly with Captan.

When the cuttings have rooted, harden them gradually by first removing the jar or opening the tent for an hour and increasing the period over a week or more until the cover is off all the time. To remove rooted cuttings, dig them out with a sharp trowel with the soil attached to the roots, and handle them like potted seedlings.

Rooting Several Cuttings In A Container

Take a container 10-12 cm (4-5 in.) wide, put coarse drainage material in the bottom and fill it up with coarse, washed river sand or a mixture of sand and peat. Consolidate it by watering well and adding extra soil as required. Saturate it with a vinegar solution (1 teaspoon to 4 litres of water). Then place the cuttings in position as described for individual cuttings, leaving a 2-3 cm (1 in.) space between the cuttings. Water them well and place the container in a protected position.

Alternatively, the cuttings may be protected by covering them with a wide-necked jar, or by placing them in a plastic bag, using a simple frame of one or two pieces of bent wire pushed into the sand to support the plastic bag. Tie the plastic bag at the top or slip it over the pot and fasten it with a rubber band. Another method is to place several cutting tubes filled with the cutting medium, which has been consolidated by watering and saturated with vinegar solution, in a plastic ice-cream or margarine tub. Spread a layer of coarse gravel in the bottom of the tub to keep the tubes out of any water. Seal a plastic bag over each tube. During hot weather a plastic freezer bag gives more protection than a clear bag. Keep the bag closed and do not water the cutting if there is any moisture on the inside of the bag. Water the cutting lightly with a fine spray. Do not allow water to accumulate in the bag above the level of the gravel in the bottom.

Rooting Cuttings In A Large Pot

If you have a pot large enough to leave a 10 cm (4 in.) space between the soil surface and the top of the pot, it can be used in a similar manner to a small cutting frame. Put coarse drainage material in the bottom of the pot, leaving space for 7-10 cm (3-4 in.) of cutting medium. Prepare the soil as described for individual cuttings, and set the cuttings in it. Place the pot in a protected, well-lit, partly shaded position and cover it with a sheet of glass. In warmer weather coat the glass with whitewash and place a stick between the pot and the glass to ventilate it and prevent overheating.

Cutting Frame

A number of pots or tubes with cuttings may be placed in a frame for protection. It is important that the side of the frame be draught-free. The frame should be high enough above the cuttings to produce a humid atmosphere, it should let in adequate light and it should be ventilated to prevent overheating. The area of the frame should not be too large as it should be kept full of cuttings for good results.

A frame which consists of a box with sides of brick, timber or fibro, is very satisfactory for rooting cuttings. The sides should be about 45 cm (1 ft 6 in.) high at the back and 30 cm (1 ft) at the front for general use; 45-75 cm (1 ft 6 in. to 2 ft 6 in.) square is a convenient size. If you want a larger area, it is better to have several sections joined together rather than one large one. A close-fitting cover consisting of a wooden-framed window makes a satisfactory lid. Alternatively, a simple cover may be made by covering both sides of a wooden frame with clear plastic. Coat the plastic or glass with whitewash to prevent overheating during hot weather.

Put 5-7 cm (2-3 in.) of clean sand in the bottom of the frame to hold moisture and allow the pots to drain. Place the frame away from drying winds in a position receiving full morning sun (except for clear plastic frames, which are best in half-shaded positions or in the glasshouse). A frame covered with plastic placed within a glasshouse is very useful for propagating purposes, as it helps to prevent overheating. During cold weather and at night keep the frame closed. During the warm part of the day lift the cover 2-7 cm, 1-3 in.) depending on the temperature. Do not allow the cuttings to overheat. A stick may be placed under the cover to keep it open and provide the necessary ventilation during the day. To help maintain a constant temperature, close the cover in the afternoon. In hot inland areas, a cover made from laths or with a 50% shade cloth may be placed over the frame during hot weather. In frosty areas, placing a hessian bag over the cover at night helps to maintain a higher temperature in the frame.

Care in watering is all-important, as allowing cuttings to dry out may ruin weeks of work and usually results in no roots forming. Watering once or twice a day is usually adequate but during hot spells an extra watering may be given in the middle of the day. If you can't water so often, put extra sand in the cutting frame to hold more moisture. In cool weather water the cuttings during the warm part of the day; avoid late afternoon watering. If you are handling a number of cuttings there is a greater possibility of infection, and so fortnightly spraying of cuttings with Captan at the manufacturer's recommended strength is a good idea.

Leave the cuttings in the frame until roots have developed then remove them and harden them for a few days in a protected position before potting. As some types of cuttings root more quickly than others, you will need to add new pots of cuttings to the frame to keep it full and provide the necessary humid atmosphere.

Plants for Rock Gardens

TASMANIAN HIGHLAND PLANTS

by Sid Corbett

Plants from the high, wet and Western parts of Tasmania, many of them endemic to Tasmania and confined to small areas, have had a dubious horticultural reputation. Gardeners usually find them hard-to-come-by, due to problems in propagation and a lack of knowledge as to their requirements. However, to many people they are particularly attractive as tangible reminders of excursions into our unique and challenging wilderness.

Like rare plants from other places, some Tasmanian endemics are the sort that only a botanist could love, but there are others whose beauty justifies their place in any alpine garden, and these are the ones considered here.

Obviously the natural habitats for these plants are colder and wetter than most gardens. We can artificially increase rainfall and to some extent humidity, but temperature places limits on the areas where they can be grown. Luckily, when competition is removed most plants can be grown successfully well outside the climatic range of their natural habitats.

For a wide range of highland plants a rockery is the best garden situation and details for construction are given in *Australian Plants*, Vol. 7, p.383. Rocks in a garden have many advantages: they provide barriers to the few species inclined to embarrassing lateral spread, they allow deep penetration for roots and water, and mimic their mountain-top functions of temperature modification, erosion control and protection from wind. Skilfully placed rocks can be most attractive in themselves.

Many people overlook the possibilities of natural timber in rockeries — sensuous shapes in bleached, durable pine (*Athrotaxis* species are specially good) or the softer forms of alpine eucalypt which become lichen-covered and merge into the soil. Wood has the cultural advantages of rock and is particularly useful for partially edging a garden where a row of rocks would detract from the natural effect. Great care should be taken with the initial construction of a rockery, which should look good even before it is planted. Most highland plants are slow-growing and with careful planting the original form of the rockery should be recognisable for some years. I have fallen heavily into the trap on underestimating growth rates for alpine plants placed in the relative comfort of my garden. I have found that plants get bigger at double the speed (or more) shown in exposed mountain situations. I use no fertiliser at all in an attempt to retain the compact shapes so attractive in the wild.

Mulch is important for temperature control, and needs to be sparse, friable and heavy, so that it neither blows around nor impedes small and prostrate plants. I use a mixture of small gumnuts, twigs and pebbles collected from the shores of Great Lake, and this is very effective, although it does lead to surprises. Several Snow Gums (*Eucalyptus coccifera*) and a number of other species have appeared miraculously, usually in inappropriate places.

There has been little development of Tasmanian highland plants for horticulture so far; Ken Gillanders from Woodbank Nursery has done more than anyone to find out their secrets. We still rely on observing how they grow in the wild and try to duplicate the conditions which seem most important, but there seem to be many contradictions. A striking example of this problem occurs with Christmas Bells, *Blandfordia punicea*. Most people at

once picture the tall spikes of red and yellow bells and strap-like leaves projecting from cracks in quartzite in the Cradle Mountain National Park (colour plate, Aust. Plants, Vol. 12, p.177) or hanging from cliff faces on the western rivers, but *Blandfordia* also thrives in sandy heaths at sea level in southern Tasmania and is most abundant on the scraggy slopes south of Queenstown and the swamps westward towards Strahan. So what does *Blandfordia* like? High rainfall seems obvious, but drainage varies from perfect to dubious. In the West Coast swamps *Blandfordia* is found on small humps but the very deep roots must go well below the usual water table. Ken Gillanders has found seedlings do well in quite dry conditions, and I am now trying this, having lost some plants apparently through rotting. This glorious plant is grown from seed, which may be slow to germinate, and every effort should be made to cultivate it.

Two of my favourite alpine plants have large single white flowers and ground-hugging leaves. *Geum talbotianum* is quite restricted in the wild, growing on a few mountains in the Southwest, most notably Mt Anne and the Arthur Ranges. It has large hairy leaves, while the smaller *Anemone crassifolia* has shiny, divided leaves. Both reproduce vegetatively by underground rhizomes, and can presumably be grown from seed although I don't know if this has been done. Strangely, *Geum* is frost tender, and is also a favourite food of snails and other pests.

The Snow Berry, *Gaultheria hispida*, (colour plate, Aust. Plants, Vol 12, p.156), extends from damp forests to the highlands and has lustrous, often reddish foliage, white bell flowers and clusters of fleshy white "fruit" which are actually enlarged calyx segments. Easily grown from seed, it is successful in most cool garden situations, growing to about 70 cm and flowering readily.

Bellendena montana (Aust. Plants, Vol. 12, p.144), is usually called Mountain Rocket, though I prefer the literal translation "beautiful lady of the mountains". It is a small shrub (about 40 cm) appearing early in the revegetation cycle after fire, and persisting in climax communities in highland valleys, moors and mountain tops. Summer spikes of creamy Mignonette-like flowers give way in autumn to spirally arranged red fruit. High colour in the fruit seems to depend on harsh conditions, and my garden plants do not colour well. Seeds can take three years to germinate, with a very low success rate, but fortunately cuttings are usually successful.

Two rewarding alpine everlastings are the large golden *Helichrysum accuminatum* and the smaller *H. milliganii* which is white with pink undersides to the bracts. *H. accuminatum* does reasonably well in the garden, dying down ominously in winter but reappearing from spreading rhizomes in spring. The small hairy rosettes of *H. milliganii* should be perennial, but rotting is a common problem, and even plants grown in pure gravel in a pot seldom last. Found only on the highest alpine moors, this plant is worth a good deal of effort because it is so beautiful.

Several monocots are worthy of attention. *Isophysis tasmanica* has a short tuft of leaves and a most unusual long-petalled purple-black flower carried on a 15 cm stem. Typically it grows on exposed high moors but is also found in sea-level heaths in the Southwest. In the wild, whole fields of plants may produce only a few flowers in most seasons. I have had two plants flower in one year but none since, although the plants are healthy. Much more reliable is the spectacular Milligans Lily (*Milligania densiflora*). This is a pioneer species in very wet alpine areas, occupying cracks along water courses and forming dense mats on slopes and ledges, with cream flower spikes in late summer. In the garden, clumps multiply quite rapidly and flower for long periods. Water is certainly important, but the larger species of

this genus appear to be easy to grow and have not received the attention they deserve.

No Tasmanian landscape is complete without the conifers. The prostrate *Microcachrys tetragona* is an ideal rockery plant, slow growing and attractive, with bright orange fruit in late summer. The dwarf conifers, *Diselma archerii* and *Microstrobos niphophilus*, grow slowly to about 1 m. Pencil Pines (*Athrotaxis cupressoides*) will eventually outgrow a rockery, but are so important in the highland landscape that bush lovers will want to have them anyway. King Billy Pine* (*Athrotaxis selaginoides*) is generally so vigorous that it is not suitable for rockeries, but makes an excellent background for alpine plants. Huon Pine (*Lagarostrobos franklinii*) is not an alpine plant, but is a graceful addition to any rockery featuring Tasmanian plants. Its reputation as a slow grower has been overstated, and it may put on 15 cm a year. All the conifers can be grown from cuttings and they will also grow from seed, but this is not always easy to obtain. Garden specimens provide cutting material which is generally better than the very hard branchlets found in the wild.

A constant associate of the alpine conifers is *Nothofagus gunnii*, the Deciduous Beech. For reasons not fully understood many people have trouble growing this beautiful dwarf tree at sea level — low humidity and particularly hot winds seems to be fatal. If you live in a cool elevated area there is a good chance of success, with a growth rate of about 15 cm a year under ideal conditions, and good autumn colour which may last much longer than in the wild. 'Fagus' is grown from seed, with slow germination and very slow initial growth.

The family Epacridaceae contributes a large proportion of endemic plants to the Tasmanian highland flora. Most species readily produce seedlings in the wild but are notoriously difficult to propagate. *Epacris gunnii* is common on sub-alpine plains and open forests on the Central Plateau, and makes a good garden specimen, with short white bells arranged densely up the stems in a four-square pattern. *E. serpyllifolia*, the most alpine species, grows readily but straggles. *Monotoca empetrifolia* is a dainty plant only to 10 cm high with an abundance of cream bells, and favours very rocky situations. Of the *Trochocarpa* species, *T. thymifolia* is most suitable for rockeries, with compact habit and tiny leaves. Pendulous clusters of pink bells show for much of the year, as do the pale purple fruit.

Of the many endemic *Richea*** species, *R. pandanifolia* and *R. scoparia* are most successful. *R. pandanifolia* produces one or more heads of bladed leaves which gradually increase in size and add a wonderful textural contrast to other rockery plants. Slow-growing stems eventually become palm-like trees with bunches of red flowers, but I know of no garden plants old enough to have reached this stage. *R. scoparia* grows to about 60 cm, with "candles" of white, cream, pink, bronze or deep red flowers which appear after four or five

*The King Billy Pine, *Athrotaxis selaginoides*, is shown in the colour plate on page 365. The Tasmanian landscape has many fine trees, why not a special photographic study of these both in the wild and in cultivation? It will be very difficult to photograph them in the wild as their foliage gets lost in the surrounding vegetation when shown in a photograph. Hopefully this will not deter the Tasmanian photographers. The King Billy Pine in the colour plate displaying its male cones is a fine example of what is needed. We need also slides of its flower and female parts.

As for the use of these fine trees in cultivation, even for rockeries, there is a great potential. Who has them growing and who will photograph them for us? Editor.

* * *Richea*

Some of the most impressive plants of the Tasmanian forests and alpine scrubs and moors, are *Richea* species. *Richea pandanifolia* is shown on the rear cover of this issue with a photograph of its flower on page 372. *Richea scoparia* is shown in full colour on pages 368 and 369.

years. Leaves are densely packed all along the stems but are only 4-5 cm long. Several other *Richeas* form small bushes suitable for rockeries, but the flowers are not impressive and perhaps they are not for everyone. *Richea procera* grows quickly compared with the other species, bearing good yellow flower spikes in the second year. At 1 m plus it may be a bit tall for most alpine rockeries.

For many people the best of all heaths is *Prionotes cerinthoides*, a small-leaved climber with pink bell flowers 2-3 cm long. *Prionotes* climbs on tree trunks and dead wood in rainforest and crawls among the rocks in sub-alpine areas. It is usually a plant of damp and shady places, but can be found on mountain tops, where its bright red new growth is impressive. With care *Prionotes* can be grown in the open in cool climates. I have it on the sunny side of my rockery, sheltered by rocks and other plants, and it flowers well.

In summer adventurous new shoots are usually burnt but the damage is not too serious. Water is essential, but it is worth experimenting with position to get best results from this beautiful plant. Unlike other members of the family, *Prionotes* is propagated fairly readily from tip cuttings.

Cyathodes species have small white bell flowers, but their main virtue is the colourful fruit. *C. glauca* (Aust. Plants, Vol. 12, p.144) has rings of 3-4 cm leaves and fruit shaped like miniature French cheeses in white, pink or shades of red and purple. *C. parvifolia* has small leaves and an abundance of bright pink fruit. Neither is a truly alpine species but both range into the highlands. Compact plants to about 60 cm, they are excellent rockery specimens, producing fruit in about the fourth year.

There are many other rewarding highland plants, some easily grown like the white daisy-flowered *Celmisias*, spreading prostrate forms of *Grevillea australis* and *Bauera rubioides* (I have a form with very large white flowers), small ferns like *Blechnum penna-marina* (which is invasive), or ground covers such as *Rubus gunnianus* and *Gunnera cordifolia* (a water-lover with spikes of red fruit). Spreading *Baeckea gunniana* and prostrate *Leptospermum rupestre* (neither are endemic) can be very free-flowering but you need to choose a good form. More challenging are the prostrate heaths with colourful fruit such as *Pentachondra pumila* and *Cyathodes dealbata* and allied species such as *Pernettya tasmanica* and *Gaultheria depressa*.

Boronia citriodora and *Boronia rhomboidea* form stunted shrubs which flower profusely in the highlands. I have experienced the same sudden death syndrome with lemon-scented *B. citriodora* reported by other gardeners, and find *B. rhomboidea* difficult too, although my plants come from lowland stock. Both species are grown from cuttings, with the usual problems of over-hard material from harsh climates, but are well worth perseverance.

Most challenging of all are the cushion plants. I have achieved some success with the green ones in various situations, from open rockery to a sump area on clay. Plants have grown and flowered, but are very prone to invasion by their neighbours. After several years in soft garden conditions they tend to overgrow, fall apart and rot and I have not yet found a way round this. The columnar grey-green *Pterygopappus lawrencii* is even more prone to disintegration, and I know of no instances where this plant has survived long in a garden.

The problems of re-creating highland conditions in a suburban garden are considerable, but with persistence many of our mountain treasures can be grown. The more people try the greater our knowledge of their requirements will become, to the benefit of everyone. ■



Athrotaxis selaginoides, The King Billy Pine

Photography by John Simmons

One of the fine conifers of Tasmania. This tree shown with its male cones, grows 10.30 m depending on its situation but the article on page 363 recommends its use in landscaping; an excellent plant for this. All the Tasmanian conifers are described and illustrated in Issue No. 34 of Volume 4, this issue also describing the other Australian conifers. Volume 4, which also includes the book, *West Australian Plants For Horticulture* is excellent value at \$21.00, from the Editor by mail.

A Garden in Tasmania

FOR A DRY AREA

by Mary McEvoy

This garden began its life about five years ago in a dry sclerophyll area with little water available. It is about an hour's drive from Hobart on the way to Port Arthur and is typical of much of Eastern Tasmania. To begin about an average block size was cleared but since then the straggly gums have been culled out to provide an area of 3-4 acres with a canopy of mainly *Eucalyptus obliqua* and *E. globulus*. The site, 500 m from a sheltered bay, has a south-easterly sloping aspect which means we lose the sun about 3 p.m. in winter. This is the sort of area where those plants thought of as typically Tasmanian, the rainforest and alpine endemics would not flourish and this is true of most of the east coast of Tasmania. We experience about six light frosts a year and occasionally a severe one such as the one which last year carried off that long flowering little gem, *Hemiandra pungens*. The soil varies even in this small area from deep sand to sandy loam, loam over clay, heavy soil and heavy clay; the pH being 4.5 to 5.5. Every effort has been made with the help of 'Grow what where' and other reference books to choose those plants suitable to the various soil types.

The decision to create a native garden was made because:

- (a) The exotics I brought with me were mainly eaten by native animals so I laboured under the delusion that native animals would not eat natives!
- (b) Native gardens should cope with the lack of water.
- (c) We wished to encourage the small native birds closer to the house.
- (d) Aesthetically a native garden would fit the environment.

We did not know we were at the beginning of a drought which early in July, '84, was still on us but in this time we have achieved a pleasant garden around the house and a slowly growing garden farther out. (Of course, this is a subjective comment). Almost all planting has been done in autumn or winter once good rain has occurred and plants have been watered in, mulched and generally left to survive or fail. Mulching material used is *Casuarina* needles, sea grass or bush litter and I rate their usefulness in that order; I find it most helpful in our conditions to mulch the whole area and not just around the plant, but this is not always possible in large areas. Close planting is also helpful as plants provide their own ground cover and cool root run and conserve whatever moisture there is. This may not be aesthetically pleasing to everyone but seems necessary in areas without adequate water.

In looking through my plant-flowering record book I find that we are growing about 150 species of the hundreds of different shrubs so I will mention just a few, mainly those long flowering. There are 22 *Acacia* now flowering — thanks to Marion Simmons and the Acacia Study group. I have found the various Study groups to which I belong most helpful as a source of information and inspiration. Acacias are particularly useful in starting a garden being fast growing and early flowering so providing colour, shelter for other plants and nitrogen for soil. My special joy just now is *Acacia imbricata*, a South Australian endemic, which is growing here equally well in clay, heavy soil and loam. One started flowering in May and another is still in bud. The compact shrubs are 1.5 m tall in two years and the long racemes of soft golden blossoms are beautiful; the loveliest wattle I have seen. Another long flowering *Acacia* is *A. acinacea* with deep gold flowers but of less compact habit which makes it less admired by visitors. *Acacia*

vestita is also a glorious picture; still only 1 m tall but absolutely covered in soft blossom and weeping to the ground. Both these are growing in heavy soil. Soon to flower is *Acacia pulchella*, the W.A. 'Prickly Moses', 1 m x 2 m, growing in clay and each year a mass of bright gold.

Grevilleas are a great joy here because they bring the honeyeaters and provide colour for so many months. *Grevillea* 'Boongala spinebill' with red toothbrush flowers, *Grevillea* 'Audreyae' with red spider flowers and *Grevillea* 'Poorinda Golden Lyre' with golden flowers, flower the whole year round. *Grevillea mucronulata* with greenish flowers, *G. juniperina* 'Pink Lady' a prostrate with pink flowers and *G. dimorpha*, *Grevillea* 'Clearview David', *Grevillea* 'Poorinda Firebird' and *G. lavandulacea* all have red flowers and bloom here from April to December and are great favourites of the honeyeaters. *Grevillea* 'White Wings' is also long flowering, its white flowers provide a nice contrast in the garden with its lower branches spread out to provide its own ground cover. The grevilleas grow in light and heavy soils and are particularly hardy. *Anigozanthus flavidus*, red flowering on 2m long stems is greatly enjoyed for months over summer by the Eastern spinebill as is *Brachysema lanceolatum* flowering from June to November.

Other particularly long flowering plants are *Boronia denticulata* growing both in clay and in loam, *Boronia filifolia* with dainty pink flowers all year, *Brachyscome multifida* with masses of blue daisies all year and the pink flower form having a shorter flowering period.

Many plants from south western West Australia are particularly suitable for growing in the warmer areas of Tasmania. *Banksia* and *Dryandra* have been slow in growth although many have flowered. *Banksia meisneri* flowers at a young age half hiding its small brushes in its attractive foliage. It is one of the plants which give a sense of adventure in wandering through the garden while such shrubs as *Mirbelia dilatata* with deep pink flowers or *Helichrysum bracteatum* with bright gold flowers force their attention on one. *Hakea* have proved particularly useful in the dry and difficult conditions and *Hakea laurina*, *H. cucullata*, *H. verrucosa*, *H. nodosa* and *H. epiglottis* have flowered and *H. multilineata* and *H. ferruginea* are a mass of buds.

Now to note a few points which I find most helpful for dry area gardening.

- (1) Build up garden beds in mounds. Plants have grown faster.
- (2) Always mulch when planting.
- (3) Plant autumn or winter so that roots can become established while soil is damp.
- (4) Choose well rooted and well hardened plants. The temptation to plant a small specimen is not for the garden that cannot be watered.
- (5) Fertilise plants which may not like a sudden frost *only* in spring. In dry conditions the main growth seems to be in autumn which gives soft growth susceptible to frost damage without accelerating growth.
- (6) Use animal guards particularly for small soft leaved plants. *Dampiera* and *Scaevola* are particularly attractive to animals. A polythene tubing is now available and especially useful since fertiliser bags have become less readily available. They have an added advantage of conserving moisture and encouraging faster early growth.
- (7) Difficult to grow plants and those especially susceptible to animals make lovely displays in pots. *Lechenaultia formosa* flowers for six months and the bright red or orange forms are a delight. *Dampiera*, *Verticordia*, *Thryptomene*, *Correa* and many other small plants make beautiful displays.



Richea scoparia on Ben Lomond

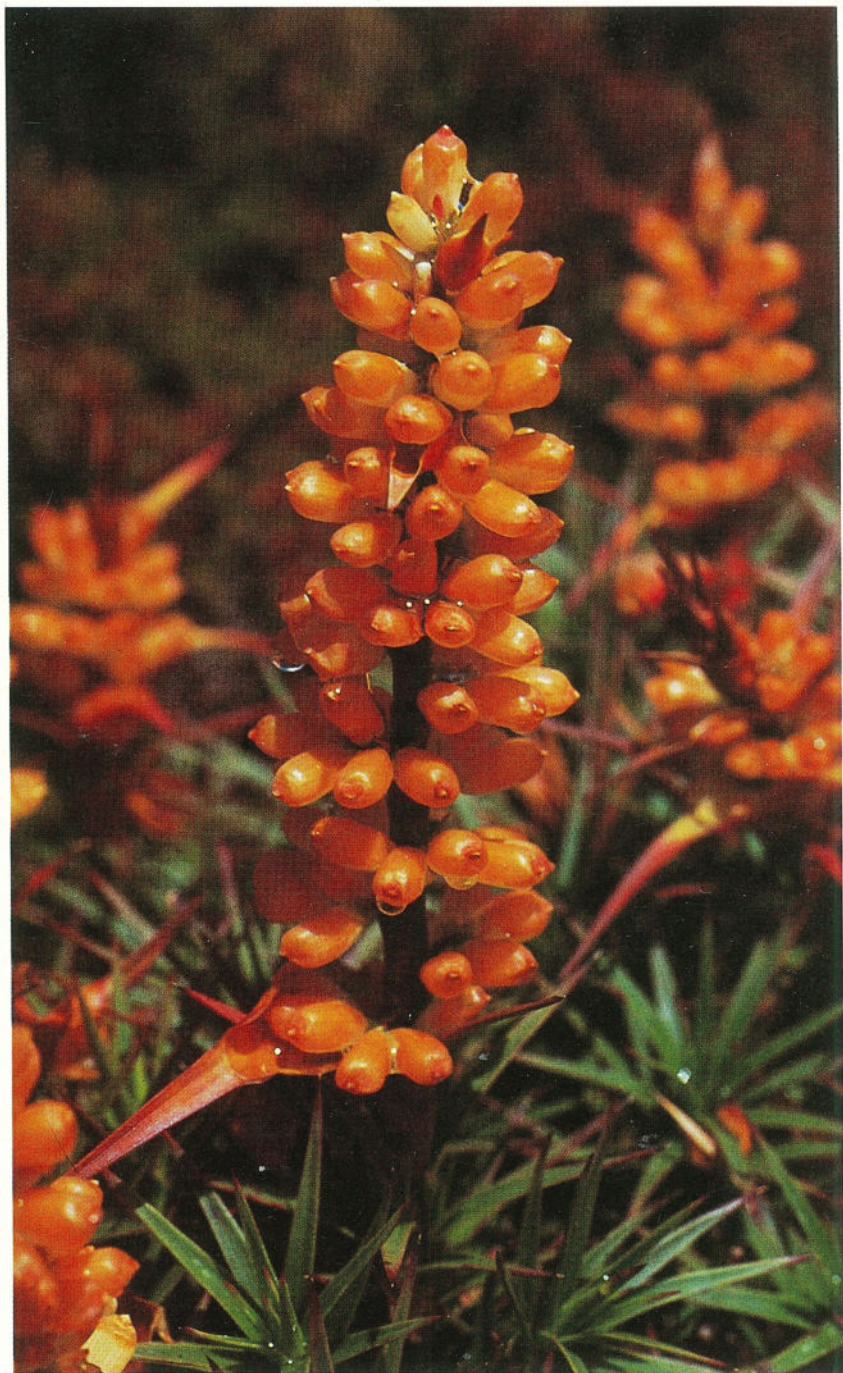
Photography by John Simmons

A flower head is shown opposite. Among the very impressive plants of the Tasmanian forests, alpine scrubs and moors are the ten species of *Richea*. *Richea pandanifolia* is shown on the rear cover, its flowers being illustrated in greater detail on page 372.

All the species of *Richea* are described in our No. 39 issue of Volume 5, together with many other spectacular Tasmanian plants. The simple descriptions are illustrated by large line drawings showing the plant and flowering parts. There is also an excellent article "*Richea* From Seed," of special interest.

Australian Plants As Bound Volumes

Previous issues of Australian Plants are available in bound volumes beautifully presented with boxed vinyl covers and gold lettering. Each has bound with it, one of the societies books. In the case of Volume 5 that has the issue on Tasmanian plants, the book included is *The Language of Botany*, a very valuable reference to botanical terms for the beginner and the student. Regrettably we have to sell these bound volumes for \$21.00, not cheap! However each bound volume has eight issues in it plus a book which if purchased separately would, in this case cost \$25.90. The bound volumes are much better value, easy to keep as a reference and look very well on a book shelf. Why not as a Xmas present? The printed material is considerable and not available in the usual pretty picture books of only superficial and short term interest and reference.



I recognise that the south-easterly aspect has probably helped save our garden in drought as has the eucalypt canopy and that many people have open bare blocks with full sun. In these cases I expect that a quick growing canopy would need to be established and that this may not be easy without water.

While I admit that our garden is not nearly as advanced as a well watered garden would be I think we have achieved many of our aims. Certainly we have many more small birds around which gives us enormous pleasure. Originally the lovely Eastern spinebill was our only small honey-eater but this year five other small ones either visited or lived in the garden and we also had the great joy of having Firetail finches nest in the garden for the first time. ■

EREMOPHILA

IN HOBART, TASMANIA

by Norma Ali

Our interest in *Eremophila* started with a visit to Albie Lindner's garden, near Horsham, many years ago. We took some cuttings, mainly of forms of *Eremophila maculata*, and with a low percentage of success, set out on a challenge to try growing them in Hobart.

Compared to reports read in the *Eremophila* Study Group Newsletters, here is much slower, but the survival rate is still surprising. It will be interesting to see if success continues when, and if, we get normal Spring rains again!

The majority of plants receive maximum sunshine. Some are in a raised sand bed, but roots would be well down into the badly-drained, but friable clay, by now. These are mulched with blue metal, and have been watered by hand, every one to two weeks, during the past three summers. Those in the normal garden bed are in the clay, mulched with stones and pinebark, and watered by trickle-irrigation system, approximately every 3-4 weeks during the Summer.

At the time of writing this article, Winter of 1984, the following *Eremophila* are doing well in the garden.

E. decipiens — planted in 1978 and now 1.2 m x 60 cms. This plant is covered in deep pink flowers throughout the year.

E. denticulata, planted in 1978. 2 m x 1.8 m. The flowers ranging from deep pink through to orange, appear in Summer-Autumn.

E. drummondii — only planted in 1983. 70 cm x 30 cms, is covered in violet flowers for a long period, including Winter.

E. gibbifolia, planted in 1978. 80 cms x 70 cms. It is continually covered in tiny deep lilac flowers. An interesting plant because of its minute leaves.

E. glabra (form with green leaves and yellow/orange flowers). Planted in 1981, 1.5 m x 90 cms. It has a long flowering period, including the Winter.

E. glabra (prostrate form with grey leaves and green flowers). Planted in 1983 and covering an area of 1.4 m x 1.7 m. A long flowering period, including Winter. This plant was hit badly by frost, during 1983, but completely recovered.

E. glabra (prostrate form with green leaves and red flowers) Planted in 1983 — 60 cms x 60 cms. It had its first 2 flowers in the Summer and is now in bud. This plant was also affected by frost in 1983, but recovered.

E. laanii — planted in 1981. 70 cms x 70 cms. It has some pale pink flowers throughout the year.

E. maculata (yellow form). Planted 1979. 50 cms x 60 cms. Slow to become established, but now looking very healthy, and its first flower has appeared.

E. maculata (red form). Planted in 1979. 60 cms x 70 cms. Also slow to become established, but now looking very healthy and supporting many flowers.

E. microtheca. Planted in 1981. 1.3 m x 60 cms. Covered in lilac flowers throughout the year.

E. serpens — Planted in 1981. This prostrate plant made exceptional growth and its longest trailer is 1.6 m. It suffered some die-back last Summer, but seems to have recovered. Interesting green flowers, with red styles, appear throughout the year.

To ensure survival of a species my aim is to have one plant in the garden, and one in a container. These plants are "potted on" from 1 litre bags in to 18 cm containers. A well-drained mix is used; the top mulched with blue metal, and the plant fed with Osmocote periodically.

Eremophila in 18 cm containers:

E. calorhabdos, has flowered and now in bud.

E. bicolor = *racemosa*, has flowered and now in bud.

E. formerly Margaretha — most attractive with deep lilac flowers, contrasting the silvery foliage. Now in bud.

E. alternifolia, has flowered and now in bud.

E. maculata var *brevifolia* — in flower at present.

E. serpens — has flowered.

E. densifolia — in bud.

E. laanii — in flower at present.

E. maculata — in flower at present. The cream form with purple spots.

E. glabra — grey leaf, red flowered form, now flowering.

E. glabra — green leaf, yellow/orange flowered form, now flowering.

E. divaricata (in 2 litre bag), has flowered. ■

Australian Terrestrial Orchids

by Collin and Dorothy Woolcock

A new book available from The Editor, Australian Plants, for \$40.00 post free. The book is the work of Collin Woolcock the artist and Dorothy Woolcock the botanist, a couple of concerned Australians who have travelled this continent of ours observing, studying and recording the native flora. They will be familiar to readers of Australian Plants because of their numerous articles including the current series on *Pultenaea*.

Illustrated by 72 large colour plates from water coloured sketches, 185 species of Australian terrestrial orchids are described in simple layman terms. Learn more about your native orchids.

Australian Epiphytic Orchids

The only complete reference "Australian Indigenous Orchids" by A. W. Dockrill, at present out of print, is being revised by the author. It will be available in 1986. Meanwhile we have collaborated to produce a new book "Australia's Tropical Orchids" to be available in 1985. Our apologies to orchid growers for these delays.

Australian Ferns

It is proposed to produce a series of books on Australian ferns by our Fern Study Group. Readers are invited to submit for inspection, suitable colour slides of species of *Platycerium*, the stags and elks, of tree ferns, of *Blechnum* species and of *Pteris* species. Help us to make this a spectacular series of books. We have the competent authors.



Richea pandanifolia

Photography by John Simmons

The full plant is shown on the rear cover, page 380. The interesting flowers of this unusual plant are shown above. Known locally as "Grass Tree", or "Grant Health" or "Pandani", it can be a large shrub or even a tree to 15 m. It is occasionally branched. Usually stunted at high altitudes, the trunk becomes bare without noticeable leaf-scars, at least on the lower end. The leaves are densely crowded into a crown, to one metre long, strap-shaped, coarse, the margins serrate, often sharply so. The flowers are very numerous and are shown peeping out from the leaf bases in the rear cover photograph.

The fruiting capsules become a deep crimson-brown after maturing and persist for two or three seasons. Propagation is by seed, Australian Plants, Vol. 5, Issue No. 39.

The article on page 363 describes its use in horticulture as a rockery plant.

Grass Trees

Will readers please forward notes and slides of "grass trees" that are recommended for landscaping. It is time we had an issue featuring them, — Editor.

Native Plants Of The Macedon Range — A Field Guide

by A. Davis & B. Kemp

As the name indicates the wildflowers of this area are described briefly, each description being adjacent to a full colour plate. The plants are grouped into the vegetative zones, sub-alpine, wet forest, wet gullies, etc. This 80 page book is available from Barry Kemp, Box 143, Macedon, Vic., 3440, for \$10.00 post free.



Pimelea

Species of Tasmania
by Marion Simmons

Nineteen species of *Pimelea* occur in Tasmania and seven of them are endemic and these are described briefly.



Pimelea nivea

Photography by John Simmons

Pimelea are a natural group of plants with the flowers often in pom-pom heads, each individual flower having two stamens as shown here. *Pimelea nivea* is a free flowering Tasmanian species known locally as "White Cotton Bush". The photographer captured the flower head well with the new white flowers opening in the centre and the outer ones ageing to pink, to red; and the dark shiny green rounded leaves that are covered in cottony hairs below but glossy dark red above.

Pimelea nivea is a straggling or bushy shrub to 2 m tall with all parts covered with densely woolly hairs except on the upper surface of usually rounded leaves, which are glabrous and dark green. In spring and summer conspicuous heads of white to pink flowers cover the bushes. Common and widespread especially on rocky hillsides from sea level to about 1100 m.

Pimelea cinerea is a straggling shrub to 2 m tall with branches and leaves densely covered with spreading hairs. Elliptical leaves are glabrous on top, densely hairy underneath, 1-3 cm long, 4-10 mm broad. Four to six tubular flowers, woolly-hairy on the outer surface form each head which is surrounded by 4-6 bracts usually smaller than the leaves. Flowering December-January. Found occasionally in wet forests, mostly in south and west.

Pimelea milliganii is a rare, low, densely-branched shrub found towards the summits of mountains near the west and south-west coasts. Branches and both surfaces of the flat opposite leaves (6-12 mm long) are covered with silky-silvery hairs. The foliage tends to crowd towards the top of the branches, with scars left on lower branches where the leaves have fallen. Hairy flowers occur in terminal heads surrounded by bracts similar to the leaves. Flowering December-January.

Pimelea lindleyana is a slender shrub seldom more than 120 cm high, resembling *P. linifolia* but often larger in all its parts. Young stems and flower stalks are rough with small tubercular lumps. Bright green shining leaves are crowded and narrow. Cream flowers are borne in terminal, usually nodding, heads surrounded by four broad bracts; floral tubes up to 15 mm long. Commonly found in wet forests and high rainfall areas near the west and south-west coasts.

Pimelea sericea most frequently occurs in mountain shrubberies and moors between altitudes of 1000-1200 m, often beside small streams and tarns. It is a small erect shrub to 70 cm tall with all parts silky-hairy except for the upper surface of the broadly elliptical leaves (5-12 mm long). White or pinkish flowers are grouped in many-flowered terminal heads. Summer flowering.

Pimelea filiformis is distinguished from other Tasmanian species in having only one stamen. It is a delicate prostrate spreading shrub with very slender branches up to about 40 cm long. Leaves are green, linear, rather widely-spaced and opposite, 6-12 mm long. Heads of 5-8 tubular white to pale pink flowers are borne on slender stalks in November-December. Floral tubes are often red in colour. It occurs in the vicinity of the Tamar River in northern Tasmania.

Pimelea pygmaea is a dwarf much-branched dense shrub (about 4-10 cm diameter) which occurs as a component of the "cushion bush" community of the moors of the central plateau and on mountains in the west. Leaves are mostly opposite, crowded, oblong, 2-4 mm long. White tubular flowers occur singly in upper leaf axils and are usually subtended by two bracts similar to the leaves; summer flowering.

The following *Pimelea* species are found on the south-eastern Australian mainland as well as Tasmania and have been described in No. 98 issue of Australian Plants.

Pimelea axiflora, *P. curviflora*, *P. drupacea*, *P. flava*, *P. glauca*, *P. humilis*, *P. ligustrina*, *P. linifolia*, *P. micrantha*, *P. pauciflora*, *P. serpyllifolia*, *P. stricta*. ■

Books On Wildflowers

The number of books available and coming onto the market must be bewildering to most. They are so expensive. Many are little more than pretty picture books, of value to beginners but of limited long term value. Most are given reviews here for readers' advice, those judged as being of greater value being referred to repeatedly.

All books mentioned may be obtained by mail from the Editor, Australian Plants, at the recommended retail price, post free. The way mailing and packing costs have grown, this is quite a saving. Others may offer better prices and you are welcome to buy from them. Any income from our service assists the publication Australian Plants, a periodical marketed on a non-profit-making basis with honorary officers, a publication that needs all the help it can get to maintain the standard.

The Banksia Book

by Alex George

The society is pleased to be associated with the production of this book to ensure the standard of presentation that it deserves. Future issues will refer to the outstanding features of this book that describes and illustrates every species of *Banksia*. A special offer order form is enclosed.

The Proteaceae Of Western Australia

by Alex George

This magnificent family of plants is represented in Western Australia by 16 genera, *Adenanthos* (31 species), *Banksia* (58), *Conospermum* (30), *Dryandra* (60), *Franklandia* (2), *Grevillea* (?), *Hakea* (70), *Isopogon* (25), *Lambertia* (8), *Persoonia* (?), *Petrophile* (30), *Stenocarpus* (2), *Stirlingia* (4), *Strangea* (2), *Synaphea* (15) and *Xylomelum* (2 species). Of these 139 species are described briefly but illustrated beautifully in full colour. Available for \$25.00 post free.

The Proteaceae Of Eastern Australia

Not a new book but a sneaky way by the editor to draw attention to the subject matter of an issue of Australian Plants in preparation. Will readers please send any good slides for inspection and any notes on their experiences in cultivation? Who can write a few notes on *Isopogon*, *Petrophile*, etc?

Australian Orchids

Encyclopaedia of Australian Plants—Vol. 3

Dendrobium contains a major portion of Australia's epiphytic orchids including many of the most beautiful plants in cultivation. Not only are there more than fifty species well described with advice on their cultivation, but the various forms and cultivars of each species are described. This exceptional record also describes 94 hybrid/cultivars of *Dendrobium*, the most complete record available. Many specialised books on orchids do not contain nearly as much information on *Dendrobium* orchids as this chapter of the encyclopaedia.

This is typical of the competent practical reference to all species of Australian plants in this magnificent set of encyclopaedia. Volume 2 available for \$45.00, post free.

Palms

by Alec Blombery and Tony Rodd

An informative, practical guide to palms of the world: their cultivation, care and landscape use. This statement describes the book, a very practical guide to the care and use of palms in the landscape. However a feature of the book is the many beautiful colour plates of species described. Available from the editor at the recommended price of \$29.95, post free.

Encyclopaedia of Australian Plants — Vol. 3

by R. Elliot, D. Jones & T. Blake

The third volume describing 1,700 species with generic names Ce to Er, will be released shortly, with 280 colour illustrations of the very practical accurate descriptions of three of Australia's leading wildflower horticulturalists, Roger Elliot, David Jones and Trevor Blake, this book is a veritable treasure. Available from the editor at the recommended price of \$45.00, post free it can also be purchased with Volume 1 at \$40.00 and Volume 2 at \$45.00.

Australian Natives For Your Garden

by Penny & John Rose

The leading nurseries have each produced a book as a guide to customers in their market area. This one from Sydney Wildflower Nurseries is a practical guide to plants that are available and have proven reliable in the Sydney area. As such it is a valuable reference especially for newcomers to wildflower gardening. \$8.95 post free.

A Diploma In Horticulture By Mail

A very interesting and worthwhile course on horticulture with Australian plants, is available by mail. Even if you do not wish to study seriously for a diploma, there are many subjects that would be of considerable interest. — Australian Horticultural Correspondence School, 264 Swansea Road, Lilydale, Victoria 3140.

Synaphea

Reprinted from *The Proteaceae of WA**
by Alex George.

There are about 15 species of *Synaphea*, all found only in the south west of Western Australia. They are small shrubs of heaths and woodlands, growing in sand or gravel. Most have staghorn-like leaves as below, and all have small, tubular, bright yellow flowers in spikes.



Synaphea spinulosa

Photography by Alex George

**The Proteaceae of Western Australia* — by Alex George is available from the Editor for \$25.00 post free. See review on page 375. The colour plates above and opposite are reprinted from the book to illustrate its high quality and excellent value.

Synaphea

This strange group of plants in the Proteaceae has bright yellow flowers in spikes. The style is expanded into a plate with two apical horns; the pollen is released onto the inside of the plate, and after the flower opens the touch of a pollinating insect causes the plate to flick back and eject the pollen onto the visitor. The action occurs only once, for the plate does not reset.



The plant of *Synaphea* above has not been formally named yet. It is one of the few *Synaphea* species that has undivided leaves. The value of these unique plants as a garden border subject, or in rockeries, is illustrated well above, this plant being to 20 cm high.

Forest Trees of Australia

by CSIRO Specialists, D. J. Boland, etc.

With authorship by D. J. Boland, M. I. H. Brooker, G. M. Chippendale, N. Hall, B. P. M. Hyland, R. D. Johnston, D. A. Kleinig and J. D. Turner, this new edition of a book first published in 1957 and regularly reprinted since because of demand, is an important reference. With 704 pages including 60 colour plates and over 2,500 black and white photographs, line drawings, diagrams and maps, this guide to 223 Australian trees is very clearly presented. 86 of these are non-eucalypt species.

Available from the Editors, Australian Plants for \$39.95, post free.

Wildflower Nurseries in Queensland

Fairhill Nurseries — Fairhill Rd., Yandina, 4561. Tel. (071) 46-7193, P.O. Box 100. Large range of trees, shrubs, ground covers, climbers, ferns, palms and orchids for the sub-tropical and tropical east coast. Extensive display gardens 8.30 a.m. to 5 p.m. any day. New comprehensive catalogue now available \$2.00 posted.

Lakkari Native Plant Nursery — Specialist growers of Australian Plants, retail & wholesale. Large range available. Browse through our display gardens. Many selected natives unique to Queensland as well as new cultivars and hybrids. Grevilleas and rainforest species our speciality. Catalogue \$1.50 posted. Open 7 days. 477 Redland Bay Road, Capalaba, Queensland. Tel. (07) 206-4119.

Wildflower Nurseries in New South Wales

Bundara Native Nursery — 37 Carters Road, Dural, Sydney, 2158. Tel. 651-1962. Specialising in *Grevillea*. Open weekends. Weekdays please ring first.

Cranebrook Native Nursery — R23 Cranebrook Road, Cranebrook, N.S.W. Tel. (047) 77-4256. Four miles north of Penrith, between Tadmore and Taylor Roads. Open 10.00 a.m.-8 p.m. Closed Sundays.

Denovans Nursery — 188 Marco Ave., Panania, 2213. Tel. 77-8891.

Sydney Wildflower Nursery — (part of the Forest Native Nursery Group) — 9 Namba Road, Duffy's Forest. Tel. (02) 450-1785. We specialise in a wide range of native plants. Catalogue \$4.50 posted. Open 7 days.

Floralands — Parry's Nurseries Pty. Ltd. Kariong via Gosford, 2250. Tel. (043) 40-1142. Preservation by cultivation. Send \$1.50 for descriptive catalogue.

Kentlyn Native Plants — 96c George's River Rd., Campbelltown, 2560. Tel. (046) 25-1583. Open 7 days.

Telopea Valley Nursery — George Downes Drive, Kulnura, 2250, 1.5 km past Kyola Road. Rare and unusual natives. Phone: (043) 76-1318 (best at 9.00 a.m.). Send S.A.E. (230 x 100 mm) for list. Regret no mail orders. Closed Tuesdays.

Terania Rainforest Nursery — (Hugh and Nan Nicholson) — Specialists in rainforest trees and shrubs, wholesale and retail. Open weekends or by appointment. Mail orders accepted — minimum 1 box. Send three stamps for descriptive catalogue. Terania Creek Road, The Channon via Lismore 2480. Tel. (066) 88-6204.

Wirrimbirra Native Nursery — Hume Hwy, between Bargo and Tahmoor E. side 2574 (3 km N. from Freeway entry). Wide range including unusual plants. Tel. (046) 84-1112.

Wirreanda Nursery — end of Wirreanda Rd., Ingleside, 2101. Tel. (02) 450-1400. Growers of advanced and semi-advanced native trees and shrubs. Open 7 days.

Deanes Orchid Nursery — Specialist in Australian Native Orchids, 29 Hemers Rd., Dural, 2158. Tel. (weekdays) (02) 651-1798. Nursery closed Friday. Plants sent anywhere. Please send for descriptive list.

Wildflower Nurseries in Tasmania

Banksia Nurseries Pty. Ltd. — Waratah Hwy., Elliot 7325. Tel. (004) 36-3128. Open 7 days, 9-5. Grower of rare and common Australian native plants. Available in most sizes at certain times of the year. Advanced lines a speciality. Send S.A.E. for list.

Wildflower Nurseries in Victoria

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Binders for separate issues of Australian Plants \$4.00 each plus \$0.60 postage.

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"NORTH AUSTRALIAN PLANTS", Part 1 by Jenny Harmer, \$12.00 plus \$1.00 postage. The best reference to top-end Northern Territory flora.

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The Society for Growing Australian Plants

The Society is for people interested in the Australian flora, its preservation and cultivation in the wild, in parks, and in public and private gardens. Preservation of our magnificent flora will, in the long term, depend on the knowledge accumulated, on its cultivation under a wide range of conditions. We hope to learn more about this by cultivating wildflowers in the garden, encouraging research on this aspect, and to record this in "Australian Plants". Enquiries for membership should be directed to:

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THE BANKSIA BOOK

Alex S. George

Banksias, named after Joseph Banks who collected the first specimens in 1770, are among the best known Australian wildflowers. This is the first book to describe and give comprehensive coverage of all known seventy-three species. It includes twelve species and nine varieties named as recently as 1981.

The author describes each species, where it grows, when it flowers, how and when it was discovered and named. There are over two hundred colour plates showing flowers, buds, fruit and habit, and drawings of fruit and seeds of all species. Advice is given on how to grow them.

The introduction gives a history of their discovery, describes what makes a plant a Banksia, tells how to collect seed and raise plants in the garden. There are tables to assist choosing Banksias for different situations.

Alex George was born in East Fremantle, Western Australia, in 1939, and was educated at Applecross State School, Wesley College and the University of Western Australia. He worked at the Western Australian Herbarium for 20 years and travelled through the length and breadth of Western Australia collecting, studying and photographing plants. He has discovered many new species.

Early in 1981 he moved to Canberra to take up the position of Executive Editor of the new *Flora of Australia* with the Bureau of Flora and Fauna.

Published by Kangaroo Press in association with The Society for Growing Australian Plants—NSW Ltd.

240 pages, 240 × 180 mm, hardcover, over 200 colour plates.

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Richea pandanifolia

"Grass Tree", "Tasmanian Giant Heath"

Photographed by John Simmons in the Cradle Mountain area, this spectacular tree is ideal for landscaping use. The flowers, "peeping" out from between the straplike leaves are shown in detail in the colour plate on page 372 together with further details on this plant.