

Australian Plants

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Those with any experience will have learnt that the creation of a native garden is not easy. Nobody has, as yet, been able to produce precise instructions as to how it can be done with assured success. It appears to be an art form that produces a setting, a landscape, a pleasant place, . . . that has different meaning to those gaze on it. Just as it is not possible to produce a book on how to paint a landscape with assured success, so also it is improbable that any book will lead you to produce a living landscape from the written word . . . but.

The authors of "Native Gardens", see page 106, have shown a sensitive appreciation of the many factors to be considered from the first plans for a new site or the redevelopment of an existing garden, to finishing touches of paths, walls, and living areas. Others have attempted this in the past with wordy usually vague statements but the authors of this book have been more specific and produced a simple illustrated guide.

Why We Need To Preserve All Species! *Pimelea*.

Researchers from Macquarie University in Sydney are presently investigating the anti-cancer properties of a group of Australian native plants. Thus far, the researchers Merlin Howden and Margaret Tyler have tested 13 of the 24 species of *Pimelea* family and almost all of those tested have "caused rapid remissions of cancerous tumours". At present those species that show the greatest potential are rare, possibly endangered. Activities in this work, on behalf of the society, are being initiated by the Lesueur Branch of the Society, Mrs. P. A. Polozza, P.O. Eneabba, 6518. *Pimelea* are also excellent plants for the garden. Who is interested in a Study Group on *Pimelea*, can report on *Pimelea* in their area, or has grown or propagated them successfully?

The research team attributes the anti-cancer properties of the plant to a derivative compound Diterpene Ester and only a small dose of the crude herbal extract is said to be required to destroy large numbers of cancer cells, without harming healthy cells.

The National Health and Medical Research Council has authorised the project which now aims to artificially duplicate the natural compound, rather than growing and harvesting the plants. — From Notes by P. A. Polozza.

Pimelea

May I see any good slides of *Pimelea* species. Who will take slides of plants over this season for me? —Editor.

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COVER PLATE: *Pultenaea dasyphylla*

Photography by John Simmons

The correct identification of this species is in doubt. If the flowers belong to a rather prostrate or low shrub it will probably be *Pultenaea dasyphylla*. If it is an erect, multistemmed, hairy and densely leaved shrub with appressed (stem hugging) leaves, it could be *Pultenaea lycopodioides*. The slide was originally incorrectly labelled *Phyllota dasyphylla*. All this is very confusing to the non-botanist but the article opposite will be a guide for all.

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Pultenaea — 1

with reference to related
Genera of the
Pea-Flowered Family

by D. T. Woolcock
and C. E. Woolcock



The Pea-flowers belong to the sub-family Papilionoideae of the huge Leguminosae family (the plants that have a legume as fruit) and have long held an important position throughout the world, both economically and aesthetically. More generally today, the sub-families of this large family are regarded as separate families — Fabaceae (Papilionaceae) Caesalpinaceae and Mimosaceae.

As defined in Issue No. 86 of "Australian Plants" the very large family Fabaceae has been divided into ten groups of genera and Group I of these, known as Mirbelieae (syn. Podalyrieae Benth.), covers the pea-flower genera with ten free stamens. As there are so many plants involved, Group I has been further divided into three parts and Part III includes *Pultenaea* as well as the genera — *Phyllota*, *Aotus*, *Eutaxia*, *Dillwynia*, *Latrobea*, *Euchilopsis* all of which are briefly described below. A more complete reference to species of *Pultenaea* then follows.

We find the pea-flowered family of plants a fascinating interest, besides the thrill we get each time we see a well-flowered plant. Many readers may not realise that there are so many species of plants involved or that they have been grouped botanically into so many genera. For those who would like to learn more, the following notes will be of assistance. In this case it is impossible to avoid botanical terms, but if you refer to the sketches over the page you may not find it as confusing as first appears.

The Genus *Aotus*

Aotus species are shrubs, the branches being as in (a) (see sketch on page 99). The leaves are in groups of three along the stem (as shown), simple, concave or with involute (turned under) margins as in (c). The flowers, usually yellow but sometimes mixed with dark red, are axillary (attached to the stem above and at the same point as the leaves) and often three together as shown in (a). The pea-flowers of *Aotus* are superficially similar to other genera and to *Pultenaea* as described on page 103, and comprise four characteristically shaped petals as shown in (a) and (b) and similar to the lead-sketch above. The pedicel (flower stalk) is short, the bracts (small leaves cupping the calyx) small, falling off early, and bracteoles (the tiny leaves on the flower stalk shown above) are not found on *Aotus* species. The calyx (four modified leaves that cup the flower as in 'a' above) has the two upper lobes broad and united. The standard (the large petal 'b' above) is suborbicular (nearly circular), the wings (the two petals below the standard 'c' above) are oblong, and the keel (the two lower petals united into a boat-shaped keel) is incurved as shown in the sketch (b) opposite. The fruit (the pod containing the seed) is ovate, flattened or almost turgid as in (d) with 1-2 seeds without an aril (darkened segment) as in (e).

The Genus *Eutaxia*

Shrubs, often glabrous (a); leaves decussately opposite, simple, concave or with involute margins (c). Flowers solitary or 2-4 together, axillary, often



Aotus villosa (above)

Photography by John Fanning

Aotus species have leaves in groups of three along the stem. The flowers, usually yellow but often mixed with dark red, form at the point of attachment of the leaves to the stem often producing three flowers seemingly together along the stem. This photograph shows a peaflower well, the green bract cupping four petalled flower. A description of the species is given on page 112.

Latrobea diosmifolia (top right)

Photography by Greg Keighery

With *Latrobea* species the leaves are scattered along the stem and the flowers are in heads on the ends of the branches. A description of the species is given on page 112.

Euchilopsis linearis (bottom right)

Photography by Greg Keighery

The only species in the genus *Euchilopsis* the features of this plant are shown in the sketch on page 99. A multi-stemmed prostrate shrub to 1.5 m diameter. It grows from a rootstock in swamps in the S.W. Drummond, Darling, Warren and Stirling Districts of Western Australia.



Latrobea diosmifolia △

▽ *Euchilopsis linearis*



crowded at ends of branches; bracteoles short, often small, separate from calyx; upper 2 calyx lobes often broader and more or less joined; standard suborbicular, wings oblong, keel rather straight and obtuse (b). Fruit ovate, compressed or turgid; on short stalk (d); seeds 1-2, reniform, with aril (e). See Aust. Pl. Vol. 10, page 108 for colour plate of *E. cuneata*.

The Genus *Dillwynia*

Shrubs (a); leaves alternate or scattered, simple, narrowly linear or almost terete, channelled above, stipules absent (c). Flowers in axillary or terminal racemes or corymbs, sometimes few, rarely solitary; bracts small, dark, falling off early; bracteoles tiny, on pedicel; calyx lobes short or with an elongated tube, upper 2 lobes more or less joined; standard broader than long, wings narrow, keel shorter than wings, nearly straight (b). Fruit subsessile, ovate or orbicular, turgid (d); seeds 1-2, reniform, with aril (e).

The Genus *Latrobea*

Western Australia only. Shrubs (a); leaves alternate or scattered, simple linear, concave or channelled above; stipules absent (c). Flowers terminal or sub-axillary on short branchlets, solitary or in corymbs or heads; bracts and bracteoles absent or small and distant from calyx; lobes ribbed and almost equal; standard suborbicular, obtuse or acuminate, wings narrow, keel straight or slightly incurved. Seeds 1-2, reniform, with aril (d).

The Genus *Euchilopsis*

An undershrub (a); leaves scattered, linear, leathery, with revolute margins (c). Flowers axillary, solitary or paired; bracts basal, stipule-like, tiny; bracteoles small, on pedicel; 2 upper calyx lobes large cuneate to orbicular, lower 3 small, lanceolate (b); standard orbicular, stamen filaments slightly dilated in lower half, anthers alternately longer and shorter, the long basifixed (d). Fruit obliquely ovate/orbicular. Seeds 2, without aril (e).

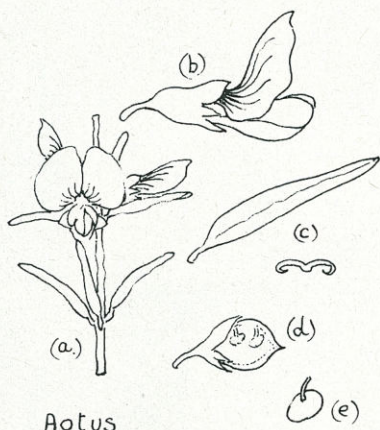
The Genus *Phyllota*

Shrubs (a); leaves scattered, simple, linear, with revolute margins; stipules often absent (c). Flowers axillary or terminal, pedicels short; bracteoles inserted close below calyx, leafy or scale-like; upper 2 calyx lobes broader and sometimes joined; standard suborbicular, wings oblong, keel very incurved; outer 5 stamens or all stamens joined to base of petals and forming with them a short tube (b). Fruit ovate, turgid; seeds reniform (kidney-shaped), without aril (e). Style thickened near base tapering above (d).

The Genus *Pultenaea*

Endemic in Australia, the interesting and complex *Pultenaea* group (about 120 species) is the largest genus of our native pea-flower family (Fabaceae or Papilionaceae). Occurring in the temperate areas of all States, except the N.T., it is widely distributed and frequently very common, with over 50 species found in N.S.W., almost as many in Vic., 20-30 in both W.A. and S.A., and 10-20 in Tas. and SE Qld. Some of these are very localised, and restricted to a small area of specialised habitat; others range through several States, producing massed displays of great charm and colour, frequently along roadside verges.

Within their chosen habitats the bush-peas may be found in alpine and sub-alpine regions (particularly near swamps and bogs), in well-drained montane forests, along the tablelands and in coastal woodlands, plains and heathlands — in good rainfall localities. A few species only will tolerate the low to moderate rainfall of mallee-type country and there they seek out the relatively damp depressions and soakage areas. In this diverse group, which is also part of a very large botanical family, a few *Pultenaea* species tend to merge, in appearance, into closely related genera; but the great majority have a distinctive character and can be readily identified as belonging to this genus. The final identification of the individual species often depends on quite small changes in feature and structure as defined in the following notes.



Aotus.



Eutaxia.



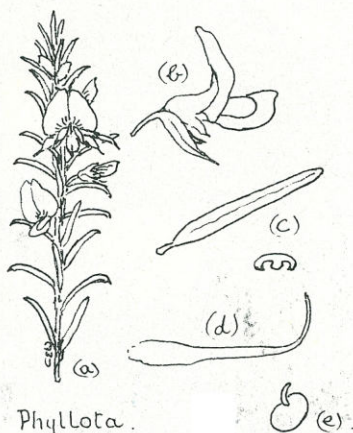
Dillwynia.



Latrobea.



Euchilopsis



Phyllota.

A group of genera in the plant family Fabaceae with affinities to *Pultenaea* as described opposite.



Dillwynia cinerascens △

▽ *Pultenaea patellifolia*





Bossiaea ornata (above)

Photography by John Simmons

This erect shrub can grow to 2 metres high but is usually much less. The leaves and flowers are usually the size shown above but both may be larger. As with most other *Bossiaea* this plant is ideal for horticulture, flowering commencing earlier than many other peaflowers, during the winter.

Dillwynia cinerascens (top left)

Photography by Greg Keighery

Shown a larger than normal size, this photograph shows the glory of the *Dillwynia* species, bright showy flowers and small leaves. The lower petal, the keel, is hidden by the two small red wing petals in the centre while the fourth petal, the standard, is large, divided at the top to appear as two petals. Yellow-orange, the photograph shows the red throat of the standard surrounding yellow markings in the centre.

Pultenaea patellifolia (bottom left)

Photography by Colin Woolcock

Described and illustrated by a sketch on page 120, this photograph shows one of the seven species of *Pultenaea* (Group 1) with ovate to obovate (rounded) leaves. It will be noted that the leaves are concave (dished) on the upper surface, a feature it shares with four other species of *Pultenaea*. The sketches on pages 118 to 121 will allow you to identify all *Pultenaea* with rounded leaves like these. Do not let the botanical names put you off; an interested observer can readily identify peaflowers. Why not teach the children?

A. Bossiaea?* *A. Pultenaea?

To most of us, all the pea-flowers look alike. There are so many of them. For those interested, this is a series of articles that commenced in No. 86 issue. Each article is illustrated with sketches and colour plates such that anyone can determine to which generic group of species a plant belongs. The No. 86 issue introduced the 10 groups of genera in the plant family, the genus *Pultenaea* being illustrated with a colour plate of *Pultenaea foliolosa*. The No. 87 issue describes the Group II plants that includes *Bossiaea* and illustrates with line drawings, all the eastern species of *Bossiaea*. *Bossiaea ornata*, above, is a Western Australian species. Whereas the Group I plants of this issue have ten stamens, all free as shown on page 103, the Group II plants have their 10 stamens joined in a sheath or tube for most of their length as shown on page 95 of volume II.

As the popular name 'Bush-peas' suggests, most *Pultenaea* species are upright, often bushy shrubs, sometimes growing several metres tall, but frequently smaller, averaging between 0.5-2 m high. A few are either prostrate or procumbent, and the swamp species tend to be rather weak undershrubs, using neighbouring plants as support. Flowering time is usually from late winter through spring to early summer, though those from higher and wetter areas may be later still. Generally, but with a few exceptions, the flowers are yellow to orange in colour, marked or suffused with red, particularly the keel and the outside of the standard. The colour glow of a hillside or a gully of *Pultenaea* in full flower can be quite breathtaking.

CHARACTERISTICS OF THE GENUS *PULTENAEA*

Along with a number of other important genera, the *Pultenaea* genus is classed in the Mirbelieae tribe, in which the distinguishing factor is the stamen arrangement.

Stamens: Perhaps the first examination made in identifying any native pea-flower is to open gently the keel of a flower and check the stamen setting, preferably with a hand lens. All Mirbelieae, including *Pultenaea*, will have 10 stamens on filaments which are individually free to their base as shown in Diagram A III opposite. (See also "Australian Plants" Vol. II, No. 86, p.50).

Stipules: These are defined as appendages growing in pairs at the base of leaf-stems adjacent to branchlet-stems (see Diagram A V). They vary in size from 4-6 mm long, sometimes longer, to 1mm or less. Rarely, they are absent. The presence of stipules is not confined to *Pultenaea*, so that additional features are necessary to confirm the plant as a bush-pea. However, many *Pultenaea* species have prominent stipules, which impart a characteristic appearance readily recognised.

Bracteoles: These are bracts, usually in pairs, defined as occurring either on the flower stalk or the calyx-tube itself. Bracteoles may occur in genera other than *Pultenaea*, but their presence and appearance are helpful in establishing identity, as they are attached either at the calyx-tube base or on the tube itself. They vary in size, shape, complexity and attachment and can be simple, bilobed or trilobed. A hand lens is again recommended to check these details (see Diagram A IV). Only rarely are bracteoles not present, although in some species they may be enclosed in additional (floral) bracts, which require careful removal. The presence of both leaf stipules and calyx bracteoles will establish the *Pultenaea* identity in many instances.

Seed Pods — Fruits: As shown in Diagram A VI, the pod is ovate, not large, but larger than the calyx, and may be flat or swollen, with never more than 2 seeds. These pods open readily on maturing (dehiscent) and expel the seeds, so that one may find only empty pods if arriving too late. The individual seeds have a creamy-white growth, known as an aril, which is present on all *Pultenaea* seeds (Diagram A VII), but not on those of some related genera.

Leaves: These may vary considerably in size and shape, are alternate, opposite or in whorls, but are invariably simple. If a plant has trifoliate leaves (as in clovers, *Glycine*, *Kennedia* and others) or pinnate leaves (as in *Swainsona*, *Indigofera*) it cannot be a *Pultenaea* species.

Inflorescence: Flowers are in umbel-like heads, in axils of leaves clustered near ends of branchlets, axillary or solitary, never in extended racemes.

Some of the related Mirbelieae genera are *Phyllota*, *Dillwynia*, *Latrobea*, *Eutaxia*, *Aotus*, *Oxylobium* and *Gastrolobium*, whose characteristics may fit a number of the above requisites but not all. The above features having been checked, most *Pultenaea* species can be recognised and separated readily from these close relatives using the sketches on page 99.

Species In The Genus *Pultenaea* — Continued on page 116

Diagram. A

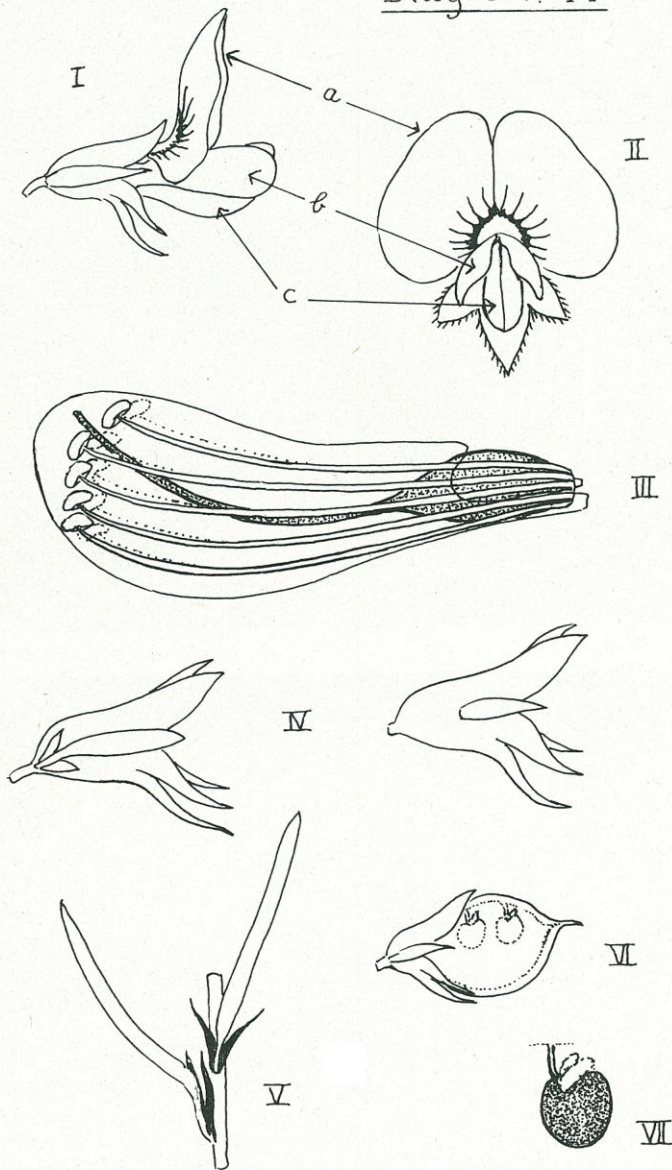


Diagram A — The *Pultenaea* Flower

- I & II a — standard, b — wings, c — keel
- III Details of Keel: 10 free stamens, ovary and stigma
- IV Two calyces with differing bracteoles
- V Leaves with stipules
- VI Pod with 2 seeds
- VII Seed with aril



Dampiera diversifolia △

▽ *Anigozanthos flava*





Pimelea imbricata (above)

Photography by John Simmons

A showy little shrub that always presents its silky-hairy pink flowers in pom-pom heads and in abundance. The flowers are similar to those of *Pimelea ferruginea* which is a more vigorous and hardy plant. Ideal for pot and rockery culture, these plants need a little care, especially water and good drainage. Both species can reach one metre in height but can be contained and rounded by regular tip pruning to look just like the plant in this photograph. The plant photographed is a variety of the species, var. *imbricata*, other varieties being var. *nana* with hirsute (hairy) leaves and white flowers, var. *baxteri* with glabrous (hairless) leaves and creamy flowers and var. *gracillima*, a slender swamp plant with few branches.

Dampiera diversifolia (top left)

Photography by Ivan Holliday

There are many *Dampiera* species which form showy rock garden plants, either as prostrate ground covers or small bushes which sucker freely. Of these, the species depicted (*D. diversifolia*) is a mat forming ground cover with deep blue to purple flowers in spring months. It is one of the few *Dampiera* species which is readily obtainable from native plant nurseries and is easily propagated from cuttings or by root suckers. Unfortunately, it is not a generally hardy plant for garden culture rarely being totally successful unless planted in deep, slightly acid, sandy soils. It comes from the south-west of Western Australia, often seen along the roadsides from Katanning to the Stirling Range.

Anigozanthos flava (bottom left)

Photography by Ivan Holliday

Used as a median strip or a driveway plant. *Anigozanthos flava* can become an excellent landscape subject as the photograph indicates. As it is a hardy plant which most gardeners can grow and extremely long flowering, it is especially useful for this purpose.

In the case of this "Kangaroo Paw", there are various colour forms to be selected from and some of lower stature. Like all plants they need a little occasional care. Cut off the old flower stalks, cut off old shabby leaves, remove the litter around the leaf base to let in air, and generally give them a cared for look and you have an eye-catching plant, when in flower — Ivan Holliday.

Native Gardens



* Reprinted by permission of the publisher Thomas Nelson Australia and the authors, from *Native Gardens* by Bill Molyneux and Ross Macdonald, \$25.00.

How to Create an Australian Landscape

Designing gardens using Australian plants in an Australian landscape is a concept which is relatively recent and still developing its own character. This book presents the considerable experience of the authors in a practical and well detailed manner with numerous clear illustrations.

Some people can intuitively plan a landscape of beauty and balance and then create it in reality. But many find that the ideas which will enable them to create a harmonious, workable garden design come with some difficulty, if at all.

This is not surprising, for unless there has been some form of basic training, design skills are hard to develop. There is seldom either the time or the incentive to acquire these skills in advance of the need to create one's own garden.

It is no wonder, then, that many gardens which are begun with good intentions (and doubtless with much loving care) finish as a fragmented collection of examples copied from other people's gardens. This approach often results in the need for high maintenance and an inefficient use of space, and while individual sections or plants may give pleasure, overall satisfaction is rare.

Soil Types

Recognising soil types and their possible deficiencies is a routine matter for the practised horticulturalist. He knows from experience how plants will thrive or struggle to survive in certain kinds of soil. This is not common knowledge to those who may be tackling the construction of a landscape for the first time. It is often at this point that steps which will affect the eventual quality of the finished planting are taken or missed.

Soils are derived from numerous sources and we need to investigate their structure and possibly modify it — sometimes dramatically — for horticulture in the small landscape.

Why do we need to do this? Mainly because we expect the plot of earth surrounding our home to grow a far wider range of plants than it would do naturally, and many of these plants will have come from very different soil conditions.

In sandy soils we will probably need to build up the humus content, that is, the amount of organic material, while dense clay, or soil derived from basalt, will generally need opening up to allow better water movement and aeration.

We often hear the statement that '... if it's native it will grow anywhere'. This is one of the most prevalent misconceptions about native plants. The most sympathetic design and balanced choice of plants may come to little if the ground in which the plants are placed cannot support good growth.

The soil structures on which the major cities of Australia are sited are described with a summary of climatic conditions.

Soil Preparation And Shaping

Most sandy soils lack humus which must be added to create a satisfactory growing medium. Up to 100 per cent by volume of humus may be added to sandy soils.

The clay dwellers are not so fortunate, as attempting to turn clay over and break it up when it is in a wet, plastic state can be frustrating. You will achieve far more in the cooler season, after the heat of summer has taken much of the moisture from the soil.

Clay soils require the addition of both gypsum and humus to make them friable. Breaking up clay just to the point of adding the gypsum will be a lengthy job. You should aim at having the largest lumps no bigger than a golf ball, for at this diameter the chemical action of the gypsum will still be effective. Worms will help further to break down these lumps.

The addition of humus to clay is beneficial. Though you may feel that the initial cost of shredded pine bark (pinepeat) is more than you wish to pay, the benefit will be apparent immediately. The difference in cost between pinepeat and introduced soil (often low in humus) is not great for the advantages gained.

To calculate the amount of pinepeat or other organic material required to improve the quality of the clay to a level capable of supporting a range of plants from greatly different natural habitats, we suggest then you would need to allow a layer of humus 8-10 cm deep.

When this is worked through the clay, it would provide a well-drained and aerated planting medium of 18-20 cm (7-8 in.). Remember, too, that the gypsum previously worked in is working on the soil below this level, further improving air and water movement. You will therefore have nearly 30 cm (12 in.) into which you can plant.

Coarse river sand may also be added to assist drainage.

The top 30 cm is the critical zone for many of the small fibrous-rooted heathland and sandplain plants that are so horticulturally desirable. *Epacris*, *dryandras*, small *banksias*, *verticordias* and *lechenaultias* will all thrive in these conditions.

The word humus describes all organic matter in the soil structure, and comprises plant remains such as roots, stems and spent leaves, together with animal and insect excretions. In simple terms, it is that part of the soil that holds the elements important to plant growth and supplies them in dilute form. Water, the diluting agent in this process, is also important, and humus has the ability to retain it for plant needs.

Healthy root development occurs in open soils with a good humus level, and this in turn increases the plant's ability to take up and use nutrients for growth. In soils which are either so fine that they compact and cement (such as clay), or are of low humus content (such as leached sand); root development and therefore plant growth is retarded.

Mulching

The bushland provides the answer to the question 'why mulch a garden?'

If we investigate natural vegetation near our homes, underneath the trees and shrubs we will find material such as leaves, twigs, spent flowers and pods. It is important that these rot and return to the soil because within them are contained the minute amounts of trace elements so essential to plant growth. Remember that our unique flora has evolved with far less of these elements than plants of the northern hemisphere.



Petrophile longifolia △

▽ *Hakea cuculata*



It is not surprising, then, to compare the rate of leaf drop of a eucalypt which has a change of foliage over a seven-year period, to deciduous trees, which shed all their leaves annually. Deciduous leaves are usually thinner in texture and decompose more readily than gum leaves. Eucalypt leaves not only supply trace elements to their own genus; all smaller plants growing in association with them will derive their share.

The materials we see functioning so efficiently in the forests also provide these elements within the man-made landscape. Additionally, they provide a cosmetic dressing and, more importantly, they control both the moisture and temperature levels at the soil surface.

If you move bush litter aside during dry weather, you will find that the ground is cooler and has a higher moisture level than do bare areas nearby.

During summer it is essential to reduce the temperature in the upper layer of soil. Extremes in this zone can cause irreparable damage to plant roots, which function mainly in this susceptible area.

Deeper rooted, large shrubs and trees do not suffer to the same degree as fibrous rooted, surface feeding plants.

The importance of applying some covering to sandy soil can be seen from tests carried out in Perth. Here, where housing development along the coastal strip has been on old dune structures, excessive amounts of water from garden sprinklers are flooded onto and through the low-humus soils. What sits on the surface evaporates very quickly. Various mulching materials applied to the sand showed that even with only 25 mm (1 in.) of cover, transpiration was reduced by 70 per cent.

Apart from bush litter, which will be self-perpetuating once your garden is established, hardwood shavings have been widely used as an initial cover. These are applied in varying depths up to 15 cm (6 in.) over the prepared soil. The greater the thickness, the better the control of moisture levels; the difference in soil temperatures, on the other hand, may not vary greatly beyond the depth of 7-8 cm (3 in.).

The deeper application means that when you are planting, it will be necessary to raise the plant up into the shavings by the Schubert method otherwise it could become swamped by the shavings whilst still small. This method is often used in broad landscape planting, when it can be difficult to water or care for a large area in the same way as one would tend a more confined landscape.

Care must be taken with the types of shavings used, as many contain toxic phenolic acids which can leach into the soil. For instance, tests using chips and sawdust from *Eucalyptus camaldulensis* (the River Red Gum) have resulted in stunted plant growth.

Generally, however, Australian hardwood materials have proved satisfactory, although, like so many of our timbers, they take many years to weather to a stable level. In this weathering process, they make use of

Petrophile longifolia (top left)

Photography by B. Crafter

This plant has considerable potential for cultivation in gardens, particularly rock gardens, even containers, because of its small rounded tussocky habit and long, terete leaves. The yellow flowers cluster at the base of the leaves in an unusual manner. There is a prostrate form and normal plants can be made to grow prostrate, the leaves growing upright from the prostrate branches.

Hakea cuculata (bottom left)

Photography by B. Crafter

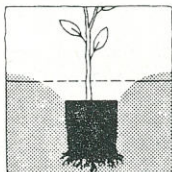
An erect shrub one to 3 metres in height this plant can add interest to the garden, not only because of its unusual flowers but because of its pleasing growth habit, contrasting well with other foliage. Fast growing it will need tip pruning to form a preferred shape or to keep small.

nitrate, and even where fifty to sixty-year-old sawdust of *Eucalyptus regnans* (the Mountain Ash) has been used in potting mixtures, the need for large amounts of nitrate has been evident. Watering the surface of a hardwood mulch once or twice a year with ammonium sulphate or potassium sulphate usually ensures that plants will not suffer nitrogen deficiencies.

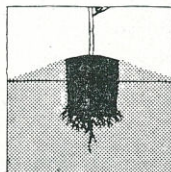
Planting, Fertilising And Staking

Planting trees and shrubs into the landscape needs as much thought as any other stage of your garden's preparation. The way in which you tackle this job, pleasurable as it may be, can affect the final health and correct growth of your plants.

No two plants that you buy will have a root system developed in the same way, and those differences in the structure of roots of, say, a eucalypt, a boronia or a grevillea, need to be understood.



Shrub planted too low, which may cause stem rot.



Shrub planted too high which may expose roots to hot dry sun as soil washes away.

Root growth in nursery pots is vigorous and some tangling of roots is inevitable in such a confined space. At this point we will assume that your ground has been thoroughly worked over and all the necessary steps so important to healthy, stable growth have been taken.

If so, you should be able to dig with your hands a hole big enough to accommodate the chosen plant. To facilitate some 'teasing' or opening out of the outer root ball prior to planting, the pot should be thoroughly soaked. This can be done either by repeated watering with the hose or (preferably) by soaking the plant, in its pot, in a bucket of water. When the soil is saturated, all air bubbles will have ceased rising. Once you have removed the plant from its pot, the root structure can be seen as you hold the plant upside down on the palm of your hand.

Cutting-grown Plants

A young cutting-grown plant develops a fibrous root system. Many, you may find, are not developed to a point of binding the soil ball together, while others may just require the lightest teasing with your finger-tips to loosen them. These may be planted without further attention. With age, however, a dense accumulation of roots will be found at the bottom of the pot. It may be necessary to loosen and lightly prune these roots before planting. This will promote vigorous new root growth.



Cutting-grown plants have a fibrous root system.



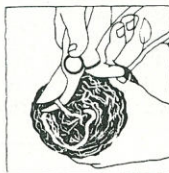
Gently tease after soaking if roots are tightly matted.

Seedling-grown Plants

In plants grown from seed, a thick primary or 'tap' root develops, together with many, slightly thinner, secondary roots. These may only need to be gently uncoiled and spread a little, so that the roots can move away from the pot soil into the prepared ground. In a very old plant, the tap root may become so tightly coiled that we refer to it as 'pot' or 'root-bound'. Plants at this stage can be retrieved, and careful root pruning will help them develop into healthy trees or shrubs.



Seedling plants will develop a more robust root system.



This may require light pruning and gentle teasing.

When positioning the plant in the ground, ensure that it is neither too low nor too high. The first may cause rotting of too wet a stem, and the second may expose the root to hot, drying sun and wind. A fraction below the ground surface will not matter, as this will be compensated for by the subsidence of the soil into which you are planting. Unless you are planting into a thick cover of a mulch of shavings no allowance for mulch need be made.

Fertilising

Fertiliser can be applied at the time of planting or be included in the soil preparation. A wide range of fertilisers is available and their methods and rates of release vary. The coated, slow-release pellets are popular and convenient and are available in several release rates.

Australian plants in general prefer low levels of phosphorus and it is advisable to use those fertilisers low in this component. Fertilisers are rated on their NPK content, that is, Nitrogen (N), Phosphorus (P) and Potash (K) levels. Selecting those with ratios of approximately N:14 per cent, P:4 per cent, and K:8 per cent is safe, so long as they are used according to the manufacturer's directions. Those with higher phosphorus levels are not safe.

Blood and bone and hoof and horn are two commonly used fertilisers in powdered form. Their main disadvantage is that their odour is attractive to dogs, cats and even foxes. Fortunately, it is a deterrent to rabbits.

The most practical way of applying fertilisers is by thoroughly mixing the prescribed amount through the soil into which the plant is to go. This will ensure that the roots will find these food sources as they move out into the soil and that large concentrations do not occur in patches. After planting, thoroughly water in both the plant and the surrounding soil. Any firming down of the soil should be done prior to watering, not when the soil is very wet. Over-working wet soil drives the air from it and can cause water-logging.

Maintenance

One of the most widely held fallacies regarding Australian plants is that they are 'maintenance free'. This is not so; however, they can (and should be) low in maintenance.

Many new home owners decide to plant natives, believing it will save them work — which, of course, is possible, with careful planning. Take away vast areas of lawn to mow, weed, trim and generally tend, annual

borders to replant and leaves to be constantly raked up in autumn, and you have a low-maintenance garden.

And this is what we have in a low-maintenance native garden: little, if any, lawn (and if so, not fussily tended), permanent plantings (replacement occurring only because of old age or death) and leaves allowed to remain where they fall to add to the mulch of ground litter.

But if we look now at the basics of garden care — pruning, shaping, culling, replacement, watering, feeding and weeding (to a lesser degree) — they apply as much to a native bush garden as to a conventional landscape.

Certainly the application of mulch to the soil surface will reduce the weed problem and the amount of water you need to apply. This last comment is relevant only if the correct preparation of either clay or sandy soil has taken place during initial construction. If not, far more water will run off the soil surface than will penetrate it. ■

Western Pea Flowers

Notes by Grey Keighery,
Kings Park, Perth, W.A.

Latrobea

A small genus of five species, confined to Southern Western Australia.

Latrobea abnormis has now been classified as *Daviesia abnormis*.

Latrobea brunonis (Benth.) Meisn. An erect spreading multi-stemmed shrub, to 50 cm, rarely 1 m with small glabrous linear leaves. Heads of bright yellow flowers are displayed in September to January, occasionally extending to April. It usually grows in swamps on sandy soils in the south-west, Warren and Stirling Districts.

Latrobea genistoides (Meisn.) Meisn. A spreading low shrub, to 1 m, with small, broad, lanceolate, glabrous leaves and orange-yellow flowers (not in heads). From August to November. It grows on sandy soils in the South West, Warren, Stirling and Eyre districts.

Latrobea hirtella (Turcz.) Benth. A slender erect shrub to 1 m, with yellow-brown-red flowers in August to October. It grows on sandy soils in the South West, Warren and Stirling Districts.

Latrobea tenella Benth. A very slender erect or prostrate shrub, to 50 cm if erect. Flowers small yellow. The leaves are minute and close to the stem. It has yellow flowers in August to November occasionally extending to February. It grows in swamps.

Two named varieties are found both having much larger flowers than normal *L. tenella*.

L. tenella var. *grandiflora* Benth. (Stirlings, Barren Ranges).

L. tenella var. *platycarpa* Benth. (Albany area).

Euchilopsis

A genus of one species as illustrated on page 97.

Phyllota

Found in temperate Australia, three species occur in Western Australia.

Phyllota barbata Benth. An erect spreading shrub, to 60 cm with small linear leaves. The flowers are yellow-brown held in small heads from December to July (perhaps sporadically throughout the year). It grows on sandy (swamps, lateritic or quartzite) soils in the S.W. Warren, Stirling Districts.

Phyllota gracilis Turcz. Represented only by type herbarium specimen, no information is available.

Phyllota luehmannii F. Muell. An erect loose woody shrub to 30 cm, the leaves on the young stems being densely tomentose (hairy). The flowers, in small terminal heads, have a standard yellow, orange wings and a red keel, appearing from August to November. It grows on sandy soils in the South West: Avon; Roe; Eremaean, Coolgardie Districts. ■

Kangaroo Paws

Studies in Propagation by P. A. Watkins and R. W. Shepherd,
Division of Horticulture, W.A. Department of Agriculture.



Most species of *Anigozanthos* (Kangaroo Paw) exhibit low germination percentages, and in some cases, delayed germination. Hot water treatment of kangaroo paw seeds has been reported to improve germination. This section reports on the effects of pre-sowing seed treatments on the germination of *Anigozanthos manglesii*, *A. viridis*, *A. rufus* and a group of mixed hybrid seed (mostly *A. flavidus* hybrids).

The following is a summary of a study undertaken.

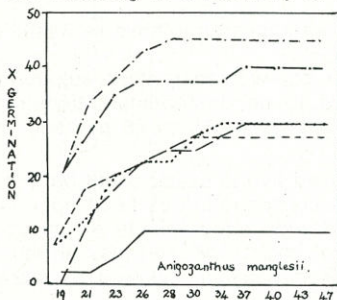


Fig 1
control ———
H₂SO₄ 1min - - -
Hot water + G.A.
H₂SO₄ + H₂O₂ - . - .
Days ex. Sowing

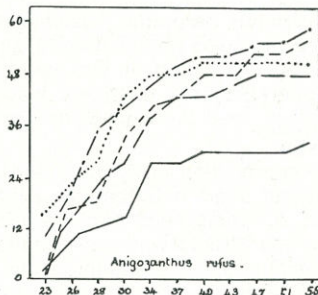
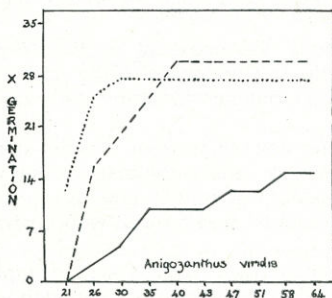
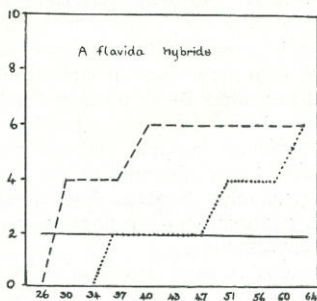


Fig 2
control ———
G.A. - - -
Hot water + H₂O₂
Hot water + G.A. - . - .



control ———
H₂SO₄ 4min - - -
H₂SO₄ 4min + G.A.



control ———
G.A. - - -
H₂SO₄ 0.5min
Days ex. Sowing

Pre-germination Seed Treatments

Seeds of the Kangaroo Paw species were given the following treatments separately and in combination:—

- Hot water at 55° to 60°C for two hours.
- Gibberellic acid soak at a concentration of 1,000 ppm for 24 hours.
- Hydrogen peroxide at a concentration of 500 ppm for 24 hours.
- Concentrated sulphuric acid for varying periods according to species. Time periods were determined from previous experimental work and were: *A. rufus*, 30 seconds; *A. manglesii*, 60 seconds; Mixed hybrid, 60 seconds; *A. viridis*, 4 minutes.

Five replicates of ten seeds each were used for each treatment and for each species. Seeds were sown in sterilised media and germination assessed at regular intervals up to 64 days after sowing.

Hot water alone did not significantly increase germination of seed, except that of the mixed hybrids. This differs from reports by previous workers in this field. However, it should be noted that different batches of seed, depending on the source of seed collection, display varying viability and therefore may also respond differently to hot water treatment.

Gibberellic acid increased germination of *A. rufus* and mixed hybrid seed from two to six percent, and 32.5 to 55 percent, respectively. Other species did not respond to this treatment.

Sulphuric acid increased seed germination for all species except the mixed hybrids. Mixed hybrid seed appeared to be killed by this treatment resulting in no germination compared with 32.5 percent germination for the control.

Hydrogen peroxide treatment by itself appeared to have very little effect on increasing seed germination of all species.

Mixed treatment in various combinations with each other; sulphuric acid plus Gibberellic acid treatment was found to be the optimum treatment for *A. manglesii* seed increasing the germination from 27.5 to 45 percent.

Conclusion

The germination of *A. rufus* and *A.* mixed hybrid seeds could be improved by a 24-hour soak in Gibberellic acid at a concentration of 1,000 ppm. Germination of *A. viridis* seed may be improved with a four-minute dip in concentrated sulphuric acid while germination of *A. manglesii* seed may be improved by a combination of a 1 minute dip in sulphuric acid, followed by a 24-hour soak in Gibberellic acid. ■

Acacia Complanata

Germination Studies by
John Delpratt and Max Heslehurst,
Queensland Agricultural College,
Lawes 4345

Acacia complanata can be found along the coast of eastern Australia from the Clarence River in New South Wales to Bundaberg in the north. Some plants have also been recorded in isolated patches west of the ranges at Alpha and Isla Gorge.

Spectacular multiple summer and winter flowerings from this flat-stemmed wattle have been observed in the Lockyer Valley, which contrasts to the annual flowering of most *Acacias*. The species regenerates rapidly after fire or severe pruning, changing growth habit to a multibranched dwarf shrub with ornamental appeal for gardens.

Successful seed propagation of the species will depend on the quality of seed collected, treatment for seed coat dormancy and germination in an adequate environment.

Seed Coat Dormancy

Hardseededness has long been recognised as the primary dormancy mechanism in most *Acacia* species, and several classical techniques (boiling water, acid, edge nicking, physical coat scarification) have been evaluated for an efficient system.

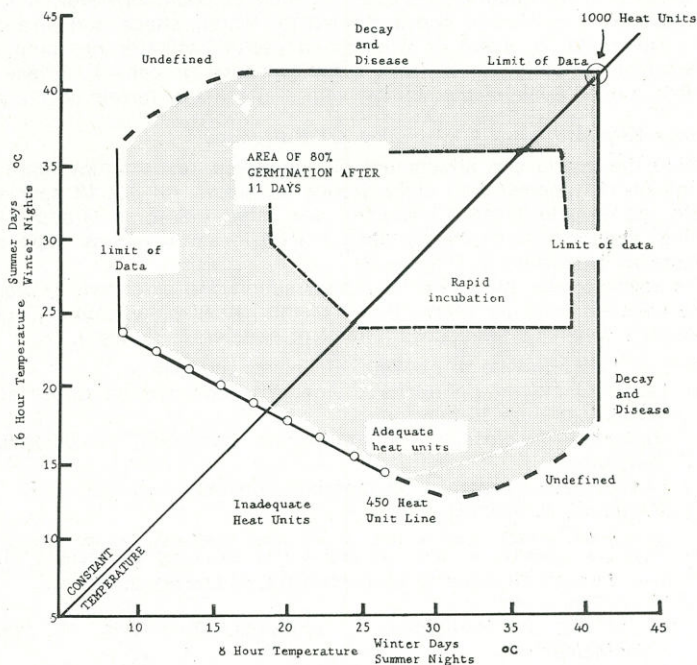
Immersion in boiling water was found to be the safest, quickest and most consistent treatment for commercial practice, although all techniques relieved dormancy. No stimulation of germination was found from substrate additives (potassium nitrate, gibberellic acid) or exposure to light.

Seed was immersed in boiling water for an optimum exposure time of 60 seconds, and most rapid germination was found to occur when the seed

was immediately rinsed in running water for 30 minutes to remove lipids from the seed coat. The seed could be dried and stored in this form.

Seed Quality

During the rinsing process some seed floated to the surface (and were discarded), whilst good quality heavy seed sank to the bottom of the container. This flotation process considerably improved the quality of the seed sample for storage or use. A large proportion of the seed collected was insect damaged, with a major amount undetectable to the eye (flotation removed). Poor germination results often reflect the poor quality of seed collections.



Germination Environment

Temperature was found to be the major factor influencing the germination of non-dormant seed. A broad spectrum of day/night temperature combinations were adequate for rapid germination, providing accumulated hourly heat sums per day ranged between 450° and 1000C° (e.g. 20C° for 16 hours = 320; 15C° for 8 hours = 120; 320 + 120 = 440 accumulated heat units for the day).

An upper limit above which germination was retarded occurred at 42°C. Summer and winter day/night temperature combinations providing adequate heat units for rapid germination (80% emergence in 11 days) are shown in the diagram (shaded section). Energy conscious nursery propagators using modified environments should aim at the 450C°/day heat unit figure, as energy inputs above this value have small effects on total germination percentages.

The rate of germination, however, varied across this broad range of satisfactory temperatures, with over a two fold difference in the incubation time. Optimum temperature values for minimal incubation periods are those combinations depicted in the white central area of the diagram. These were night temperatures of 20°C and above combined with day temperatures of 25° to 35°C.

The Genus *Pultenaea* — Continued from page 102

Having established that the plant is a *Pultenaea*, the problem is to determine which one, of approximately 120 species, it is. Some simplification into sub-groups or sections is desirable. Various keys and schemes have been suggested, using the characteristics outlined above, and even others including haploid numbers, which are beyond normal use. Any such scheme is somewhat arbitrary and presents difficulties with marginal species. For simplicity, a guide using leaf properties is suggested for initial subdivision. There is, of course, variation in leaf size and shape even within one species and even on one bush, depending on factors of habitat and age of plant. However, if a typical leaf from a plant is chosen and examined for length, shape and arrangement, (whether alternate, opposite or whorled) a useful basis for grouping can be obtained. Note whether leaves have a flat, concave or convex surface or are rolled into a needle-like shape (terete) with a channel or furrow on the surface.

A Simple Key Grouping Of Species Of *Pultenaea*

Using the shape and attachment of the leaves, readers may quite readily group all of 120 species into eight groups as below. All but 13 species have alternate leaves and these 13 species are listed below as Group VIII. The remaining, about 107 species, are then placed in seven groups depending on leaf shape as illustrated in Diagram B.

The seven groups may then be further subdivided as shown in Diagram B and the species listed as below. Part I of this series of articles on *Pultenaea* is completed with illustrated descriptions of species in Group I.

GROUP I — Leaves ovate to obovate — Leaves alternate.

- (a) Leaves incurved on edges or margins (concave on upper surface); small, less than 10 mm long.

Pultenaea foliolosa, *P. stuartiana*, *P. parviflora*, *P. patellifolia*, *P. densifolia*.

- (b) Leaves flat or recurved on margins (convex)

P. gunnii, *P. stricta*.

Note: *P. rotundifolia*, a W.A. species, has, as the name indicates, leaves that fit Group I but they are opposite, not alternate and will be described in (Group VIII).

GROUP II — Leaves ob-ovate to ob-lanceolate — Leaves alternate.

- (a) Leaves incurved

P. villosa, *P. ferruginea*, *P. altissima*, *P. flexilis*, *P. trifida*, *P. selaginoides*.

- (b) Leaves flat or recurved margins

P. capitellata, *P. pycnocephala*, *P. ochreate*.

GROUP III — Leaves linear (but not terete) — Leaves alternate.

- (a) Leaves incurved

P. hispidula, *P. campbellii*, *P. aristata*, *P. boormanii*, *P. glabra*, *P. weindorferi*, *P. viscosa*, *P. viscidula*, *P. aspalathoides*, *P. neurocalyx*, *P. setulosa*.

- (b) Leaves flat or recurved margins

P. petiolaris, *P. stipularis*, *P. conferta*, *P. drummondii*, *P. diffusa*, *P. whiteana*, *P. piniifolia*, *P. barbata*, *P. microphylla* var. *cinerascens*.

GROUP IV — Leaves elliptic/oblong — Leaves alternate.

- (a) Leaves incurved

P. cambagei, *P. paludosa*, *P. dentata*, *P. elliptica*, *P. subspicata*, *P. muelleri*, *P. canescens*, *P. euchila*, *P. quadricolor*, *P. humilis*, *P. subumbellulata*, *P. capitata*, *P. sp. affin. elliptica*.

- (b) Leaves flat or recurved margins

P. pedunculata, *P. benthamii*, *P. rosmarinifolia*, *P. paleacea*, *P. lino-phylla*, *P. polifolia*, *P. platyphylla*, *P. myrtoides*, *P. dasyphylla*, *P. lycopodioides*.

Gp I



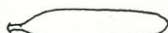
Diagram B



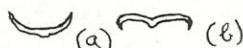
Gp II



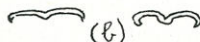
Gp III



Gp IV



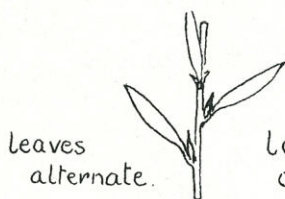
Gp V



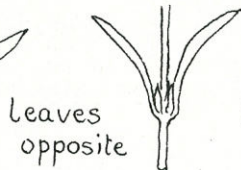
Gp VI



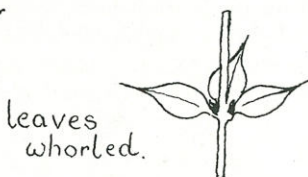
Gp. VII



leaves
alternate.



leaves
opposite



leaves
whorled.

Diagram B — *Pultenaea* Leaf Groupings

Group I: Leaves ovate — (a) incurved (concave) and small (less than 10mm long)
(b) flat or recurved (convex)

Group II: Leaves ob-ovate to ob-lanceolate — (a) incurved, (b) flat or recurved margins.

Group III: Leaves linear — (a) incurved, (b) flat or recurved margins.

Group IV: Leaves elliptic/oblong — (a) incurved, (b) flat or recurved margins.

Group V: Leaves lanceolate — (a) incurved, (b) flat or recurved margins.

Group VI: Leaves cuneate or emarginate.

Group VII: Leaves terete and l-channelled above.

Group VIII: Leaves opposite or whorled.

GROUP V — Leaves lanceolate — Leaves alternate.

(a) Leaves incurved

P. incurvata, *P. vrolandii*, *P. procumbens*, *P. rigida*, *P. trinervis*, *P. involucrata*, *P. costata*, *P. villifera*, *P. juniperina*.

(b) Leaves flat or recurved margins

P. reticulata, *P. skinneri*.

GROUP VI — Leaves cuneate or emarginate — Leaves alternate.

P. microphylla var. *microphylla*, *P. largiflorens*, *P. hartmannii*, *P. daphnoides*, *P. scabra*, *P. retusa*, *P. maidenii*, *P. millari*, *P. sp. affin. hartmannii*.

GROUP VII — Leaves terete and 1-channelled above — Leaves alternate.

(a) Leaves tuberculate

P. subalpina, *P. divaricata*, *P. brunioides*, *P. laxiflora*.

(b) Leaves pungent

P. acerosa, *P. vestita*.

(c) Flowers solitary or twin

P. graveolens, *P. tenuifolia*, *P. prolifera*, *P. prostrata*, *P. fasciculata*, *P. canaliculata*.

(d) Flowers in sessile heads

P. d'altonii, *P. strobilifera*, *P. ericifolia*, *P. empetrifolia*, *P. verruculosa*, *P. radiata*, *P. bauerlenii*, *P. echinula*, *P. adunca*.

(e) Flowers — heads subsessile or pedunculate

P. mollis, *P. teretifolia*, *P. williamsoniana*, *P. hibbertioides*.

GROUP VIII — Leaves opposite or whorled. The only species not alternate.

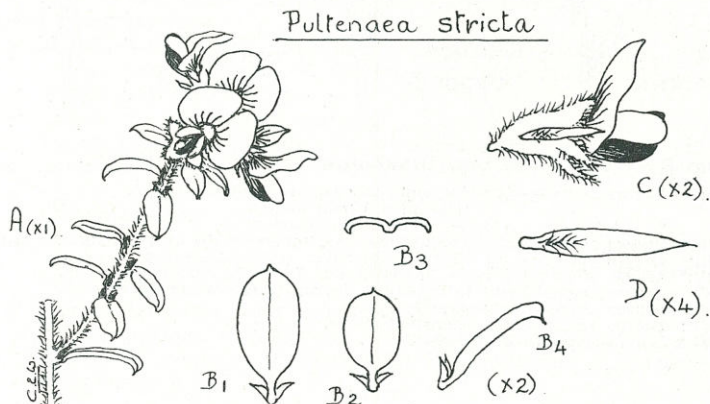
P. spinosa, *P. cunninghamii*, *P. tenella*, *P. blakelyi*, *P. leuhmannii*, *P. subternata*, *P. calycina*, *P. arida*, *P. obcordata*, *P. rotunditolia*, *P. spinulosa*, *P. tricophylla*, *P. elachista*.

DESCRIPTION OF PULTENAEA SPECIES OF GROUP I

Pultenaea stricta Sims

Rigid Bush-pea

Habit	Slender upright shrub to 1 m high (A).
Leaves	Ovate to oblong (B_1 and B_2), mostly 6-10 mm x 2.5-5 mm with recurved margins (B_3) and a definite recurved callus point (B_4); both surfaces glabrous. Stipules small and inconspicuous.
Flowers	Subsessile in terminal heads. Calyx silky hairy. Keel red (C).
Bracteole	Oblong-linear, attached in middle of calyx tube and often exceeding the lobes in length; brown membranous and usually glabrous except near the base (D).
Flowering	September-November.
Distribution	Damp, cool localities in southeast heathland and forest.

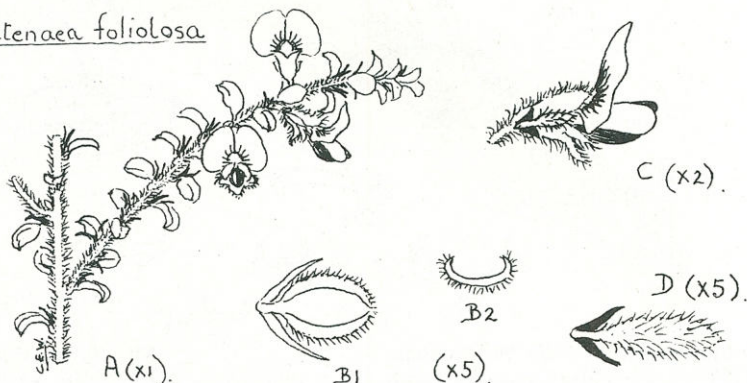


***Pultenaea foliolosa* A. Cunn. ex Benth.**

Small-leaf Bush-pea

- Habit** Shrub to 2 m high, sprawling, villous. Sometimes rusty appearance (A). See Volume 11, Page 49 for colour plate.
- Leaves** Less than 4 mm long, ovate to orbicular (B_1), concave, villous (B_2). Stipules prominent, almost as long as leaves.
- Flowers** Usually single on branchlets with pedicels 1-2 mm. Calyx villous; upper calyx lobes larger than other three (see *P. stuartiana*). Keel dark red (C).
- Bracteole** Leaf-like and villous with brown stipules (D).
- Flowering** Spring — October/November.
- Distribution** Vic. (North-east); N.S.W. (Northern Tablelands, Northern, Central and Southern Western Slopes and North-west Plains); South-eastern Queensland.

Pultenaea foliolosa

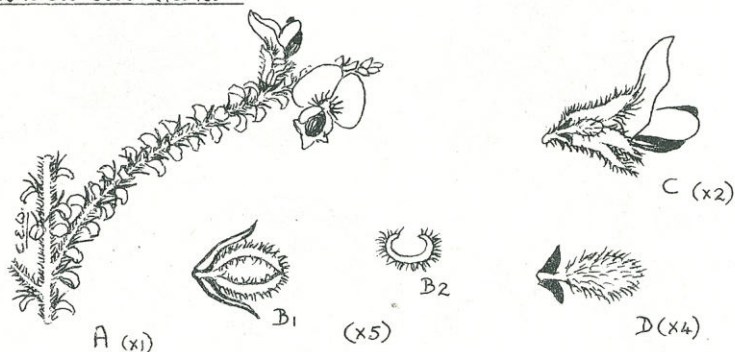


***Pultenaea stuartiana* Williamson**

Stuart's Bush-pea

- Habit** Soft, diffuse, villous shrub to 2 m high (A).
- Leaves** Ovate, 1-2 mm long (B_1), incurved, villous, crowded (B_2). Stipules about as long as leaves.
- Flowers** Axillary on branchlets, on short pedicels c. 1 mm long. Calyx villous with lobes all similar. Keel reddish (C).
- Bracteole** 3-lobed, with central lobe leaf-like and villous, side lobes small and stipulate. Shorter than tube (D).
- Flowering** Late Spring to early Summer — mainly November.
- Distribution** Localised in Tablelands in Northern N.S.W., e.g. Torrington.
- This species is similar to *P. foliolosa* but differing in calyx lobes and with smaller leaves.

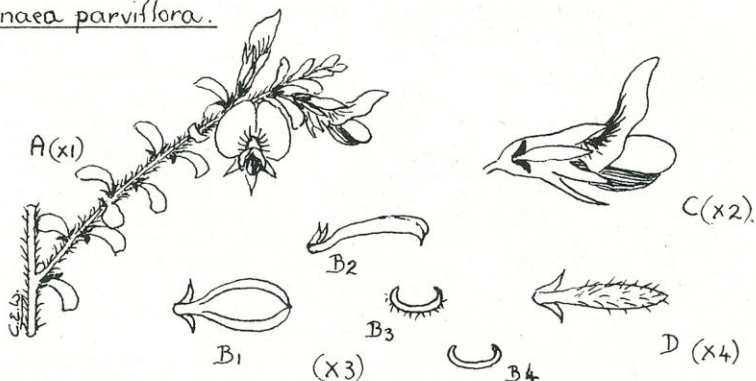
Pultenaea stuartiana



***Pultenaea parviflora* Sieber ex De Candolle**

- Habit** Erect shrub to 1 m high (A).
Leaves Ovate/obovate (B_1), 2-6 mm long, tip recurved (B_2), incurved, hairy on young leaves (B_3) becoming glabrous (B_4). Branchlets hairy, stipules small.
Flowers Axillary, on short pedicels c. 1 mm long, towards end of branchlets. Calyx mainly glabrous with long pointed lobes (C).
Bracteole Trifid, lobed almost to the base, the central lobe about 4 mm long, sparsely hairy, attached on tube (D).
Flowering Spring — September/October.
Distribution Heavy soils in Sydney area — now uncommon.

Pultenaea parviflora.

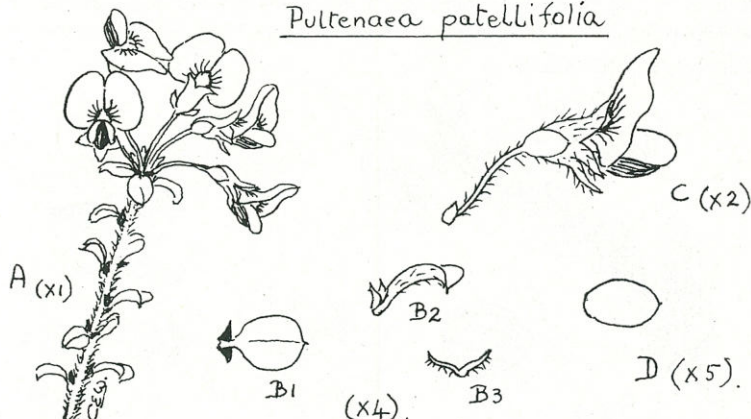


***Pultenaea patellifolia* Williamson**

Mt. Byron Bush-pea

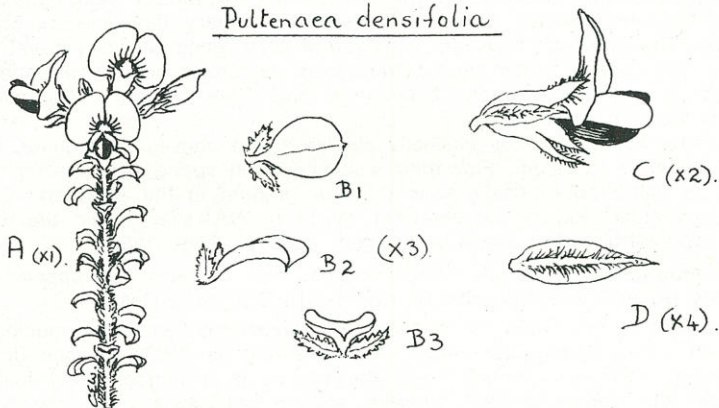
- Habit** Erect graceful shrub 1-2 m high (A).
Leaves Orbicular, 2-3 mm diameter with small recurved mucro (B_1); glabrous or with a few appressed hairs on undersurface (B_2); incurved (B_3).
Flowers Usually 3-6 in umbel-like clusters, with pedicels 4-8 mm long, at ends of branchlets. Calyx and pedicels with sparse appressed hairs. Keel dark red (C).
Bracteole Orbicular, viscid, about 2 mm long or half length of calyx tube, attached at base of calyx (D).
Flowering September-October.
Distribution Endemic in Black Range, Grampians, Vic.

Pultenaea patellifolia

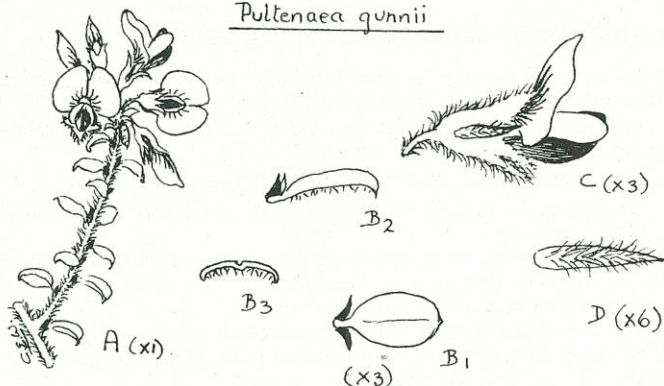


Pultenaea densifolia* F. Muell*Dense-leaf Bush-pea**

- Habit** Rigid, leafy, diffuse shrub to about 1 m high, stems hoary (A).
Leaves Crowded, glabrous, broadly ovate (B_1), 2-5 mm long, with recurved mucro and imbricate, ciliate stipules (B_2, B_3).
Flowers Sessile in leafy heads. Calyx glabrous except for shortly-ciliate margins on the acute-tipped lobes. Keel dark red (C).
Bracteole Lanceolate, villous, inserted at base of calyx and longer than the tube (D).
Flowering September-November.
Distribution Mallee areas of S. Aust and Vic.

Pultenaea densifolia***Pultenaea gunnii* Benth.****Golden Bush-pea**

- Habit** Small, wiry, spreading shrub, 30-90 cm high (A).
Leaves Ovate (B_1), usually less than 5 mm long, slightly convex above, with a recurved point (B_2); glabrous on upper surface and a few hairs on undersurface (B_3); small stipules.
Flowers Mostly 3-8 in terminal heads, on short pedicels of 1-2 mm. Calyx hairy. Keel dark red (C).
Bracteole Simple, small, inserted on the tube, hairy (D).
Flowering Spring — October/November.
Distribution Open hilly forest and heathland in Central and Eastern Vic.; also Tas.

Pultenaea gunnii

Arthropodium and Dichopogon in Western Australia

by Greg Keighery, Kings Park and Botanic Garden, Perth, W.A.

As the previous issue of Australian Plants described the 'Fringed Lily', readers will be interested in the closely related species in the genera *Arthropodium* and *Dichopogon*, all interesting and rewarding plants.

Arthropodium contains two species in Western Australia, *A. capillipes* Endl. and *A. preisii* Endl.

Arthropodium capillipes is a rhizomatous tuberous perennial, which produces a rosette of leaves during autumn and as these senesce during late spring produces a tall (to 1 m) erect panicle of solitary pendulous pink flowers. Flowering occurs from September to February (finishing by March in areas). The species grows on a variety of soils, generally winter wet and nutrient rich (granite, loam, calcareous loam or creek beds). The species is found in the Irwin, Avon, Drummond and Dale botanical districts of southern Western Australia.

Arthropodium preisii is basically similar to the above, but smaller, with an inflorescence to 50 cm. Flowering also occurs in spring not summer. The species is restricted to heavy soils (clay or granite) in the Avon and Coolgardie botanical district of southern Western Australia. It is the drier country counterpart of *A. capillipes*. Colour plate on page 125.

Dichopogon, a closely related genus, also contains two species: *D. fimbriatus* (R. Br.) MacBride and *D. strictus* (R. Br.) J. G. Baker.

Dichopogon fimbriatus is a tuberous rhizomatous herb, producing a rosette of leaves during the winter, and flowering as these senesce before the summer dormancy period. The inflorescence is a slender erect panicle to 70 cm (but generally less), bearing solitary pendulous pink flowers, in spring and early summer. The species occurs on sand; granitic soils or sandy clay, in the Irwin, Avon, Coolgardie and Roe botanical districts of southern Western Australia.

Dichopogon strictus is very similar but more robust, with the inflorescence to 1 metre. Flowering occurs in late spring and early summer. The species occurs on a variety of sandy soils, in the Drummond, Dale, Menzies, Eyre and Avon Botanical District of southern Western Australia (i.e. wetter regions compared to *D. fimbriatus*).

Both genera are easily grown from seed planted in the autumn. Flowering commences 18 months after sowing. Because of their summer dormancy the plants are best kept as pot subjects. ■

Arthropodium and Dichopogon by D. T. & C. E. Woolcock

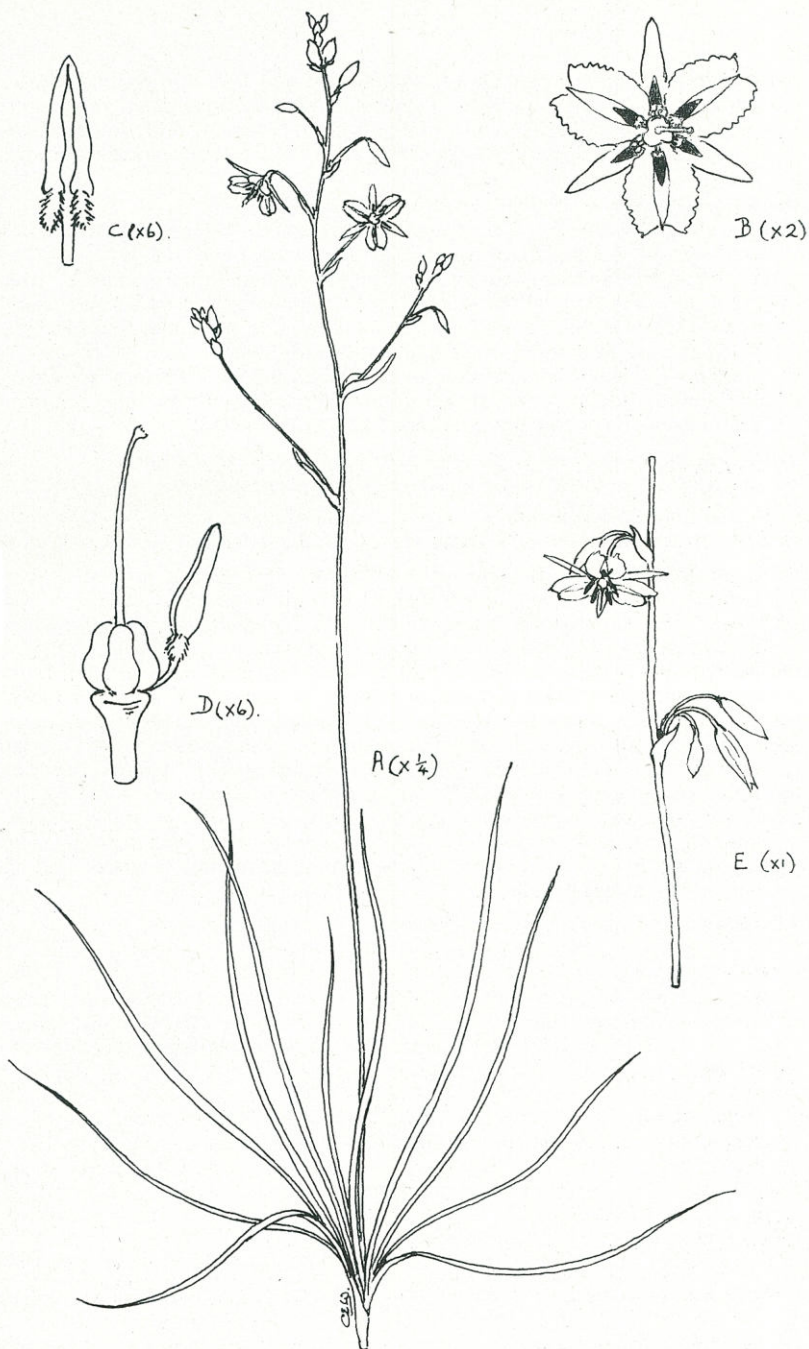
Two delightful members of the Liliaceae family are *Arthropodium* and *Dichopogon*, popularly known as the Vanilla Lily and Chocolate Lily because of their distinctive perfumes. These two genera are very closely related, even sometimes listed together as *Arthropodium*.

Arthropodium milleflorum (R.Br.) MacBride "Pale Vanilla Lily"

Habit — Slender herb, usually branched, 25-80 cm high; leaves basal, grass-like, 10-30 cm long.

Inflorescence — Panicle, 10-25 cm long; flowers numerous, white or purplish, spreading or drooping (2-3 in clusters), on fine pedicels 8-15 mm long with a small scarious bract at base; scented.

Stamens — Upper two-thirds of filaments bearded; anthers slightly longer than bearded part of filaments; beard hairs pale in colour, anthers pale or purplish. See detail B on page 126.



Dichopogon strictus

A. The plant $\frac{1}{4}$ full size.
B. The flower twice full size containing the anther C and the ovary and stigma D.

Dichopogon fimbriatus

E. The plant full size showing a different flower shape and the drooping habit on the stem.

Distribution — Occurs in all States except W.A. and N.T. Widespread in cooler parts of S. Aust. (S.E.), Vic. (widely scattered in cool damp regions from coast to mountains favouring sheltered situations), N.S.W. (most districts except extreme N. and W.), Tas. and Qld., also New Caledonia. Flowering time — late Summer.

***Arthropodium minus* R.Br. "Small Vanilla Lily"**

Habit — Small slender herb, usually unbranched; leaves basal grass-like, linear-terete, spreading or erect. See sketch on page 126.

Inflorescence — Panicle, sometimes a simple raceme; flowers solitary at each bract on a fine pedicel that is recurved or nodding, lilac or purple, scented.

Stamens — On slender filaments nearly twice as long as anthers, upper half of filament obscured by a dense but short pale beard.

Distribution — Occurs in all States except W.A. and N.T. Prefers open woodland or dry forest areas at lower elevations. Sometimes locally common but has been affected by clearing. Flowers in Spring.

***Arthropodium capillipes* Endl. and *Arthropodium preissii* Endl.**

See the article by Greg Keighery for these western species.

***Arthropodium dianellaceum* F. Muell. "Northern Vanilla Lily"**

Endemic in S.E. Qld. Perhaps some Queensland reader will describe it.

***Dichopogon strictus* (R.Br.) Baker "Chocolate Lily" (Grass Lily N.S.W.)**

(Syn.: *Arthropodium strictum* R.Br.). Sketch on page 123.

Habit — Slender perennial herb, 20-100 cm high; basal grass-like leaves (20-35 cm long) and stiff erect flowering stem.

Inflorescence — A loose panicle with long leafy bracts at base of each branch and a lanceolate bract at base of pedicel or sometimes a simple raceme.

Flower — Solitary, drooping, blue or violet (rarely white), 10-12 mm across, scented; inner whorl of perianth segments with wide crisped margins, broader than outer three; anthers dark purple, with two shorter basal hairy appendages, yellow as shown in details B, C and D, page 123.

Distribution — Very widespread in temperate parts of all States (only in extreme S.W. corner of N.T.) — common in open forest, heathlands and grasslands in these situations. Flowers in November/December and into January in wetter localities.

***Dichopogon fimbriatus* (R.Br.) Macbride "Nodding Chocolate Lily"**

(Syn: *Arthropodium fimbriatum* R.Br.)

Habit — Similar to that of *D. strictus*.

Inflorescence — A loose raceme or panicle with short bracts at base of branches: flowers generally 2-4 in axil of stem bract, drooping, blue or violet, scented. Anthers dark purple; 2 hairy appendages much shorter, yellow.

Distribution — Occurs in all States except Tas. and N.T. — more often scattered on sandy ground of drier heaths and open forest but not so common as *D. strictus*. Flowering time — Late Spring and Summer. ■

***Dichopogon strictus* — "Chocolate Lily"**

Photography by A. J. Cough

A robust plant showing its flower up to one metre above its rosette of leaves springing from a tuberous rhizome below ground. The leaves appear during winter and die during flowering, the plant becoming dormant over summer. The detail of the plant and flower is shown on the sketch on page 123.

***Arthropodium preissii* — "Vanilla Lily"**

Photography by G. Keighery

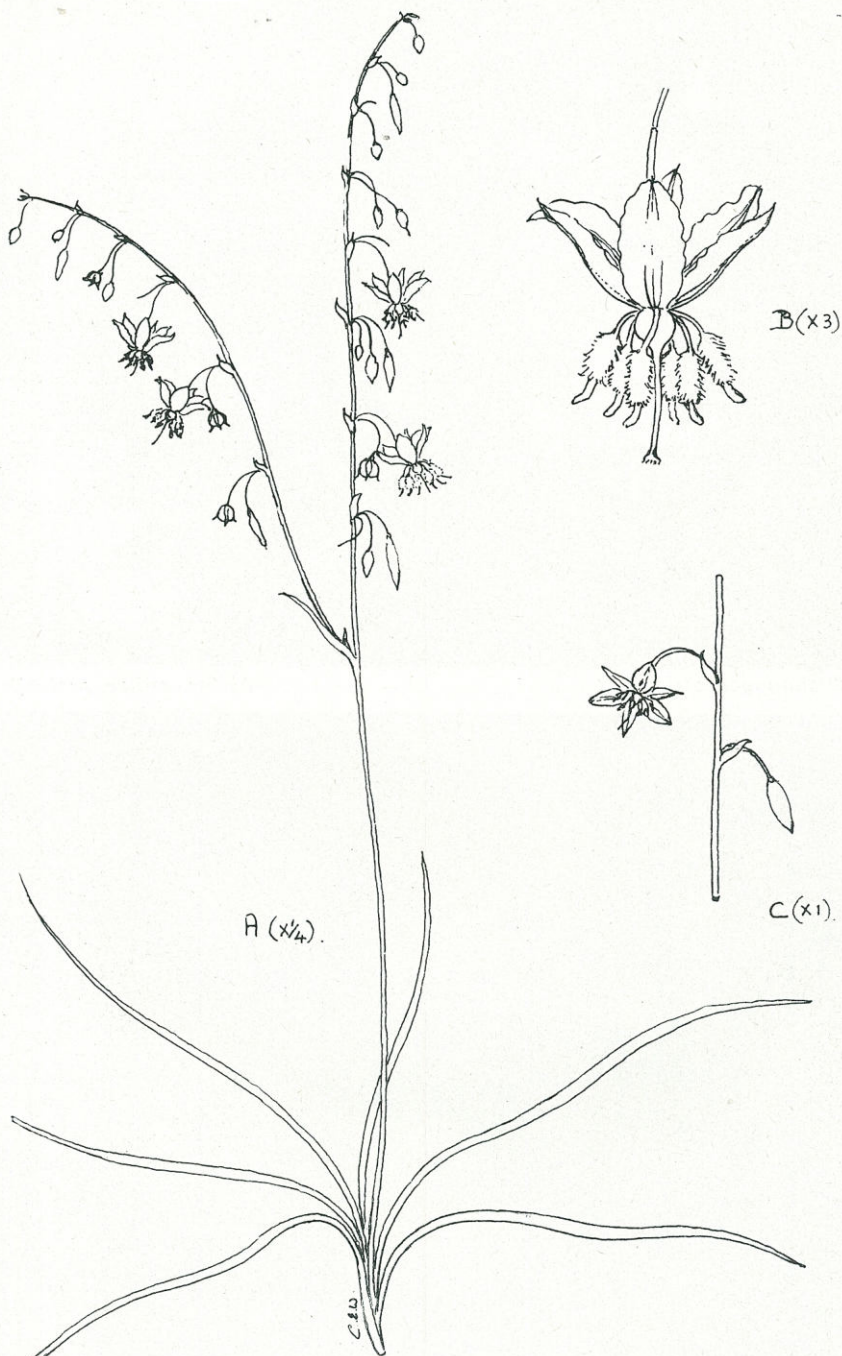
The flowers are held 50 cm above ground and its rosette of leaves. The flower details are shown in a sketch on page 126. The leaves appear in autumn and die as flowering progresses in spring. The rhizomatous tuber produces renewed flowering each year.



Dichopogon strictus △

▽ *Arthropodium preissii*





Arthropodium milliflorum

A. The plant $\frac{1}{4}$ full size, flowers numerous.
B. The flower three times full size.

Arthropodium minus

C. A smaller plant, flowers singly on a nodding pedicel.

Actinodium

Common species can be rare, in part.

by Greg Keighery, Kings Park and Botanic Garden

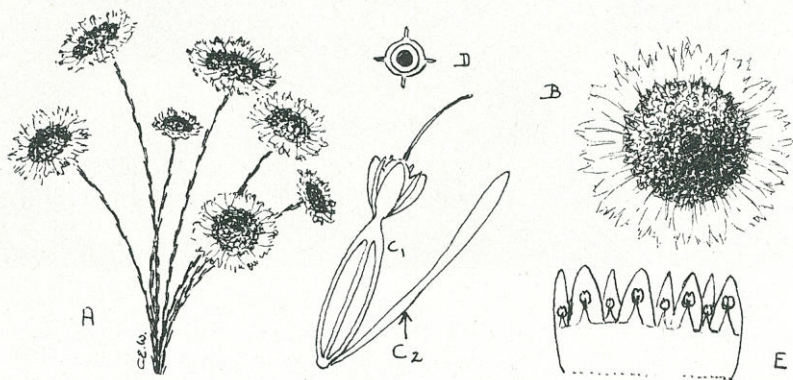
Many people are familiar with Western Australia's remarkable genus of Myrtaceae that has the outward appearance of a daisy. Different forms have been featured in colour in several popular books on the botany and horticulture of Australian plants.

The genus has recently been found (research by Neville Marchant and myself) to consist of two species, previously considered forms of *Actinodium cunninghamii*. One is a large flowered (inflorescence to 4 cm across), erect (to 40 cm tall), sparsely branched shrub which occurs on loam or clay soils north of Albany to the Oldfield River region (between Ravensthorpe and Esperance). This is the species commonly thought to be *Actinodium cunninghamii*. A colour photograph is on page 128.

A second species, perhaps unnamed, with a smaller spreading stature and smaller inflorescences (to 2 cm across), occurs on winter wet soils between Albany and Perth. This is according to Roger Elliot and David Jones (Encyclopedia of Australian Plants in Cultivation, Vol. 2) the species commonly grown in eastern Australia.

Colour variation of flowers is commonly encountered in both species, generally within a population. I have documented plants with pure white inflorescences, pale pink, white rays with a red centre and combinations of the above in the large flowered species. Similarly the small flowered species can produce flowers in shades of white, pink or red.

During 1978, however, I discovered on the Scott River Plains (east of Augusta) a population of the small flowered form with bright red flowers. The population appears unique, as all others in the area are largely white flowered. Slides of this form have always elicited great response wherever shown, and in 1982 some members of SGAP saw the wild population during our long weekend excursion.



Actinodium cunninghamii

A. Habit; B. Floral head; C. Single floret — with ribbed Calyx tube (4 segments); C₁, Floret bract; C₂, Floret bract; D. Cross-section of ovary — showing ovule; E. Floret opened — showing larger petals, smaller calyx-lobes.

A remarkable example of convergent evolution:

Superficially resembling a daisy (ASTERACEAE), *Actinodium* is however a close relative of *Darwinia* in the MYRTACEAE. Each flower has an inferior ovary with one ovule in a solitary carpel, and the pollen is presented on the stigma in an oily suspension (vis a vis *Darwinia*). The inflorescence however has two types of flowers: outer sterile ray florets and inner fertile disc florets. The leaves have the characteristic oil glands of all MYRTACEAE.



Actinodium cunninghamii

Photography by Brian Crafter

The purpose of this short note is to record this beautiful form, and to encourage its protection. The population occurs on a road verge, and extends into a lightly grazed paddock. On last count there were 271 plants in the area. Cuttings of this form strike readily, but we have had little success in raising adult plants, and I have not yet been able to obtain germination from wild seed. Tissue culture is being attempted this year.

Because the species is common (and probably unnamed), and the form not named (it does not have any taxonomic significance) little can be done to protect such a horticultural treasure. When people talk about preservation of rare species, I always wonder what rarities are being lost within "common" species, and how much poorer our horticultural future will be because of it. ■

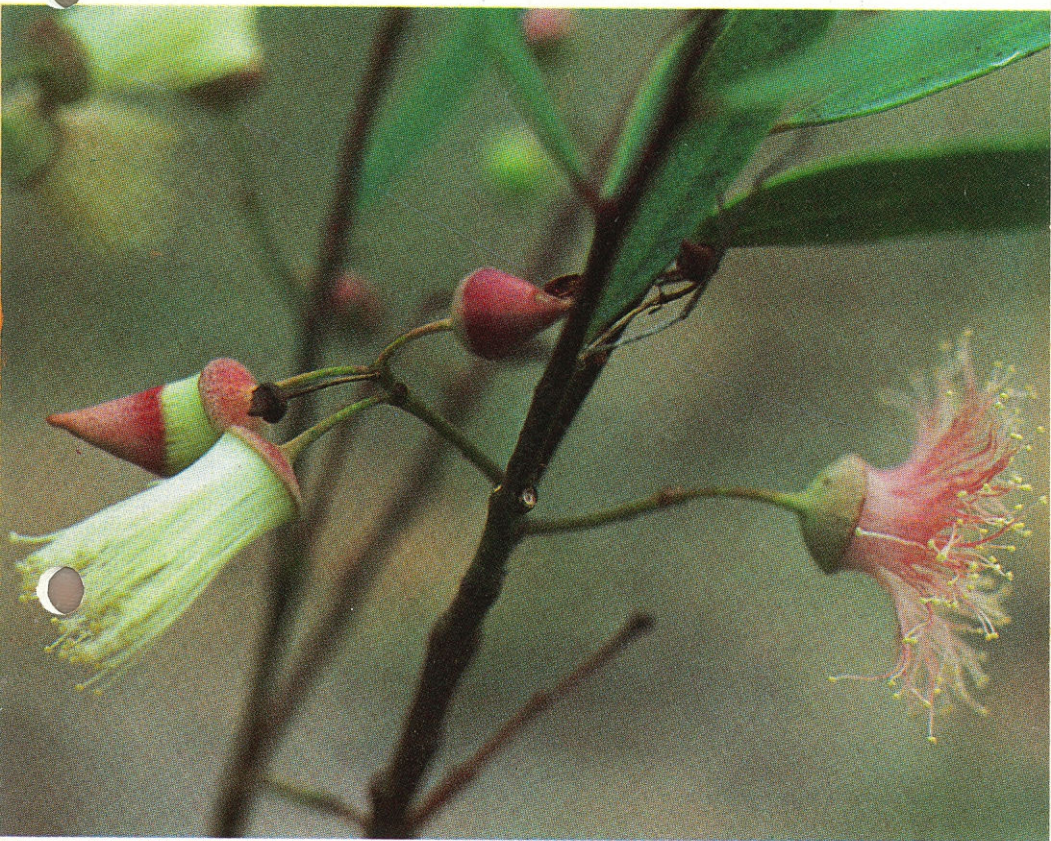
EUCALYPTS with Tubular Flowers

by Greg Keighery, Kings Park and Botanic Garden, Perth, W.A.

Most people are familiar with the standard *Eucalyptus* flower, consisting of fused sepals and petals giving the operculum which falls as the flower opens, exposing one or several rings of free stamens which serve as the attractive agent of the flower.

Western Australia contains two recently described Mallee species, whose flowers depart dramatically from the usual, in having fused anthers giving tubular flowers (see fig. 1).

Both species, *Eucalyptus beardiana* Brooker et Blaxell and *Eucalyptus synandra* Crisp are segregates of *Eucalyptus leptopoda* Benth. (a widespread species in arid and semi-arid southern Western Australia).



Eucalyptus synandra is a mallee to 6 m, with smooth grey or white bark. The basic inflorescence is 7 flowered, but again rarely produces 7 flowers. The flower buds, are deep pink, "top" shaped to 15 mm long. The anthers are fused for at least a third of their length. The anthers are pale cream on opening and senesce pink or red, as shown above.

Eucalyptus synandra has two distinct forms. In the western part of the species' range plants have pendulous glaucous branches, and always occur on lateritic or ironstone hills. (Area — Koorda to Morawa; Avon and Austin Botanical Districts). In the eastern part of the range (Great Victoria Desert) plants have erect non glaucous branchlets, and grow on sand.

Seed (of the Great Victoria Desert form) was obtained by courtesy of Jack Hallberg in 1980 and sown in 1981. Plants were placed in the Arboretum in 1982 and flowered in summer of 1982/83.

These two species are basically western (*E. beardiana*) and eastern (*E. synandra*) segregates of *E. leptopoda*. I have postulated elsewhere that synandry is a closer adaptation to birds as pollinators, by restricting access to the flower by smaller insects.

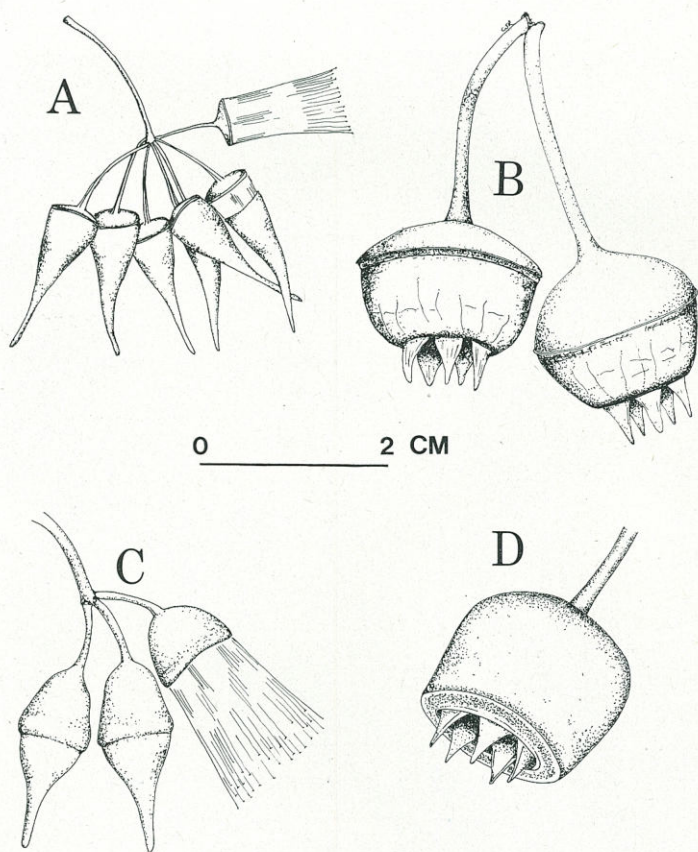


Figure 1: *Eucalyptus beardiana* and *Eucalyptus synandra*

- A: *Eucalyptus synandra*, buds and flower
- B: *Eucalyptus synandra*, fruits
- C: *Eucalyptus beardiana*, buds and flower
- D: *Eucalyptus beardiana*, fruit

See page 140 for colour plate and description of *Eucalyptus beardiana*.

Eucalyptus caesia

And Other Mallees
With "Minni Ritchie Bark",
Nuytsia Vol. 4, 1.

*Nuytsia is the name of a publication issued irregularly by the Herbarium of the Department of Agriculture, Western Australia. This issue one of volume 4 is available for \$10.00 from the Department, Jarrah Road, South Perth, if there are any available. The publication is at scientific level used to describe new species. As outlined on page 138, a summary of scientific literature describing new species or name changes, will appear in issues of Australian Plants.

Eucalyptus caesia

For many years *E. caesia* has been known to exist in two fairly discrete variants, a typical form from, for example, Mount Caroline and Boyagin Rock, Western Australia, and a larger coarser form from localities further to the north-east. This latter form has hitherto received no formal taxonomic status but it is a notable ornamental tree or mallee known as 'Silver Princess'. The authors M.I.H. Brooker and S. D. Hopper have formerly described the following sub species.

- E. caesia* subsp. *caesia* is the type species, a small mallee to 10 m tall.
- E. caesia* subsp. *magna* has larger flowers, fruits and leaves than the type species and is widely known as *Eucalyptus caesia* 'Silver Princess'.
- E. caesia* subsp. *lanceolata* differs from the type species in having lanceolate or narrow-lanceolate adult leaves with distinct petioles 5-15 mm long, and in having erect stems up to 15 m tall.

Other Mallees With 'Minni Ritchie' bark

A distinctive feature of *Eucalyptus caesia* is the red-brown over green bark which partly decorticates (peels in strips) longitudinally (usually) remaining incompletely detached with the free margins becoming curled. It superficially resembles the rich red-brown crisped bark of some species of *Acacia* for which the term 'Minni Ritchie' bark is now widely used. There are four mallee eucalypts with this form of bark as given in the following key.

Key to the species of subseries Orbifoliae

1. Disc of fruit descending; leaves of the seedling petiolate, shining green, thick.
 2. Fruit usually urceolate, less than 2 cm broad, stamens faded pink *E. caesia* subsp. *caesia*
 2. Fruit usually bell-shaped, more than 2 cm broad, stamens red-pink *E. caesia* subsp. *magna*
1. Disc of fruit broad, ascending or horizontal; leaves of the seedling petiolate or sessile, glaucous or dull green, thin
 3. Operculum shorter than or equal to hypanthium, rounded, or pileate with buds constricted, pedicels stout and often angular; leaves of the seedling petiolate, dull green *E. ewartiana*
 3. Operculum longer than hypanthium, pointed, buds not constricted, pedicels not strongly angular; leaves of the seedling petiolate or sessile, glaucous
 4. Leaves of mature plant lanceolate or narrow-lanceolate, petiolate, entire *E. crucis* subsp. *lanceolata*
 4. Leaves of mature plant orbicular or elliptical or ovate, sessile or petiolate, entire or emarginate
 5. Leaves of mature plant glaucous, sessile and orbicular or broader than long, or shortly petiole and ovate, entire; seedling leaves sessile, tree or mallee *E. crucis* subsp. *crucis*
 5. Leaves of mature plant green or glaucous, petioles to 2 cm long, elliptical or ovate to orbicular, emarginate; seedling leaves petiolate; usually a mallee
 6. Leaves ovate or orbicular, glaucous *E. orbifolia*
 6. Leaves longer than broad, green or yellow-green—*E. websteriana*

* * CORRECTION? In the caption to the colour plate on the cover of our No. 93 issue, it was stated that the beautiful *Eucalyptus* illustrated laboured under the name of *Eucalyptus caesia* sub sp. *magna* 'Silver Princess'. This is not technically correct as a recognised species cannot carry a cultivar name. However, a good form of this sub-species could be selected and by virtue of its special characters, be registered to carry the appendage 'Silver Princess'. Being realistic one can readily judge which name will survive common usage for the magnificent plant, its botanical sub-species name or the unofficial cultivar appendage.

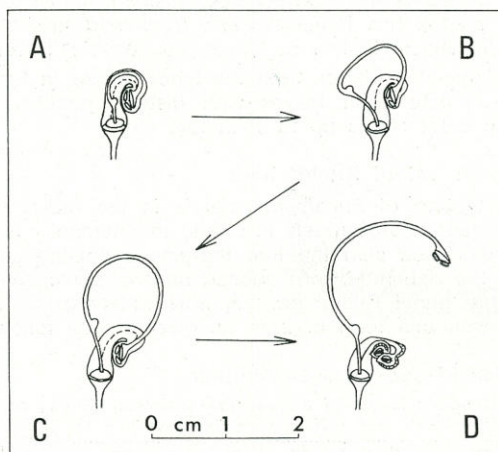
Grevillea leucopteris

Report by W. H. Payne

A study of the reproductive biology of *Grevillea leucopteris* by Dr. Byron Lamont was recently published in the German journal "Flora". It is such a spectacular plant that I thought it worth illustrating and reporting on here. The photo shows a clump of three plants flowering on the road verge at Byron's home. They have never been watered or fertilized.

I obtained seed from the *Grevillea* Study Group and germinated them using the egg-box method (Australian Plants, Vol. 11, No. 85). Others find that they germinate best when laid on the soil surface and are kept moist. I got 100% germination and the plants now line my entrance driveway.

Many insects are attracted to the masses of creamy flowers of *Grevillea leucopteris*, but few of them serve as pollinators. The most important pollinator visiting Byron's plants was a large scarab beetle which is attracted by the strong musty perfume emitted by the flowers at sunset. Some people find the odour objectionable and the plant is probably most suitable for parks and farms. The stages of maturation of the flowers are shown below:



- A — young, green bud with one pair of petals removed.
 B — style emerging from perianth.
 C — style completely elongated, pollen sacs at tip of style shedding pollen onto the tip, flower now cream.
 D — flower sprung open by pollinator with pollen held aloft on presenter at tip of style.

Grevillea leucopteris is a spectacular shrub native to the northern sand-plains of the South-West Botanical Province of Western Australia. Recent studies show this species is pollinated by nocturnal animals, especially large scarab beetles, which spring open the flowers soon after sunset. However, it can set seed in the absence of pollinators if necessary. Only 6% of mature flowers set seed, due to limited internal resources rather than inadequate pollination. Large plants may produce 5000 fully-viable seed over summer. The membranous wing aids wind dispersal and is eaten by ants which then carry the seed to their nests for storage. Resin glands over the young parts of the plant capture tiny insects, but their bodies are not absorbed as in insectivorous plants. The seed is highly nutritious and there is scope for development of this remarkable species as a food plant.

Reference: Lamont, B. 1982. The reproductive biology of *Grevillea leucopteris* (Proteaceae), including reference to its glandular hairs and colonizing potential. *Flora* 172, 1-20. (Copies are available from the author, School of Biology, W.A. Institute of Technology, 6102).



Grevillea leucoptervis

Photography by Byron Lamont

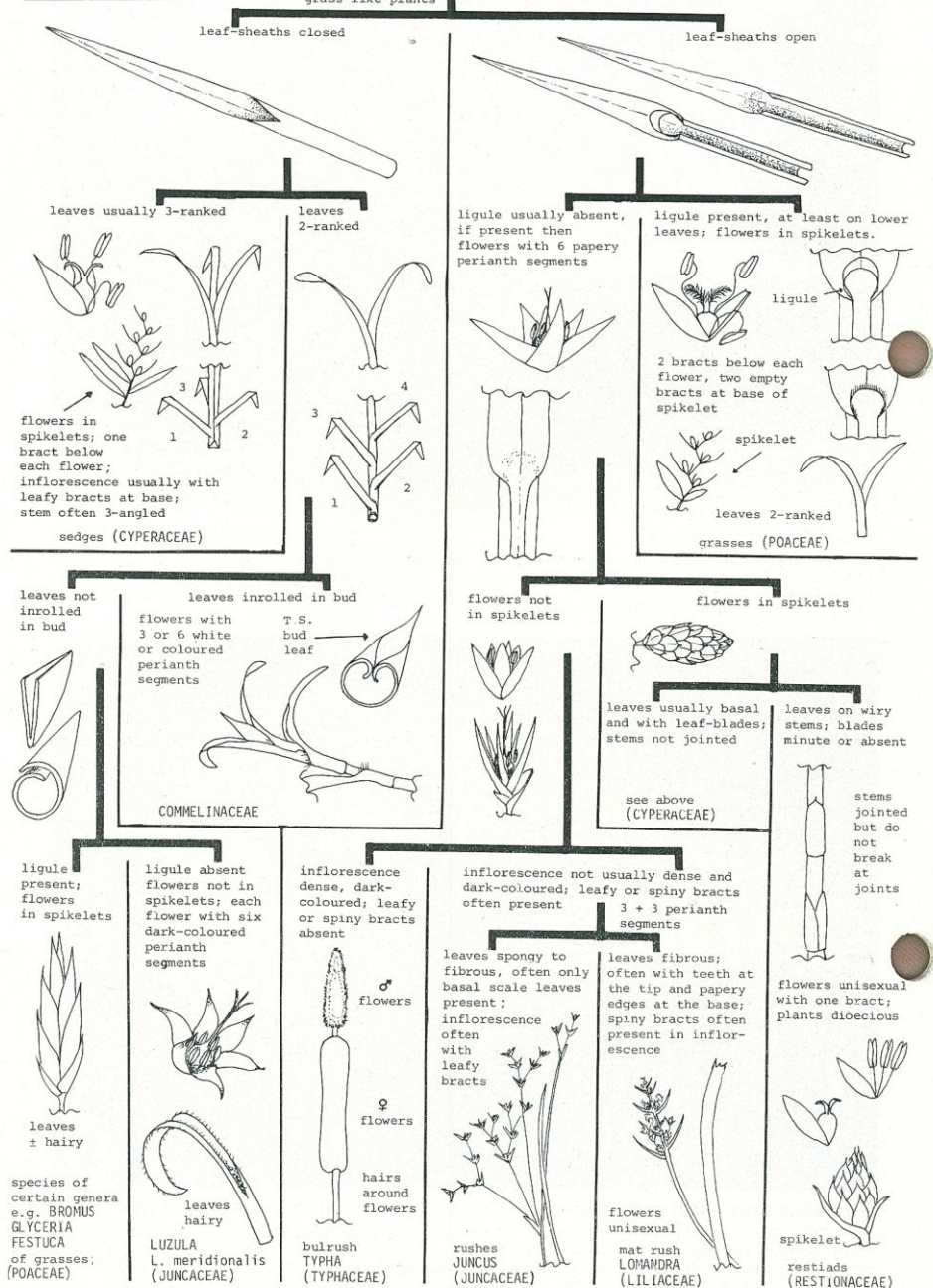
A group of three plants growing on the footpath outside the home of Dr. Byron Lamont. A research project by Dr. Lamont (see report opposite) required regular inspection of plants in the wild. He supplemented these observations with those of plants he cultivated on the footpath.



***Grevillea leucoptervis* flower**

Photography by Byron Lamont

The flower buds are green and, within one to two weeks of their appearance, the style begins to push between the two pairs of coloring tepals. As the bud begins to turn cream, the style elongates and pushes the ovary out of the flower and is displaced abaxially by the elongating style. The style continues to elongate, the enlarging loop pulling up the base of the style. The curved plant of the uppermost tepal of the now creamy-white flower forms a platform for pollinators.



NATIVE GRASSES

Grasses of N.S.W. by D. J. B. Wheeler, S. W. L. Jacobs and B. E. Norton.

Grass — you chew it, sit on it, feed stock with it, mow it, even build with it. You also eat it as a cereal such as wheat, rice, barley, rye and so on. The grass family is the most important plant family to mankind — agriculturally, economically, and ecologically and the uses of Australian grasses in landscaping is being pioneered.

In New South Wales there are at least 150 genera of grasses described in a fascinating book, "Grasses of New South Wales", recently published by the University of New England. It has been compiled not only as an aid to botanists and agriculturalists, but also to encourage interest in grasses among a much wider range of people. It explains why grasses are important, how to identify them, how to distinguish them from similar plants.

The book is extensively illustrated and contains a pictorial key, part of which is shown opposite, and two conventional generic keys.

"Grasses of New South Wales" (318 pages with glossary and index) is available at booksellers or from the UNE's Publishing Unit, Armidale 2351. Cost is \$22.00 plus postage and packing. Do not order from The Editor, Australian Plants.

Native Lawn Grasses

Dr. D. J. B. Wheeler

A few comments on the use of Native grasses for lawns may be of interest.

The so called horticultural grasses are good for lawns because they have been highly selected for good performance under cutting and with heavy traffic. If Australian grasses were similarly selected and bred they would probably perform as well as the imports. It is a pity that someone does not try out some Australian species under dryland conditions or with minimal watering. It is so wasteful to use precious water on lawns in many areas of Australia.

We have a native grass lawn at Armidale, N.S.W., which has its problems but it is fairly drought tolerant. The best species are *Elevsine tristachya** and *Chloris truncata* with *Bothriochloa macra* being a bit thin but not too bad. These grasses can be prostrate and will stand regular cutting.

In other areas such as the sub-tropics, grasses like *Digitaria didactyla* are good as are various strains of ordinary couch, *Cynodon dactylon*. Because these grasses are stoloniferous they spread into gardens. I have always been impressed by the excellent grass areas on the North Coast of N.S.W. with *Elevsine indica** as the main species.

* These grasses are introduced but have become widely naturalised.

Grass-like Plants (opposite)

Notes from "Grasses of N.S.W." by permission

The grasses are generally grouped into one plant family Poaceae (often referred to as Gramineae). To the uneducated eye many other plants appear to be a grass. The botanist has grouped them into other plant families such as Cyperaceae, Commelinaceae, Juncaceae, Typhaceae, Restionaceae, and some Liliaceae. Many of these plants are of value in landscaping and for dried arrangements but for horticulture, the one most commonly used is Liliaceae. The sketch opposite is presented as a reference source for those interested. The botanical terms used are described and illustrated in the book together with many others used to pictorially key out the species of grasses.

ARID AUSTRALIA

A chapter from a book *Australia's Wildflowers* by John Brownlie and Sue Forrester

* Available from your bookseller for \$15.95 this new book is large and colourful, designed apparently for spontaneous tourist buying. There are so many like it available that one hesitates to even mention it, but! The photography by John Brownlie is superb and the sensitive dialogue by Sue Forrester should make us pause. Read the article as directly quoted and judge for yourself.

This article was selected to be published in our No. 92 issue on "Landscaping And Plants For Dry Areas" but there was no space. The articles in the issue were about the use of our Australian plants as a buffer and protection against harsh climate. Those that are required to endure this habitat also reap the benefits of its grandeur. Rather than endure and cringe, why not prepare for a flash of colour by the brilliantly coloured annuals that only reach their full splendour in these conditions. With some work you can create your own "carpets of pink, mauve and yellow" at your doorstep.

Do not order this book from The Editor, Australian Plants, as I cannot supply.

The land form of Australia's interior captures the senses in timeless suspension. Nothing disturbs the serenity of this ancient landscape, weathered

over millions of years to bony, ribbed ranges, rolling plains and distant horizons. At night, the velvet blue-black canopy is radiant with frost-glittering stars, and the whispering sigh of the mulgas ruffled by a gentle breeze stirs the silence.

Winter and summer are the only seasons: the spring and autumn of softer climates have no place here. Winter may be bitter-cold, the mornings heavy with frost, but the day which follows such a dawn is clear and sunny and of gentle warmth. Summer is unquestionably hot.

Occasionally, there may be storms — dust-storms, perhaps, which bring a rain of falling red sand; or rainstorms, heralded by billowing black clouds and weird light, bursting upon the thirsty earth in deafening torrents.

Then magic follows. Carpets of pink, white, mauve and yellow flood over the soil, a sea of waving, quivering colour which, on close inspection, reveals uncountable flowers. Ephemerals, they are called. Many belong to the daisy, or Asteraceae family. Their tiny seeds have lain buried in the soil, perhaps for years, patiently awaiting their chance to sprout in damp warmth, to flower briefly, to set and shed their seed, and to wait again for those conditions which trigger the cycle.

Little red will be seen but for the bold scarlet of *Clianthus formosus*, the Sturt Desert Pea. Its soft grey pinnate leaves and furry stems creep over the gravel and sand, supporting clusters of glistening flowers, some showing a jet-black central boss, others a deep cherry-red.

Nowhere in the entire arid zone is there a desert of the truly barren type. There is, in fact, a great deal of vegetation to be seen, even in the Simpson Desert, which receives the least rainfall of all.

Roughly, the vegetation can be categorised into four broad groups: woodlands, savanna grasslands, spinifex country, and succulent (or saltbush) steppes.

The woodlands range from the stands of great spreading River Red Gums (*Eucalyptus camaldulensis*) which line the watercourses, to mulga country and mallee. Growing with their roots deeply buried in the sandy edges of the rivers, which are often dry, the Red Gums live to a great age. The Coolibah, *Eucalyptus microtheca*, spreads out over the floodplains, similar to, but not as large as the Red Gum.

A particular characteristic of inland trees is their light-coloured trunks. Many, in fact, are a startling pure white, with a white powder which will rub off on the hand, and which is associated with the tree's ability to withstand the heat and glaring light. The Ghost Gum of the Centre, *Eucalyptus papuana*, and the smaller *Eucalyptus brevifolia*, stand in dazzling contrast against the vivid orange-red rock and sand.

Mulga, *Acacia aneura*, mostly grows in pure stands covering vast areas of flat or gently undulating country. Often the sand supports a mass of small ephemerals and low shrubs. Numerous species of acacias will be found in the dry inland of Australia, superbly adapted to the desiccating conditions. Casuarinas, too, are part of the typical woodland landscape, their fine needle foliage exposing the least possible surface area to the atmosphere, and their trunks clothed in thick bark.

The mallee areas are widespread, and contain many species of specially adapted eucalypts, characterised by a large woody base of ligno-tuber, from which sprout numerous branches. The flowers of these species are often spectacular, either in massed groups, or individually large. The gumnuts which follow the flowers are equally appealing in their shape and texture. Growing in association with the eucalypts is a wide range of smaller shrubs, particularly *Melaleuca* and *Acacia* species, and many brightly-flowered herbs and ground-covering plants.

Grasslands, both savanna and spinifex, cover enormous tracts of country. Savanna plains mainly support perennial grasses such as Mitchell grass

(*Astrelba* species), and spinifex is a term applied to several species of grass, including *Triodia* and *Plectrachne*. Typically, they form dense, extremely prickly mounds of considerable size, and tend to die out in the centre, thus forming rings of growth. While the savanna plains tend to be treeless, spinifex grasslands are generally found in association with either mallee, mulga or scattered shrubs.

The succulent steppes might, to the casual eye, appear to be all salt-bush. In fact, three particular groups of species would be apparent on closer investigation: saltbush, bluebush and samphire, each associated with different soil types, and all belonging to the family *Chenopodiaceae*. ■

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New Plant Names And Name Changes

Editor

The correct classification and naming of plants is an important sphere of botanical research. When new species are named or existing species have their names changed it is often confusing, even frustrating for many people. At least, if people can be advised of these changes, it helps. The botanists have a venue for doing this, by publication in one of a large range of scientific journals, but the general public is left in ignorance. The official publications are voluminous in scientific jargon, supporting data and detail and are, for the non-botanist, difficult to translate to common language. It is a pity it is not mandatory to present an abbreviated general description as well as one in Latin.

Australian Plants is now the generally accepted bridge between the general public and the botanical scientist and it is the policy of the society to summarise recently published botanical research. One problem is to be sure to not fill the publication with scientific matters to the exclusion of our main topics of interest, and to present the research in an interesting "readable" form. For this reason some delay is often necessary but readers are assured of the publication of new names and name changes along the following lines:

1. *Australian Plant Genera* by J. S. Baines (available from the Editor for \$9.90 plus \$1.40 postage), was published by the Society in 1982 and is a record of plant names as at that time. Naturally there are some discrepancies but the book is an amazing reference being accepted now at the botanical professional level, as a very valuable reference. If you are interested in the correct naming of plants, you must have a copy.
2. *Flora of Australia* is the official publication by the government/scientific world, of the correct description and name of plants dealt with at that time. These books are not presented in the "heavy" botanical jargon used in initial plant description publication but are accurate and readily followed. At present Vol. 1 (\$15.00), Vol. 8 (\$35.00) and Vol. 29 (\$25.00) are available from the Editor. Changes and corrections to these will be published in *Australian Plants* to maintain these references up-to-date.
3. As the work can be prepared, the general subject matter in the *Flora of Australia* series, will be presented in our "language" together with colour illustrations so that in the long term the entire flora, of interest, will be presented. The first in this series is in preparation. This will take many years.
4. Meanwhile, as publication of new species and name changes is made, and building on the information already in *Australian Plant Genera*, interesting articles will be presented. For instance the publication of prostrate *Banksia* in *Australian Plants* Vol. 11, No. 92 is the first of a series based on a review of the genus by Alex George in *Nuytsia*, Vol. 3:3, 1981.
5. *Australian Plants* because of its regular publication and capacity for good colour printing will increasingly become an invaluable, unsurpassed reference to the Australian flora. This applies particularly to its index. Do you have Part 1 covering Volumes 1 to 8 of *Australian Plants*?

BOOKS ON WILDFLOWERS

This is a mail order service of books, the price including a discount of 10% plus postage. You may be able to buy the following books a little cheaper and some groups in the society are offering certain books at a bigger discount so if you want to shop around after reading my reviews, then do so. However the service we offer will be convenient and any small profit made is reinvested in the production of *Australian Plants*. You may pay a little more through this service but the donation will be well used.

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Eucalyptus beardiana

Photography by Greg Keighery

A *Eucalyptus* with tubular flowers? The flower of this *Eucalyptus* shows its densely packed yellow anthers. With most *Eucalyptus* species the anthers spread out to form a ring, even a pom-pom with the style of the flower clearly in the centre. Two recently described Mallee species have their anthers fused (joined) at the base for their lower third as described on page 129.

Eucalyptus beardiana is a mallee to four metres with a smooth grey bark and light green foliage, ideal for garden use.

Eucalyptus beardiana is a mallee, to 4 m, with smooth grey bark. The basic inflorescence is 11 flowered (but usually less than this number survive to flowering). The species has light green foliage. The flower buds are green in colour, to 25 mm long, the operculum with a conical "beak". The anthers are fused for at least their lower third (Crisp (1982) states that some populations have free stamens, and this needs verification on flowering material). See sketch on page 130.

The anthers are a pale cream on opening, blushing pale pink by anthesis, and the flowers are pendulous.

Seed was obtained from near the type locality in 1976, sown in 1977 and the material planted in the Botanical Gardens flowered in 1979. Since this time the species has flowered regularly each spring and is now 3 metres tall. Since the species grows naturally on deep red or yellow sand, it thrives at Kings Park.