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An Australian Wildflower Weekend

You are invited to a pleasant weekend in Canberra on 20th and 21st, October, 1984. Features to be promoted are:

1. A seminar to be conducted by the Australian Flora Foundation. This will be in the form of previously circulated papers for general discussion on research projects associated with the preservation or horticultural application of the Australian Flora. While many papers will be on a scientific level, as after all the foundation is a scientific research organisation, the most technical will be grouped separately and the discussion between those attending will be kept to a level for all to enjoy.
2. Guided tours of the National Botanic Garden with discussions on cultivation and propagation presented for the enjoyment of the whole family.
3. Guided tours of the city attractions for those who only want a little of items 1 and 2 above.
4. Buses will depart and return from Adelaide, Melbourne and Sydney, picking up en route and a charge, as cheap as possible will include transport, accommodation, and city tours. Other cities may also organise similar tours some being based on an airline package over 5-7 days. Inclusive cost on application.
5. Send enquiries or firm bookings to the society secretary for your state as listed inside the rear cover of this issue.
6. The promotion aims at a pleasant weekend regardless of weather. Come and meet people and join in the fun, or quietly enjoy the entertainment on your own or with the family. This is an exceptional opportunity to learn from the scientists, enjoy guided tours of the National Botanic Garden or just see the city sites of Canberra.

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COVER PLATE

Pimelea lehmanniana

Photography by Lois Sourry

A slender shrub to one metre high, the white to cream flowers are displayed to advantage. The flowers are in heads similar to many of the eastern Australian species described and illustrated in our last issue.

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Pimelea

Species of Western Australia
by Greg Keighery and Robert Dixon, Kings
Park and Botanic Garden, West Perth, 6005,
Western Australia.

Western Australia has approximately 41 species of *Pimelea*, 4 species confined to the tropics, 5 confined to the desert, 27 in temperate Western Australia and 5 which occur in both the desert and temperate regions.

In habit, members of the genus display considerable diversity ranging from annual herbs to small trees, though most are small soft wooded shrubs.

In south western Australia the genus is somewhat unusual in having long tubular flowers, which are largely adapted to pollination by butterflies, moths and bees. Hence they are pastel shades (white, cream or pink) and often scented. Growing *Pimelea* species could help in attracting such insects to your garden. One species, the remarkable *Pimelea physodes*, has radically departed from this scheme, and its large colourful bracts serve to attract birds* hence its remarkable resemblance to a *Darwinia*.

Seven species of the genus are dioecious, and in all cases male inflorescences are much larger and more attractive than female inflorescences. In several species we have checked (*P. argentea*, *P. clavata* and *P. microcephala*), the male : female sex ratio was approximately even, hence if you are growing any dioecious *Pimelea* from seed, about half of your plants will be females! Cuttings are perhaps preferable for this group.

Pimelea microcephala produces succulent sweet-tasting orange fruits, which are fed on by birds, so this fact may influence using some female plants in this species.

Horticultural Potential

Pimelea species have enormous horticultural potential but unfortunately in W.A. few are grown due mainly to the difficulty in propagating them.

The small tropical annuals are a very distinctive (they form a separate section *Thecanthes* of the genus) group, and contain two species with blood red flowers, a most unusual colour. However, we know nothing about their response to cultivation.

The non-tropical species are especially suited for horticulture.

For foliage: *P. ammodendron* (tropics), *P. argentea* (temperate).

Attractive form and flowers: *P. ferruginea*, *P. imbricata*, *P. rosea*, *P. sp. aff. rosea*, *P. sp. aff. sylvestris*.

For attractive flowers: *P. floribunda*, *P. gilgiana* (especially limestone soils) *P. holroydi* (tropics), *P. sp. aff. lehmanniana*, *P. physodes*, *P. spectabilis*, *P. sylvestris*, *P. suaveolens*.

The only commonly available species in nurseries is *Pimelea ferruginea*, both the light and dark pink forms. *Pimelea rosea* is occasionally available, usually the pink form, and to a lesser extent *P. spectabilis*, *P. suaveolens* and the southern forms of *P. imbricata*. Of these only *Pimelea ferruginea* and *P. rosea* are regarded as reliable garden plants, that is they grow quite well in cultivation and last for several years.

We have had difficulty in establishing any species other than *Pimelea ferruginea* in the Kings Park botanic garden.

* Keighery, G. J. (1975) "Parallel Evolution of Floral Structures in *Darwinia* (Myrtaceae) and *Pimelea* (Thymelaeaceae)" West. Aust. Naturalist 13: 46-50.



Pimelea suaveolens △

▽ *Pimelea imbricata*





Pimelea floribunda (above)

Photography by F. W. Humphreys

An erect slender shrub to 0.8 m the nodding head of flowers to 6 cm wide and lightly scented. This dainty little shrub is generally unobtrusive when not in flower providing a pleasing spectacle in flower from July to October.

Pimelea suaveolens (top left)

Photography by F. W. Humphreys

A pleasing shrub rarely to one metre, covering itself with yellow nodding flower heads from July to October.

Pimelea imbricata (bottom left)

Photography by F. W. Humphreys

A densely flowering shrub to one metre that provides an excellent contrast with other shrubs, its white flowers showing all to advantage.

PROPAGATION BY SEED

Seed Treatment

Unfortunately we are not sure if the fruit, seedcoat or seed contains any inhibitors or if the inhibitors are leached after weathering or if ageing seed builds up inhibitors.

Various seed treatments have been tried to increase germination rates. However none of these treatments to my knowledge has proved to be consistently successful. The most common treatment is to remove the fruit by washing it off in running water, e.g. place the fruit in a cotton bag in the toilet cistern for 3 weeks and flushing should remove any inhibitors. The fruit can also be placed in a small quantity of water for a few days, it will then become soft, ferment, and then be carefully washed off the seed, using a low pressure hose.

The seed of most species has a hook at one end. We have tried scarifying the seed by removing the hook with little success. Scarifying any other part of the seed is difficult as the seed coat is brittle and the seed itself very soft.

Sowing The Seed

The seed is best sown in the autumn in open trays or pots in a well drained sandy mix. In our nursery we use a mixture of fine and coarse sand and composted plant material. This material is rotted down for 2 years and turned at least twice, then put through a shredder. After the seed has been sown on a level and fairly firm surface, we place a thin layer, about the same depth as the seed, of blue metal dust 2-3 mm grit on top of the seed. This coarse material allows water and air to penetrate through and stops the seed being washed to the surface.

The seed trays are then placed in an open frame which may be covered with clear fibreglass at night time or during heavy rain.

Another good seed mix to use is 7 parts local grey bush sand with 1 part Cladium peat, a local sedge like peat, the parts by bulk.

Germination Rates Of *Pimelea* Seed

Some years you get what we call good germination, however when you check the number of seed you have sown the germination rate is very low. Other years the germination rate may be zero or less than 1%.

Within a reasonable age, say about 4 years, the germination rates generally do not seem to vary much, that is the seed does not seem to lose viability. Seed of *Pimelea floribunda* which was baked out in the sun for 2 summers and also leached by rain during 1 winter gave a much better germination rate the second autumn after sowing. The guess estimate germination rate was 5%.

Pricking Out Of *Pimelea* Seedlings

Seedlings are best pricked out into tubes or small pots when they are only a few days old, as they are very susceptible to damping off disease and root rot. Even when they are up to 2 cm high seedlings can be lost through root rot and it will spread rapidly through a seed tray or pot.

The pricking out mix should be light and free draining similar to or the same as the seed mix. No fertilisers are required at this stage.

Potting On *Pimelea* Seedlings

When the seedlings are about 3 to 4 cm high they can be potted into a light free draining mix, similar to the seed mix. Most of our W.A. *Pimelea* are rapid growers and require little fertiliser, the best types to use are those which release the fertiliser slowly, e.g. Osmocote. However plants can easily

outgrow themselves, become top heavy, very lush and liable to severe damage, e.g. splitting during wet and windy conditions. Probably the most tolerant to fertilisers appear to be *P. ferruginea*, *P. rosea* and *P. imbricata*.

Planting Out *Pimelea*

We prefer to plant out directly from the tubes or small pots as most species grow rapidly and seem to establish themselves easier. Larger plants in W.A. are best planted out in the autumn during the first heavy winter rains.

Most species prefer a well drained sandy soil in full sun or broken sunlight but not an exposed area. They appear to grow rapidly enough without any fertiliser.

Cultivation Of *Pimelea* Species

All plants should be watered once a week for at least the first spring, summer and autumn to establish them. Hand watering or trickle irrigation is best.

It is best to hand weed around plants as you may damage their root system if you use a hoe. You will also find several species will reproduce themselves from seed as long as you do not hoe the garden. Mulch the garden if possible. This will save water, suppress weed growth and add nutrients to the soil when using an organic mulch, e.g. leaves.

Many species respond well to regular light pruning straight after flowering, e.g. *P. ferruginea*, *P. rosea*, *P. imbricata* and *P. floribunda*.

Pests And Diseases

As yet we have not encountered any serious pests in cultivation, although we have seen mealy bug on some species and there is also a small grub which attacks the seed in W.A. but it does not badly affect the flowers.

Snails are a problem with small seedlings, but I have not seen them eating the foliage of large plants.

Root rot is common in badly drained soils, as well as in potted plants with poor drainage.

VEGETATIVE PROPAGATION

The main reasons for producing *Pimeleas* from cuttings are to reproduce a plant which is almost identical to its parent, i.e. you can produce a plant with a certain character (e.g. flower colour) and raise the generally more attractive male plants of the dioecious species. Several species are also easier to raise from cuttings.

Although cutting-grown plants generally flower quicker, some *Pimelea* will flower in 12 to 15 months after germination of the seed.

Preparation Of Cuttings And Cutting Mix

Several species can be raised from semi-hardwood cuttings. In W.A. they are best taken from the autumn through to late winter, before the new growth starts. The cuttings are usually 3-4 cm long and should be treated with a hormone for semi-hardwood cuttings. Unfortunately the cuttings take a long time to prepare as the bark will strip off as you pull off the leaves. Therefore you have to cut off the lower leaves with a sharp knife or razor blade.

The cutting mix which should be clean and fairly sterile is usually made up of sphagnum moss, peat (German or Irish peat) and Perlite or sphagnum moss, peat and washed river sand. Note the washed river sand should be sterilised, e.g. with boiling water or put in the oven. I do not recommend the use of chemical sterilisers as some of our native plants are very sensitive to the chemicals even well after the recommended withholding period and a good airing.





Pimelea sulphurea (above)

Photography by F. W. Humphreys

A yellow flowered erect spindly shrub to one half metre, it takes little garden space.

Pimelea ferruginea (opposite)

Top Photography by David Pitches
Bottom Photography by Q. B. Hockings

The easiest of all the *Pimelea* species to grow and possibly the most floriferous. The photograph (top left) shows a typical compact bush to about 0.8 m high and wide. The lower plate shows the flowers which are usually a deeper pink in colour and the unusual glossy foliage. In some areas of south western Australia, it grows quite close to the sea. It appears to thrive in most garden situations. There is a tendency for the plant to fall over. It seems to appreciate additional support and some will form a rounded shrub if left lying.

Propagating Frames Etc.

The cuttings will strike as easily in the home made frame, propagator or polythene bag as they will under a mist unit, however they will take a little longer to form roots.

When using a polythene bag, etc., keep the cuttings in a very light area, but not in direct sunlight as this may heat up the cuttings and kill them. When using material such as opaque fibreglass, coreflute, etc., these can be used in direct sunlight during the winter but may need shading in the spring.

The cuttings should be kept moist but not wet. How often you give them a light spray depends on their position and time of the year. They may require it once a day or only once a week. Check the cuttings regularly for damping off and other fungus diseases, remove any dead cuttings or leaves. An occasional spray with fungicide may be necessary.

Hardening Off And Potting Up

When the cuttings have struck, gradually harden them off, i.e. give them more air, do this over a period of several days. Now pot them up leaving them in a light but not sunny position for a few days to recover. Then gradually introduce them to a sunny position. Use the same potting mix as for seedlings.

Alternatively pot up the cuttings as soon as they strike, then place them back in fairly humid conditions and gradually harden them off. Pot on or grow on as for seedlings.

SPECIFIC PROPAGATION AND CULTURAL NOTES

Descriptions of the species are given from page 298.

The germination times represent the shortest period from sowing to germination and are mainly based on information from Kings Park Research Notes No. 7.

Pimelea ammodarid — Very poor germination, 24 days to germinate, seedlings are susceptible to damping off disease. Photo on page 296.

Pimelea argentea — Poor germination, 21 days to germinate, seedlings are susceptible to damping off disease. A few stock plants are held in our nursery.

Pimelea brachyphylla — Good germination, 28 days to germinate. A few stock plants are held in our nursery. Colour plate on page 296.

Pimelea brevifolia — Very poor germination, 21 days to germinate, susceptible to damping off disease.

Pimelea ferruginea — Good germination, 14 days to germinate. This species is best raised from cuttings with a light brown colour at the base of the cutting, strike rates should be 90% or more. The dark pink forms, e.g. 'Magenta Mist' are very popular. Colour plate on page 292.

Plants are easy to grow in containers and in the open ground. The life span of hard grown plants can be over 10 years, but under normal garden conditions is generally about 6 years. Plants respond well to light pruning if necessary, straight after flowering. Too much water and/or fertiliser causes lush growth and plants often split down the middle. Seedlings often germinate around the parent plant.

This species tolerates alkaline soil and is a good coastal plant as it tolerates exposed positions and salt spray. When grown in a protected position plants can be up to 1 m high. Seedling growth is rapid and a few flowers are produced the first year after sowing the seed.

Pimelea floribunda — Good germination, 20 days to germinate, susceptible to damping off disease and root rot.

Seedlings are best planted out directly from the tubes or small pots. After 13 months' growth in my garden, plants were bushy 26 cm high and produced from 12 to 19 flowers per plant. I would suggest as the plants grow so rapidly, in cultivation their life span would be short probably only about 5 years. Although plants prefer a poor sandy soil they will grow well in free draining sandy loam. This species tolerates a light pruning after flowering if required. Colour plate on page 289.

Pimeleas are not regarded as a good cut flower, however I find this species, when cut from my garden and placed straight in water will last nearly 2 weeks in a vase. These flowers are also pleasantly scented, especially in the morning.

Pimelea hispida

Very poor germination, 60 days to germinate, this is the only record we have for this species. Seedlings are susceptible to damping off disease.

Pimelea holroydii

Poor germination, 14 days to germinate, susceptible to damping off disease. Mature stock plants are held in our nursery.

Pimelea imbricata

Poor germination, 20 days to germinate, susceptible to damping off disease. The southern forms of this plant are very easy to strike from cuttings, a strike rate of 90% or over can be expected. This plant grows on well in pots, however when grown in light shade the small forms from exposed granite rock areas have trebled in height. In dry sandy soils these forms may require regular summer watering. Potted plants respond well to hard pruning. Colour plate on page 288.

Pimelea lehmanniana

Poor germination, 34 days to germinate. Seedlings are susceptible to damping off disease. Cover page colour plate.

Pimelea leucantha

Poor germination, 34 days to germinate. Seedlings are susceptible to damping off disease.

Pimelea microcephala

Fair germination, 10 days to germinate susceptible to damping off disease. A few mature male and female stock plants are held in our nursery.

Pimelea physodes

Poor germination, 49 days to germinate, susceptible to damping off disease. Strikes from semi-hardwood cuttings, but the percentage strike rate is usually low. We find in Perth plants are difficult to grow on in the open ground and not too easy in containers. Plants require early morning and late afternoon sun. Too much shade results in the large bracts not colouring up to their normal reddish tinge. Plants have been grown successfully for a few years on heavier free draining soils in the Darling Range near Perth and also in the south of the state, e.g. Albany and Northcliffe.

Pimelea preissii

Poor germination, 64 days to germinate, only 1 record for this species. Seedlings are susceptible to damping off disease.

Pimelea rosea

Fair germination, 37 days to germinate. A few stock plants are held in our nursery. Fairly easy to grow on in pots. In the open ground plants require full sun to broken sunlight amongst other shrubs. Tolerates alkaline to slightly acid soils and prefers a sandy, well drained soil. Best grown from semi-hardwood cuttings, the strike rate varies but is usually fairly low.



Pimelea ammocharis △

▽ *Pimelea brachyphylla*





Pimelea rosea (above)

Photography by F. W. Humphreys

A much prized small shrub often with bright red flowers. There are forms also with a pure white flower head. It can be difficult to grow but it is rewarding if persevered with.

Pimelea ammocharis (top left)

Photography by F. W. Humphreys

An erect dioecious shrub to 1.5m from the desert it is often a multistemmed dense shrub to 0.5 m. Trials could show that this plant is suitable for those difficult dry hard positions that reject other plants.

Pimelea brachyphylla (bottom left)

Photography by F. W. Humphreys

This small dense shrub to 0.3m covers itself with white flowers. Coming from the dry interior it could prove hardy.

Pimelea spectabilis

Poor germination, 15 days to germinate, susceptible to damping off disease. Difficult to grow on, requires broken sunlight in a protected area preferably in sandy soils or heavier free draining soils. Will strike from semi-hardwood cuttings, but the strike rate is usually low.

Pimelea suaveolens

Poor germination, 52 days to germinate, susceptible to damping off disease. Difficult to grow on, requires broken sunlight in a protected area, preferably in a sandy or slightly heavier free draining soil. Will strike from semi-hardwood cuttings, but the strike rate is usually low. Photo, page 288.

Pimelea sulphurea

Poor germination, 48 days to germinate, only 1 record for this species. Seedlings, are susceptible to damping off disease and are difficult to grow on. Colour photograph on page 293.

Pimelea sylvestris

Poor germination, 27 days to germinate. Seedlings are susceptible to damping off disease and are difficult to grow on.

NOTES ON INDIVIDUAL SPECIES OF WESTERN *PIMELEA*

Pimelea aeruginosa F. Muell.

An erect loosely branched shrub, to 1 m, with nodding inflorescences, surrounded by large green bracts to 5 cm x 3 cm wide, flowers yellow, sweetly scented, flowering July to October. Occurring on sandy soils.

South West: Darling (Dale), Avon, Roe and Interzone.

Pimelea ammodendris F. Muell.

An erect dioecious shrub, with silver-grey leaves, to 1.5 m (desert plants are often dense multistemmed shrubs to 50 cm), inflorescences erect, to 3 cm wide, flowers yellow, flowering May to October, occurs on red or calcareous sand. Colour photograph on page 296.

Eremaean: Carnarvon, Canning, Fortescue, Giles and Northern: Dampier.

Pimelea angustifolia R.Br.

A widespread and highly variable species, with many distinct forms. All are erect sparsely branched shrubs, to 75 cm, inflorescences erect, 1-1.5 cm wide.

A northern form has cream or yellow flowers, flowering August to November, rarely to January, on white, grey or lateritic sand.

A widespread form of the South West (Irwin and Dale/Drummond) has white flowers, flowering September to December, on yellow or red sand, loam or granite.

South West: Darling (Drummond, Menzies, Warren), Avon, Roe, Eyre, Interzone and Eremaean: Austin.

Pimelea argentea R.Br.

An erect slender dioecious shrub, to 1.5 m with silvery-grey leaves, flowers in leafy spikes, 3-4 cm long, flowers cream, flowering July to November, on sand, loam, granite or lateritic loam. A form with smaller, more sparse leaves and a smaller inflorescence is found in the Irwin District.

South West: Irwin, Avon, Darling (Drummond, Dale, Menzies, Warren), Roe and Eyre.

Pimelea brachyphylla Benth.

A small densely branched shrub, to 30 cm, inflorescences erect, to 1 cm wide, flowers white, occurs on sandy clay. Colour photograph, page 296.

South West: Roe, Eyre.

***Pimelea brevifolia* R.Br.**

Erect sparsely branched shrub, to 60 cm, inflorescences erect, to 1 cm wide, flowers white, flowers August to October, occurs on grey, gravelly or granitic sand.

South West: Darling (Warren), Roe, Eyre, Interzone.

***Pimelea* sp. (previously considered a form of *P. rosea*)**

Erect densely branched shrub, to 1 m, inflorescences erect, to 2-3 cm wide, flowers white (rarely pink), flowering September to October, occurs on grey, granitic or gravelly sand.

South West: Darling (Dale), Avon, Roe.

***Pimelea* sp. (previously considered a form of *P. sylvestris*)**

Erect densely branched shrub, to 1 m, inflorescences erect, to 3 cm wide, flowers pink (rarely purple), flowering September to November, occurs on calcareous sand.

South West: Darling (Drummond).

***Pimelea clavata* Labill.**

A large dioecious shrub or small tree to 6 m, inflorescences erect, small, to 6 mm diameter, flowers cream, flowering September to March, but also sporadically throughout the year, occurring on sand or sandy swamps.

South West: Darling (Menzies, Warren), Eyre.

***Pimelea concreta* F. Muell.**

An erect annual herb, to 50 cm, inflorescence erect, flowers white, flowering March to May, occurs on loam.

Northern: Gardner.

***Pimelea cornucopiae* Vahl.**

A slender erect annual herb, to 50 cm, inflorescence erect, flowers white, flowering March to June, occurs on loam soils.

Northern: Gardner.

***Pimelea eyrei* F. Muell. is in fact *P. angustifolia* R.Br.**

***Pimelea ferruginea* Labill.**

Erect (often compact) much branched shrub, to 1 m x 1 m broad, inflorescences erect, to 3 cm wide, flowers pink, flowering August to November extending to January, occurs on coastal dunes, granitic or calcareous sand or limestone. Colour photograph on page 292.

South West: Irwin, Darling (Drummond, Menzies, Warren), Eyre.

***Pimelea flava* R.Br.**

An erect dioecious shrub, to 2 m, with yellow flowers. Recorded for Western Australia in Bentham (*Flora Australiensis*, VII, page 29) from Cape Arid, but I have not seen any material.

***Pimelea floribunda* Meisn.**

An erect slender shrub to 80 cm, inflorescences nodding to 6 cm wide, flowers cream or white, lightly scented, flowering July to October, occurs on grey, calcareous or gravelly sand. Colour photograph on page 289.

South West: Irwin, Darling (Drummond).

***Pimelea forrestiana* F. Muell.**

A lax ascending shrub, to 1 m, inflorescences erect, loose, to 1 cm wide, flowers yellow, flowering from May to September, occurs on granitic soils.

South West: Avon; Eremaean: Austin.

***Pimelea gilgiana* E. Pritzel.**

Erect slender shrub, to 1 m, inflorescence nodding or erect, 2-2.5 cm wide, flowers white with a pink tinge, flowering May to September (rarely into October), occurs on limestone soils, one record on red loam.

South West: Irwin; Eremaean: Carnarvon.



Pimelea hispida

Photography by F. W. Humphreys

***Pimelea gracilliflora* (Endl.) Hook.** is in fact *P. sylvestris*

***Pimelea hispida* R.Br.**

An erect slender shrub, to 1.5 m, inflorescences erect, to 2.5 cm wide, flowers pale pink to cream, flowers from September to December, occurs on sand dunes or in sandy swamps.

South West: Darling (Menzies, Warren) and Eyre.

***Pimelea holroydi* F. Muell.**

An erect soft shrub to 1 m, inflorescences erect, to 3 cm wide, flowers white, flowers August to January (probably all year), occurs on clay or loam. Eremaean: Fortescue.

***Pimelea imbricata* R.Br.**

An extremely variable species, consisting of many different variants, some probably distinct enough to be separate species. Colour photograph, page 288.

***Pimelea imbricata* var *imbricata* (includes var *baxteri* Meisn.)**

An erect densely branched shrub to 1.2 m (plants on granite, very low and dense), with dull green leaves, inflorescence erect, to 2.5 cm wide, flowers pink, flowering October to January (rarely to March), occurs on granite or in swamps.

South West: Darling (Drummond, Dale). — Colour plate No. 95 issue, 105.

***Pimelea imbricata* var *gracillima* Meisn.**

A straggly erect slender shrub, to 1 m, with green leaves, inflorescences erect, to 2 cm wide, flowers white, flowering September to November, occurs on winter wet clay soil.

South West: Darling (Dale, Drummond).

***Pimelea imbricata* var *piligera* Benth (= ? *P. nana* Grah.)**

A densely branched shrub, to 60 cm, with densely hairy grey leaves, inflorescence erect, 1-2 cm wide, flowers white, flowering August to November, occurs on white, grey, granitic, red or lateritic sand, limestone or lateritic clay.

South West: Irwin, Avon, Darling (Dale, Drummond), Roe, Eyre.

Eremaean: Austin (this is a very distinct form with very small imbricate leaves from the sandstone area, occurring on red sand).

***Pimelea lanata* R.Br.**

An erect slender shrub, to 2.3 m, inflorescences erect, 1-2 cm diameter, flowers pink to almost white, flowering December to April (rarely to August), occurs on sandy swamps.

South West: Darling (Drummond, Menzies, Warren).

***Pimelea lehmanniana* Meisn.**

An erect loose slender shrub, to 1 m, inflorescence erect, to 2 cm diameter, flowers cream or white, flowering August to November, occurs on gravelly, quartzite or grey sand. This is the cover plate of this issue.

South West: Darling (Drummond, Dale, Menzies), Eyre.

***Pimelea leucantha* Diels.**

An erect open shrub to 1.4 m, inflorescences ? nodding or erect, 3-4 cm diameter, flowers cream or pale yellow, flowering June to August (extending to October), occurs on sandy soils.

South West: Irwin, Darling (Drummond).

***Pimelea* aff *lehmanniana* (often referred to as *P. macrocephala* Hook)**

An erect robust few branched shrub, to 1.75 m, inflorescences clustered, dropping with large bracts to 5 cm diameter, flowers white or cream, flowering July to October, occurs on grey, white or granite sand, rarely clay.

South West: Eyre, Roe, Interzone.

***Pimelea modesta* Meisn.**

An erect sparsely branched shrub, to 60 cm, inflorescence erect, to 1 cm diameter, flowers white, flowering August to October, occurs on sand, loam. South West: Avon, Roe, Interzone.

***Pimelea longiflora* R.Br.**

An erect slender shrub, to 1m, inflorescences erect to 2.5cm wide, flowers white or cream, flowering August to February, occurs on sandy swamps.

South West: Darling (Drummond, Menzies, Warren) and Eyre.

***Pimelea microcephala* R.Br.**

An erect woody spreading dioecious shrub, to 2 m x 2 m wide, inflorescences erect to 8 mm wide, flowers yellow, flowering May to October (sporadically all year), occurs on red loam, granite, alluvium, calcareous loam, sand. The sweet orange fruits are attractive to birds.

South West: Irwin, Avon, Roe; Interzone; Eremaean: Carnarvon, Austin, Fortescue, Helms, Ashburton, Eucla.

***Pimelea nervosa* (Walp.) Meisn.**

An erect spreading shrub, to 60 cm, inflorescence erect, to 2 cm diameter, flowers white, flowering October to February, occurs on loam or clay soils.

South West: Eyre, Roe; Interzone.

***Pimelea physodes* Hook.**

An erect robust slender shrub, to 2 m, inflorescence pendant, bracts pale green tinged red to 5 cm long, flowers cream, flowering June to October, occurs on sand, ironstone. South West: Eyre.

South West: Eyre.

***Pimelea punicea* R.Br.**

A slender erect spreading annual, to 60 cm, inflorescence erect, to 2 cm wide, flowers red, flowering April to August, on loam or clay.

Northern: Gardner, Fitzgerald.

***Pimelea preissii* Meisn. Lehm.**

A slender few branched erect shrub, to 70 cm, inflorescence erect, to 2 cm diameter, flowers white suffused pink, flowering September to November, occurs on loam or clay.

South West: Darling (Drummond, Dale, Menzies, Warren), Roe.

***Pimelea rosea* R.Br.**

An erect slender much branched shrub, to 1 m, inflorescence erect, to 3 cm diameter, flowers white, pink or lilac, flowering August to November, occurs on sand dunes, limestone, swampy, granitic or gravelly soils. Photo, page 297.

South West: Darling (Dale, Drummond, Menzies, Warren), Avon, Eyre.

***Pimelea sanguinea* F. Muell.**

A low much branched annual, to 20 cm, inflorescence erect, to 1.5 cm diameter, flowers reddish, flowering March to August, occurs on loam soils.

Northern: Gardner.

***Pimelea serpyllifolia* R.Br.**

Low spreading woody dioecious shrub, to 50 cm, inflorescences erect to 5 mm diameter, flowers cream, flowering July to October. On calcareous sand.

Interzone; Eremaean: Eucla.

***Pimelea spectabilis* Lindl.**

An erect few branched shrub, to 1 m, inflorescence nodding, to 5 cm diameter, flowers white, often flushed pink, flowering September to December, occurs on sand, loam, quartzite or lateritic loam.

South West: Darling (Drummond, Dale, Menzies, Warren), Eyre.

***Pimelea spiculigera* F. Muell. ex Benth.**

Low spreading woody dioecious shrub, to 1 m, inflorescence erect, to 1.5 cm diameter, flowers yellow, flowering August to October, occurs on granite or loam soils. Interzone; Eremaean: Austin.

***Pimelea suaveolens* (Endl.) Meisn. in Lehm.**

A variable species with at least two distinct forms.

An erect shrub, to 1 m, inflorescence nodding, to 3 cm diameter, flowers yellow or cream, flowering July to October, occurs on yellow sand, loam or laterite. Colour photograph on page 288.

South West: Darling (Drummond, Dale, Menzies).

***Pimelea suaveolens* var *menkeana* Meisn.**

An erect shrub, to 1 m, inflorescence nodding, to 1.5 cm, flowers yellow, flowering July to October, occurs on sand or loam.

South West: Avon, Darling (Dale), Roe; Interzone.

***Pimelea sulphurea* Meisn.**

A variable species, with two forms:

(i) An erect spindly shrub, to 50 cm, inflorescence nodding, to 2 cm diameter, flowers yellow, flowering July to November, occurs on white, grey or lateritic sand, loam and clay. Colour photograph on page 293.

South West: Irwin, Darling (Drummond, Dale), Roe, Eyre.

(ii) An inland form with glaucous leaves, smaller inflorescences, flowering August to October, occurring on yellow sand.

South West: Irwin, Avon; Interzone.

***Pimelea sylvestris* R.Br.**

An erect slender shrub, to 1.5 m, inflorescence erect, to 3 cm, diameter, flowers white or pink, flowering September to December, occurs on lateritic sand, loam or clay. South West: Darling (Dale, Menzies, Warren), Eyre.

***Pimelea tenuis* Scott.** is in fact *P. angustifolia*

***Pimelea thesioides* S. Moore.**

A spreading twiggy woody dioecious shrub, to 2 m, inflorescence erect, 1-1.5 cm diameter, flowers yellow, flowering July to September, occurs on red loam, clay or granite.

South West: Avon; Interzone; Eremaean: Austin, Helms.

***Pimelea tinctoria* Meisn.**

An erect sparsely branched shrub, to 1 m, inflorescence nodding to 4 cm wide, with large bracts to 3 cm long, flowers yellow, flowering September to October, occurs on sand, gravel or loam.

South West: Darling (Menzies, Warren), Eyre.

***Pimelea trichostachya* Lindl. in Mitch.**

A slender erect, much branched annual, to 50 cm, inflorescence an elongated spike, flowers greenish, cream, pink or red tinged, flowering July to November, occurs on red sand, loam or alluvium.

Interzone; Eremaean: Austin, Helms, Giles.

***Pimelea villifera* Meisn. in Lehm.**

An erect much branched shrub, to 1 m x 70 cm wide, leaves densely packed, grey tomentose, inflorescences erect, flowers white, flowering November, occurs on sand and granite. (Part of the *Pimelea imbricata* complex).

South West: Avon.

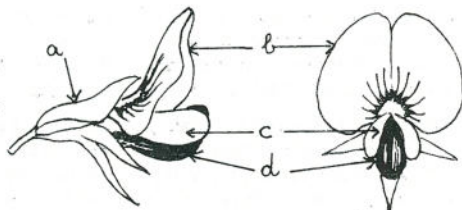
Acknowledgements:

The curator of the Western Australian Herbarium allowed access to collections under his care. Dr. Barbara Rye had undertaken a preliminary sorting of the genus for the Metropolitan Flora Project, and this greatly facilitated data collection. ■

Bush Peas

The Genus *Pultenaea* —

Part 2 by C. E. & D. T. Woolcock



- a — the calyx cupping flower
 b — large petal — the standard
 c — two petals — covering keel
 d — two petals — boat shaped keel

A delightful feature of our Australian bushland scene is the many bright pea flowered plants that attract the eye. This article is one of a series that will assist those without botanical knowledge to identify the species.

It should be emphasised again that any simple key for field or general use in this large and complex genus has limitations. This key is based primarily on leaf characteristics — size, shape, curvature and method of attachment, i.e. whether alternate or opposite. Of these the size and shape can be somewhat variable, depending, on habitat and age of plant, etc.

Group II — Leaves obovate to oblanceolate — alternate (see sketches).

(a) Leaves incurved

Pultenaea villosa, *P. ferruginea*, *P. altissima*, *P. flexilis*, *P. trifida*,
P. selaginoides, *P. sp. affin. elliptica*, *P. ochreatea*.

(b) Leaves flat or with recurved margins

Pultenaea capitellata, *P. pycnocephala*

Pultenaea altissima Benth.

Tall Bush-pea

Pultenaea obovata. No longer considered a valid species — included with *P. altissima*.

Habit Tall, erect glabrous shrub often exceeding 2 m in height. Angled stems (A).

Leaves Narrowly oblanceolate, incurved, 5-9 mm long with obtuse apex, glabrous on both surfaces (B₁ B₂ B₃). Lanceolate stipules 1-2 mm long.

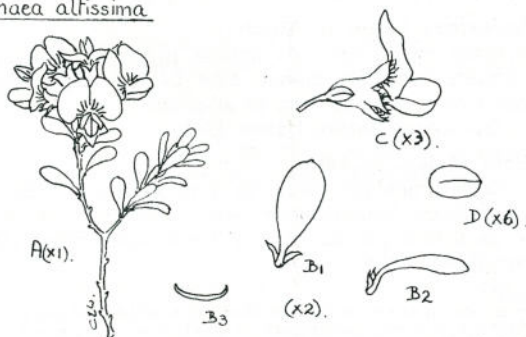
Flowers Clustered at ends of branchlets on pedicels c. 2 mm long. Calyx and pedicel mainly glabrous, except for a fine cilia on the calyx lobes. Keel yellow (C).

Bracteoles Small, ovate, attached at base of calyx tube, glabrous (D).

Flowering September-October.

Distribution Higher parts of the Central and Southern Tablelands of N.S.W. with a small occurrence near the upper reaches of the Genoa River, East Gippsland, Vic.

Pultenaea altissima



Pultenaea* sp. affin. *elliptica

(sp. nov. — at present un-named)

Habit Shrub to 1 m high (A).

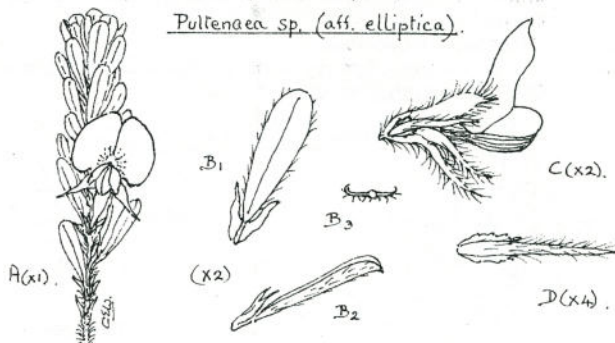
Leaves Somewhat crowded, slightly concave, elliptical, hairy on under-surface, 10-15 mm long. Petiole to 2 mm long and stipules to 4 mm (B_1 B_2 B_3).

Flowers Large, sparse, axillary & sessile. Calyx villous with elongated subulate lobes and short tube. Keel yellow (C).

Bracteoles Linear, villous, longer than calyx tube, with small irregularly dentate stipules, attached near base of tube (D).

Flowering August-September.

Distribution Northern N.S.W. — particularly coastal.



***Pultenaea ferruginea* Willd.**

Larger Bronze Bush-pea

Habit Erect shrub 1 to 2 m high, branches pubescent (A).

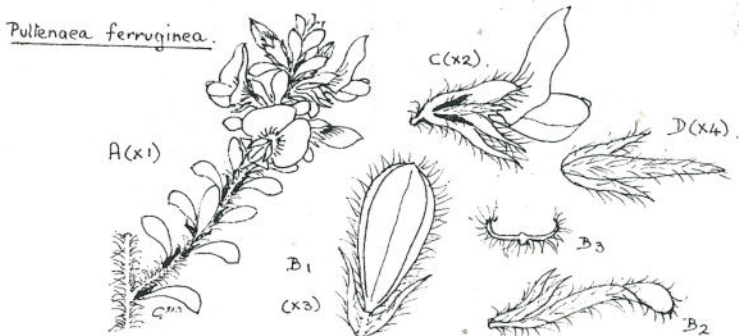
Leaves Alternate, crowded, obovate, incurved, spreading, apex retuse and recurved, 3-15 mm long and 2-4 mm wide, softly pubescent mainly on lower surface. Stipules brown, prominent, 3-6 mm long. (B_1 B_2 B_3).

Flowers Relatively large, yellow, axillary, subsessile, moderately dense towards the end of branchlets. Calyx villous, the two upper lobes acuminate, the lower much longer than the tube (C).

Bracteoles Three-lobed, the centre lobe green and villous, the others brown; stipulate, villous, about as long as calyx and lobes. Attached on calyx tube above its base (D).

Flowering Spring.

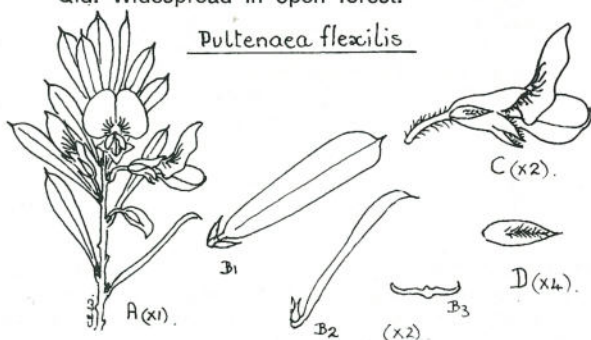
Distribution Lower Blue Mountains and Hornsby Plateau, N.S.W. var. *ferruginea* — leaves less than 7 mm long var. *deanei* — leaves usually 8-15 mm long.



Pultenaea flexilis* Sm.*Graceful Bush-pea**

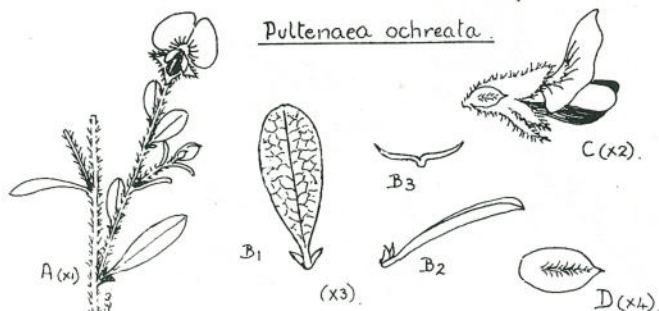
Pultenaea flexilis could also be considered under Group IV as its leaves are at times narrow-oblong; usually they are wider near the apex than the base.

- Habit** Erect, graceful, showy shrub up to 4 m high. Stems glabrous or smaller branches sparsely pubescent (A).
- Leaves** Oblanceolate to narrow-oblong, flat with slightly up-curved margins, mainly glabrous both surfaces (B_1 B_2), 10-30 mm long with mucro and prominent midrib, particularly on undersurface (B_3). Petioles short, stipules 2-4 mm long.
- Flowers** Clustered in axils towards the end of branchlets on pedicels c. 3 mm long. Calyx glabrous with shortly ciliate margins (C).
- Bracteoles** Linear-lanceolate, no longer than the tube, a few short hairs on midrib (D).
- Flowering** September-November.
- Distribution** N.S.W. — from Sydney north on coast and tablelands; Southern Qld. Widespread in open forest.

***Pultenaea ochreatea* Meisn.**

Placed in Group II (a) but may have leaves mainly flat and could be classed as Group II (b). Sometimes leaves can be oblong to lanceolate but typical form is obovate.

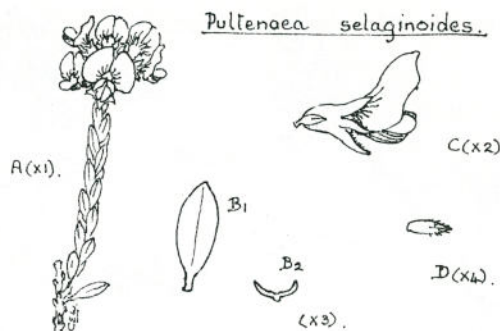
- Habit** Open upright shrub to over 1 m high. Stems lightly hairy (A).
- Leaves** Lanceolate to obovate, obtuse or slightly emarginate, alternate, 5-20 mm long x 2-7 mm wide, glabrous, reticulate, flat to slightly incurved, not crowded. Petiole short, c. 1 mm; stipules 1-2 mm long (B_1 B_2 B_3).
- Flowers** Solitary at end of branchlets, 8-10 mm long. Calyx c. 6 mm long, lobes about as long as tube, acuminate, both tomentose; a few small floral bracts at base of calyx. Keel dark red (C).
- Bracteoles** Ovate, hairy on midrib; shorter than calyx tube; inserted at base of tube (D).
- Flowering** August-October.
- Distribution** South-west of W.A. — from Perth to Walpole.



***Pultenaea selaginoides* Hook f.**

Clubmoss Bush-pea

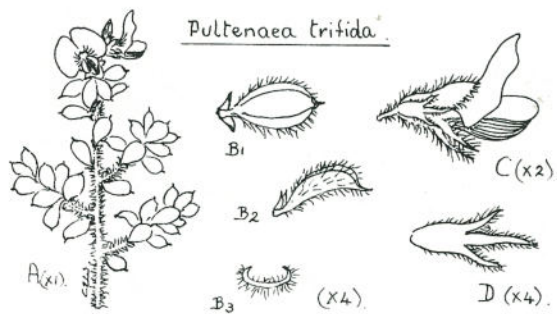
- Habit** Slender, erect, glabrous shrub, 1-2 m high; leaves on current year's growth, old stems tuberculate.
- Leaves** Alternate, numerous, crowded, imbricate, obovate or oblong-cuneate, obtuse or with a thick short point, 3-10 mm long, thick, concave. Stipules reduced to minute tubercles (B_1 B_2).
- Flowers** Axillary, subsessile, clustered at or near ends of branchlets, appearing sometimes like a terminal head but always interspersed with leaves, new shoots continuing along the axis. Calyx c. 4 mm long, lobes as long as the tube, obtuse; all lobes nearly equal, ciliolate (C).
- Bracteoles** Small lanceolate, concave, attached at the base of the calyx, slightly hairy (D).
- Flowering** September-November.
- Distribution** Tasmania — Central eastern coast.



***Pultenaea trifida* J. M. Black**

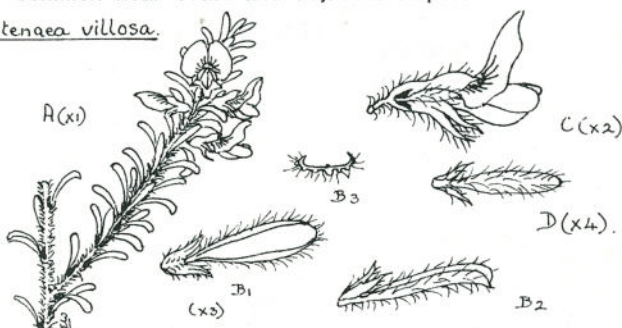
Kangaroo Island Bush-pea

- Habit** Procumbent spreading shrub about 30 cm high (A).
- Leaves** Crowded, obovate (B_1), incurved, sparsely pubescent above, densely pubescent or villous below, 4-5 mm long, mucronate, with small brown stipules slightly longer than the petiole (B_2 B_3).
- Flowers** Axillary on short pedicels, usually several in leafy heads at ends of branchlets. Calyx pubescent, the lobes with tapering points. Keel dark red (C).
- Bracteoles** Trifid, as long as the calyx and inserted just below it; ciliate and with tapering lobes (D).
- Flowering** October-November.
- Distribution** Kangaroo Island, S. Aust.

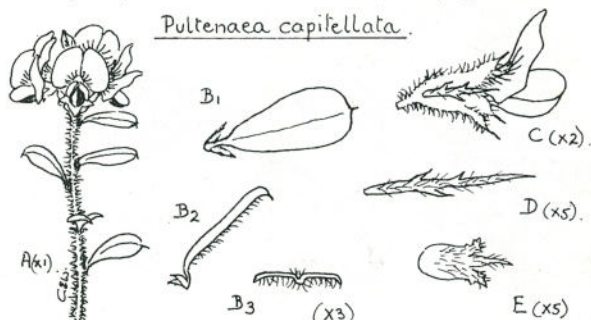


Pultenaea villosa* Willd.*Bronze Bush-pea**

- Habit** Spreading or erect shrub, 1-3 m high, softly hairy, hairs often rusty-coloured. (A)
- Leaves** Crowded, usually linear to slightly obovate with rounded re-curved tip (B_1); concave (B_2), 5-10 mm long and 1-2 mm wide; hairy or tuberculate on undersurface (B_3). Petiole c. 1 mm long. Stipules 1-4 mm long, usually c. 2 mm.
- Flowers** Numerous, axillary towards end of branchlets. Calyx villous, upper lobes larger, lower acute longer than tube. Pedicels c. 2 mm long. Keel usually yellow. (C).
- Bracteoles** Leaf-like, linear, villous and stipulate — slightly larger than calyx tube (3-8 mm long). (D)
- Flowering** August-November.
- Distribution** N.S.W. — Central Coast and N. Tablelands; Qld. Frequently common near coast and adjacent slopes.

Pultenaea villosa***Pultenaea capitellata* Sieber ex DC****Hard-head Bush-pea**

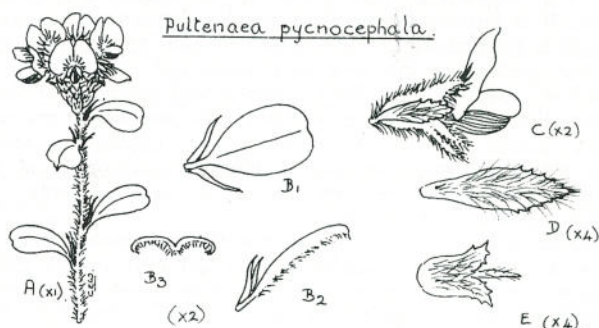
- Habit** Weak, straggling, sub-alpine shrub, sometimes prostrate; branchlets to 30 cm long (A).
- Leaves** Less than 12 mm long, obovate to elliptic, with reflexed mucro, mainly glabrous above, appressed hairs below. Stipules small, (1-3 mm) (B_1 B_2 B_3).
- Flowers** Sub-sessile in dense terminal heads. Calyx villous, lobes shorter than tube but with acuminate tips (C). Heads partly enclosed in numerous pubescent floral bracts (E).
- Bracteoles** Linear, hairy, longer than calyx tube, often 3-5 toothed, attached near or above the base of tube (D).
- Flowering** Late Spring-early Summer.
- Distribution** Vic. — eastern highlands, sub-alpine, damp areas; N.S.W. — higher parts of Blue Mountains, damp ground.

Pultenaea capitellata

***Pultenaea pycnocephala* F. Muell. ex Benth.**

Dense-head Bush-pea

- Habit** Small shrub to 40 cm high, stems with appressed pubescence (A).
- Leaves** Obovate, 8-13 mm long x 3-7 mm wide, with recurved margins and mucro, glabrous above and with thick appressed hairs beneath, giving silvery appearance. Stipules moderately large and prominent, 2-6 mm long (B_1 B_2 B_3).
- Flowers** Small, in dense heads, surrounded by imbricate hairy bracts often 3-lobed (E). Calyx villous, lobes acuminate, shorter than tube (C).
- Bracteoles** Linear-lanceolate to oblanceolate, villous, slightly longer than tube (D).
- Flowering** Early summer.
- Distribution** Northern N.S.W. — Gibraltar Range; Qld. ■



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 84 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.

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. ■

Banksia

A Study in the Propagation of *Banksia occidentalis* by P. A. Watkins and R. W. Shepherd, Division of Horticulture, W.A. Dept. of Agriculture

Cuttings were taken in August and given a 10-second dip in IBA solutions with concentrations of 0, 2,000 ppm, 2,500 ppm, 3,500 ppm and 5,000 ppm. Cuttings were assessed for root development five weeks following treatment.

IBA concentration ppm	% rooted
0	30
2000	40
2500	60
3500	90
5000	70

The study indicated that *Banksia occidentalis* cuttings can be very successfully propagated when given a 10-second dip in a solution of 3,500 ppm IBA. ■

The Eco-Garden—3

by Coralie Whitby

The Need for Diversity and Mixing

The stability of forests is in part dependant on their composition: a forest contains a great number of different, fully-compatible plant species, and this plant diversity acts to produce other diversities. For instance, different plants give different vegetation heights and leaf types, attractive for various reasons to different birds, mammals and insects; different plants and animals give rise to a litter composed of a variety of materials, each exploited by a different range of consumer and decay organisms.

How Does Forest Diversity Help Stability?

A particular plant, heavily parasitised by a particular insect, will be severely reduced. There will then be insufficient food for many of these insects to survive to breed, and so the number of insects will be reduced until the plant can regenerate, when the cycle will repeat. This is oscillation, not equilibrium. If a bird preys on the insect, the oscillation is interrupted: if the bird itself is subject to another predator (such as a lizard which eats birds' eggs) the control of the bird population will prevent the complete wiping out of the insect. In a forest, parasites and diseases of insect, bird and lizard, and the hundreds of other kinds of consumers and predators, ensure that all species will survive in the dynamic network of relationships — the longer the food-chains and the greater the complexity of the food-webs, the greater the degree of equilibrium. So forest stability is directly dependant on the diversity of its species.

Some species in forests are responsible for the general health of the forest as a whole: for instance, wattles provide nitrogen for the other plants from the nodules on their roots, and many species are known to counter die-back. *Acacia pulchella* roots for instance contain chemicals which can suppress formation of *Phytophthora cinnamomi* zoo-spores. *Bauera rubioides*, and wattles in general, by their own resistance to the same fungus, can restrict the spread of the disease wherever they grow: in Gembrook forests where forest understorey has not been cleared, *Bauera rubioides* can be found everywhere. Removal of this species would lessen general forest resistance to the disease, and so forest stability.

Some Benefits of Mixing

Diversity and mixing of plant species helps to reduce the infection of particular plant leaves by fungal or bacterial spores, because many spores must collect on the wrong species. An assortment of plants, well-mixed, uses soil elements more effectively, increasing forest health. And as previously said, the mixing throughout the forest of disease-resistant species can give it protection from fungal parasites.

How To Increase Diversity?

General forest diversity is increased wherever there is a zone of changed microclimate. In the forest gully, for instance, the extra moisture makes it impossible for some of the species of the forest proper to persist, but it also gives an opportunity for the appearance of many new kinds of plants.

How Does This Apply To An Australian Garden?

A garden of exotic Australian natives set in conserved or replanted natural bush, and with a local native flora understorey, gains in diversity in the same way as the forest proper does, with its additional gully flora. If each exotic tree or tall shrub in the garden is underplanted with a richly-various, repeating association of lower-growing compatible local native species,

* Part 1 of this series was presented in No. 92 Issue of Australian Plants and it created considerable interest. Each of the six priorities as defined in her book "Eco-gardening — The Six Priorities" are now discussed with their application to wildflower gardening.

then local native birds and insects, even the less aggressive ones, will feel welcomed by an environment they already know and love, giving the permanent natural pest control which is a part of equilibrium.

In Gembrook, Victoria the local understorey would be *Banksia spinulosa*, *Hibbertia pedunculata*, *Goodenia ovata*, *Bauera rubioides*, *Comesperma volubile*, *Spiridium parvifolium*, and bracken, and ground-covering species such as *Goodenia lanata*, *Hydrocotyle laxiflora*, *Halorrhagis tetragyna*, *Dampiera stricta* and *Viola hederacea*.

The Native Eco-garden — Practice and Theory

The following are questions by the Editor, in correspondence, and answers by Coralie Whitby.

"Many local understorey species are difficult to get, hard to grow, or undesirable. Also we do not want everybody going into the local bush and digging up plants."

I agree that at present nurseries do not stock many local species, and that the general public should not dig up what they want from the bush. But once gardeners want local understorey plants as the foundation of their gardens, botanists from State herbariums and Universities could be asked to collect local bush material to supply a few plant nurseries which intend planting local bush gardens. Perhaps the SGAP could set these up. From them, with time, the public could obtain rooted cuttings and seedlings of species indigenous to particular localities. The SGAP has already accomplished miracles — all we need now is for it to bring off another one.

"Is it hard to grow local species?"

It ought to be possible to grow any species in its own locality, unless we have poisoned or completely replaced the soil. I was told in the past that natives could not be transplanted — but here I transplant them daily with total success. I was told that natives did not like root disturbance — and yet the other day I forked the soil to a foot depth right up against the central growth of a local *Olearia* and *Spiridium*, exposing their roots: and they showed no reaction whatever. So I am doubtful about the "difficulty" of growing local species — it may not be true.

I began on my Gembrook block by thinking some of my natives were undesirable — *Goodenia ovata*, for instance, and *Halorrhagis tetragyna*. But I have found them to be lovely if given room to develop; and they also have highly desirable functions in a garden like this one. The *Goodenia* diverts the attentions of parrots away from my fruit tree branches — *Goodenia* shoots are nipped off instead. Both prevent weed growth; and the *Halorrhagis* forms a well-shaped border plant which holds the wood-chip paths in place against onslaughts of blackbirds. In general we just do not give our local native species a chance to prove how good they are.

"Nobody wants to plant bracken, which you have mentioned as one of your own understorey species."

I don't agree that nobody wants to plant bracken. It is a very beautiful plant, and tolerant of difficult conditions; and it often shelters less robust species from pests which might attack them when they are young. I have a friend who has included bracken in her front garden of natives, so I am not alone in appreciating its qualities.

"Instead of growing one's own local understorey species of (for instance) *Hibbertia* and *Dampiera*, could just any species of *Hibbertia* and any species of *Dampiera* be substituted?"

No — for an Eco-garden, local understorey MUST provide the species — just any species will not give the degree of equilibrium we are after.

The local understorey species have evolved together, producing a compatible plant association which can tolerate close spacing, thus increasing leaf area, so that the pests can be fed without the plants being killed. Local understorey has an effect on the bird and insect populations: just any species of *Hibbertia* might provide a habitat for a more tolerant local species of spider, whereas the local *Hibbertia* might bring back into the garden a range of twenty useful local species. In a garden with no local plants, you get only the few more aggressive predatory species: these are welcome, but they are not enough for equilibrium. Local plants draw in the timid predators. There are big differences between the basic flower structures and leaf tissues of *Hibbertia scandens* and *Hibbertia pedunculata* for instance — you would expect these two species of same genus to be therefore populated by an entirely different range of insects: especially also since one is a tropical species, and one from a cool temperate region.

Growing Your Own Food-Bearing Plants In Australia by Selby Gouldstone

This book is for the home gardener who would like to grow unusual trees and bushes adding interest to the garden as well as providing edible crops to furnish table and kitchen. There is also a small section with recipes. Not many Australian plants are included. This 246 page book is available from the Editor for \$20.00, postage included.

Seed Germination

Notes by D. R. Blundell,
Manager Agr. Res. Strn.,
Dareton, N.S.W.

I have used the egg carton method of germinating *Banksia* seed as described in Australian Plants P350, Vol. II, No. 92 on many native seeds — *Eucalyptus*, *Banksia*, *Melaleuca* and others. There is no doubt that the seeds respond to the treatment, but you need to be a micro surgeon to advance to the next stage of relocating the small germinated seeds for growing on.

If you move the plants as soon as they show root radicles you need strong glasses and tweezers and more than likely if you succeed they will dry out and die. If the seeds are left to develop, they are likely to embed their roots in the egg carton material. In any case the roots are so brittle that even handling the plants with tweezers, the roots are likely to snap off and the same problem of drying out is again present if you are successful in transplanting.

The Seed Bed Method Of Seed Germination

Over the years I have had tremendous success raising the seeds in a seed bed and lifting them at the two-leaf stage, when they can be handled in your fingers and transplanted into the desired container. Generally well over 90% success rate is possible without any special precautions using this system.

While at Wagga a large steel tray was set up on a stand. This tray was approximately 150 cm x 80 cm x 10 cm deep. It was located under the eaves on the eastern side of a building and the stand gave sufficient room for a 40 watt lamp bulb to be placed under the tray. A piece of silver-sided sisalation was pegged to the three exposed sides of the tray to form a curtain between the ground and the bottom of the tray, this simple reflector enabled the temperature to be maintained at around 25 degrees C, by the low wattage bulb.

No facilities were available for soil sterilisation and a mixture of local granite soil, river sand and mulch from native trees at approximately 2:1:1 was made up and placed in the tray at 10 cm depth. Drainage was achieved by tilting the tray lengthwise to an open end and watering consisted of a light sprinkle each morning.

When moved to Dareton a similar mix was made up of the local wind-blown drift sand, river sand and mulch from underneath the native Hopbush, in the same proportions. Despite warnings that the mulch could be saline, it was used in potting mixtures as well and no problems evolved.

Planting On The Seedlings

Transplanting from the trays took place as soon as the plants were large enough to handle with the fingers. This was usually at the two-leaf stage, with eucalypts when the leaves stand clear of the cotyledons and can be grasped between the thumb and forefinger. Tubes of similar proportions to those used by the forestry people seem to be the best size for planting on, and these were prepared and watered so that a hole could be dibbled with a 5-7 mm rod. The damp soil retains the shape of the hole and allows the long root to be directed into place without damage or obstruction. The root at this stage almost appears to be magnetised and tends to be drawn to the side of the hole, so some care is necessary to induce the root to extend to the full length in the hole. Once the root is in place the soil can be pushed into contact with the root and a light watering ensures that this contact is complete.

Under the hotter conditions of the far south-west the seedlings in tubes were placed under shade but at Wagga this was not found to be a necessity. As most will have found, the seedlings seem to move along at an enormous pace in the tubes once they are established, and a similar situation prevails when the tubed trees are carefully planted in their permanent positions. ■

As with most systems there are problems. The article "Seed Germination" by D. R. Blundell, on page 312 highlights the principal ones. Everybody's conditions for seed germination are different. If you have found a method that gives results in your conditions as Don Blundell did, then stick with it.

There are many simple methods described in previous issues of Australian Plants that could suit you. I wanted to adopt a method that should produce good results in any conditions, on which to base my numerous trials of seed germination and subsequent cultivation of plants. I have proved to my satisfaction that the egg carton method will provide reliable, consistent results over a wide range of seed. The other major advantage is that it enables me to handle seed of up to 100 species with a minimum of space and an excellent facility for recording.

The egg carton method did not originate with me. Its use was described in this series of articles commencing with No. 85 issue. Following the use of this method over five years and seed of many hundreds of species, an update may be of interest.

Prior Treatment Of Seed

All species of seed are soaked in a cup of water for a week. For hard testa seed the water is poured on the seed at 100°C. For other seed the water is hot; you can just bear to put your finger into it. Over a week, with the cup in a well lit position, such as on a verandah, some seed will germinate in the cup. This applies to hard coated seed such as *Acacia* (wattles), fresh seed of *Hakea*, etc. I recently germinated every seed in the cup of three species of *Hakea* and 50% of three species of *Banksia*. Transfer non-germinated seed to the prepared, wet and numbered egg cartons, with a teaspoon.

Care Of Egg Cartons Containing Seed

Each carton fits nicely into a plastic sliced bread bag with enough bag to get a simple knot in the end to make it airtight. The bags are placed in a hot sunny position, in my case inside a window on a ledge. They need to be inspected regularly and maintained moist by introducing a few drops of water into each recess containing seed. Rotted seed can be removed easily.

Lifting The Germinated Seed From The Carton

If you leave the seed in the carton too long, the new root shoot (radicle) may penetrate into the wall of the carton and be damaged in attempting to remove the seed for planting. I try to not let this happen by checking on the progress of the seedlings regularly. Where it has occurred, I gouge out the piece of carton enclosing the radicle and leave it on, planting it with the seed.

Fine seed can be a problem. I do not use the method with very fine seed of many of the Myrtaceae including *Eucalyptus*, *Melaleuca*, *Callistemon*, etc., as there is no trouble in germinating this seed. A little of the fine seed sprinkled in a row of 2 cm pots filled with sand yields such a harvest that it is necessary to thin out to retain the one best seedling per pot. However, I have been using some small seed such as *Anigozanthos*, *Beaufortia*, *Boronia* and western *Eucalyptus* as I have found a simple method of lifting the seed from the carton, one at a time, with complete success. Select a small twig off the ground, or even a match stick. Moisten one end, fraying it if necessary. The seed clings quickly and securely to the end of the stick when given just the gentlest of a prod. A similar prod into a hole in the sand in a small pot usually plants the seed with a minimum of stress. Naturally you need good light.

Growing On The Germinated Seed

It is very easy to lose the young seedling by drying out. I lost so many that the experience did me a good turn. I devised a method that gives almost 100% success in raising the seedling. The mini-hot-house, using ice cream containers and a plastic bag is quite successful for small lots — see Australian Plants Vol. 11: pages 25, 136, 231. However, the method described on page 232 of Vol. 11 has proved invaluable. I do not lose seedlings from drying out.

For my conditions I do not start until May of each year and do not have a damping off problem. I have extended this method to grow the seedlings on in large pots. A hole in the tray prevents the water getting more than 2 cm deep and this water does not dry out for a week. ■

Extinct And Endangered Plants Of Australia

by J. Leigh, R. Boden, J. Briggs — forward by H.R.H. The Duke of Edinburgh
A review and comments on conservation by The Editor, Australian Plants

"This book aims to stimulate greater conservation efforts to ensure that no further species become extinct either wittingly or through ignorance or neglect" — H.R.H. The Duke of Edinburgh.

Why Should We Bother?

A new book "Extinct And Endangered Plants of Australia" describes 203 Australian native plant species in serious danger of becoming extinct. Tragically it also lists 76 species known to have become extinct in the last 50-100 years. The significance of this is lost to most Australians, even if they knew of this crisis in survival — "ignorance".

It means the loss forever, of a finite form of life, forever! Some people do care? Being selfish, self-centred, it could mean that one of nature's gifts will not be available for use in the future. Of what use? Many of the substances that support human life and combat sickness and disease, come from plant life. We are ignorant of much that our native plants can provide. One researcher recently discovered that a solution from a native species of *Pimelea*, listed as in danger of extinction, could provide a cure listed as in danger of extinction, could provide a cure or a lead to a cure of a form of cancer. Are you to be the next cancer victim who may bless this little wild plant?

As responsible human beings it is dependent on us to try to repair the damage of past generations on this planet of ours. Will our children's children look back on this generation, look back on us and say, "but they knew but did nothing — why!"

Ignorance!

With the publication of this book, there is no excuse for ignorance. You may buy a copy at your bookseller or obtain a copy, post free, for \$50.00 sent to Editor, Australian Plants, 860 Henry Lawson Drive, Picnic Point, N.S.W. 2213. This book describes the plant species at present known to be in danger of extinction, and action required for the survival of the species.

Neglect!

Neglect by governments from local to the federal level, is the cause of this crisis. How easy it is to say and pass the buck, but it is true. Criminal neglect, irresponsible neglect, indifference to the stage of incompetence? Such finding could be too harsh on politicians of the past because we the voters are responsible to see that our representatives are informed and perform in what we regard as a responsible manner.

For years pioneers in conservation and a concerned minority have been desperately trying to bring this crisis to the attention of real 'Australians' and the governments. With the publication of "Extinct and Endangered Plants of Australia" there is no excuse at government level. Action, responsible action is needed.

Governments And The Preservation of Australia

Governments at all levels should act now. It is not easy. Hopefully they will have the national responsibility and courage recently shown by the State Government of N.S.W. in their stand to conserve the surviving rainforest. Does the State Government of Queensland have the same courage, the awareness of its responsibility.

Does the State Government of Western Australia have the courage, and in this case the plain common sense, to prevent the ruin of land adjacent to the Fitzgerald River National Park by incorporation of it into the park?

The Fitzgerald National Park

Here is a typical example. A large parcel of land between the Fitzgerald National Park and the main highway from Esperance to Albany is about to be rezoned. Selfish individuals are campaigning for it to be released for farming. In some cases it is by some who are already in debt and getting further in debt, trying to make a living from marginal land adjacent. The new acreage will save them for a time while they "flog the guts out of the land", but most of it is not viably suitable. The local shire is only after more rate revenue.

The real position is that the land in question contains the water catchment areas for the streams in the Fitzgerald National Park, contains a range of plant species native to the area of exceptional value including a number of rare and endangered species, consists of unique land form for the area, contains a range of habitat not abundant in the Fitzgerald National Park, and is a real buffer and savour to the long thin national park against the activities of man.

Here is a practical and immediate way a piece of Australia can be conserved.

What Can We Do?

I expect many thousands of individuals will continue to be frustrated trying to impress our politicians. They in turn are desperate to know what to do for the best with the nation's money and its resources, and the powerful vested interests. It remains for us all to press for more national parks and botanic gardens and better management of these resources. Many of you will know of similar cases to the Fitzgerald National Park mentioned above as an example. It remains for you to keep pressing with well gathered facts to help the politician. He needs all the help he can get as he is usually a conscientious, responsible, patriotic Australian.

In the case of the Fitzgerald National Park, a well prepared case is being presented. It will be of interest to all to see how the West Australian politicians can be classified after their decisions over the coming year.

This review, and all comments is by the Editor, Australian Plants, and in no way reflects the views or the content of the book "Extinct And Endangered Plants of Australia" or its authors. The book does not imply any of the "political" issues raised above but is an accurate record of research by competent scientists. Why not buy a copy? ■

The aims of the National Botanic Gardens are to establish, maintain and display to the highest standard possible a national collection of Australian native plants for botanical and horticultural research, conservation and public education and enjoyment.

Although the natural vegetation of the Black Mountain Reserve blends well with the man made environment of the National Botanic Gardens and enhances its setting, there have been difficulties encountered in establishing and maintaining the range of plant material grown in these Gardens. Severe frosts, soil type and poor drainage are the major limiting factors combining to limit plant growth and many frost sensitive species are now grown in the mist gully at the Gardens. By careful siting and the use of "cover" or canopy trees and adequate water and humidity control, this artificial mist gully has delighted many thousands of tourists and has become one of our major tourist attractions.

Soil inadequacy can also be overcome. For many years attempts have been made to establish some of the smaller and more attractive species that make up part of our flora. Many of these plants have failed, due mainly to the heavy, poorly drained soils which characterise the Black Mountain site. Some of the hardier species can be established on existing soils but these are often crowded or suppressed by larger and more vigorous species. For these reasons the Gardens started to plan a major rockery complex in 1978-79.

In 1979 the Gardens negotiated with the National Capital Development Commission (N.C.D.C.) for the supply of a large number of rocks from a quarry that was associated with the construction of a nearby freeway. A design concept was then developed at the Gardens. This was adopted by the N.C.D.C. who engaged a firm of landscape architects to design and supervise the construction of the rockery.

The plan of the scheme is shown on page 318.

The work of positioning the rocks started in December 1979, and a large crane was located at the site for the next couple of months. The area behind an existing pool was excavated without disturbing its concrete base. A concrete foundation was laid behind the pool to support the heaviest rocks which made up the wall of the waterfall. The very large rocks, one weighing 24 tonnes, were positioned by crane, and concrete was injected into the crevices between them to prevent further movement.

The reinforced concrete bed of the watercourse was built on a carefully graded sandbed. The ground level was raised to the watercourse level as more rocks were positioned, gradually working up-slope from the pool.

The original concrete pool base was cut through to allow pipes from the pump, which recirculates water through the watercourse, to enter the pool. The pump is housed below ground level on the southern side of the pool, with the electrical control box built into the rockface above it. The pump raises the water about three metres to an outlet under the first small bridge.

The dripping rock face is experimental and its success is still being evaluated. About fifty fine tubes from a standard trickle irrigation system lead to the upper rocks above the pool and are carefully positioned to keep the maximum area of rock face damp. Silicon plastic compound has also been used on some rock faces to establish drip lines over large areas. The irrigation system was positioned, during the placement of rocks, with PVC pipes being laid under the paths where possible. These pipes are joined to metal pipes above ground level to enable the use of Buckner® quick-couple sprinklers. Garnet plastic drainage pipes were laid beneath many of the beds, connected to cement drains running beneath the main path. The emphasis on good drainage inevitably means that some nutrients are leached from the soil. This loss is compensated for by the addition of slow release fertilizer and occasional watering with Aquasol®.

The crevices and cavities between the rocks were filled with blue-metal gravel prior to the overlay of the specified soils. There are five different soil mixtures used in the rockery to cater for as wide a range of plants as possible.

- (1) 50% sand, 50% Australian peat.
- (2) 60% sand, 40% Australian peat.
- (3) 100% Australian peat.
- (4) 100% sand.
- (5) 30% limestone chips, 50% sand, 20% Australian peat.

One bed of 100% peat now has Jansum Leaky Pipe® laid beneath the surface of the peat to keep it continually moist.

The running water system was designed to provide several different plant habitats, and to establish an attractive feature. The upper part of the creekbed is dry, and initially was lined with clay. This proved to be a problem in discolouring the run-off water, and it has since been consolidated with cement. The next section is a damp watercourse, concrete-based and filled with sand, fed from a tap outlet under the upper bridge. The section of running water is fed from the pump outlet under the bridge from where it flows to the waterfall.

Planting of the rockery began in April, 1980. The object is to provide suitable growing conditions for the plants in the National collection rather than aim at an early 'completed' landscaping. Plants are selected because of their small size or their specialised soil requirements, although some large species are used for special effect. The raised beds provide an opportunity to view those plants which are difficult to display in other sections of the Gardens. Beds in the Rockery do not represent geographical regions, although soil requirements will dictate that the sand beds contain mostly arid plants while the peat will be more suitable for alpine species.

The following are examples of the approximately 500 species and cultivars now growing successfully in the rockery and which are available from time to time from commercial sources.

***Blandfordia*, The Christmas Bells.**

All four species of Christmas bells, *B. nobilis*, *B. grandiflora*, *B. cunninghamii* and *B. punicea*, have been established. The first three species have grown well even in slightly dry sites. All species are growing in sand/peat mixes. Honeyeater birds are regular visitors to the flowers, providing an added attraction to the rockery.



***Anigozanthos*, 'Dwarf Delight' — see page 323**

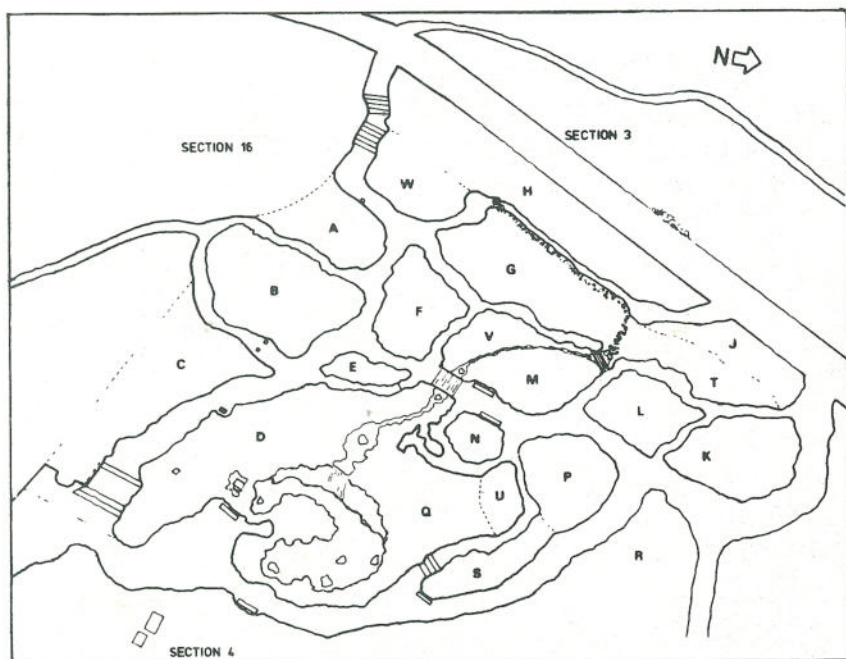
Photography by M. Fagg

***Anigozanthos*, The Kangaroo Paws.**

When previously grown in existing soils many species have been very short lived except for the common kangaroo paw. However, a number of species and hybrids are now well established. Three colour forms of *A. manglesii* have flowered for the past two seasons and the plants are still vigorous. In the past *A. manglesii* has rarely lived for more than one season. *A. humilis*, *A. viridis* and *A. rufus* are also doing very well. A number of *A. flavidus* hybrids have been planted, with *A. 'Dwarf Delight'* flowering prolifically in both sand/peat and sand/peat/limestone mixes.

Correa pulchella

While growing on existing soils in some parts of the Gardens *C. pulchella* has proved unreliable. Both the more usual orange flowered and the white flowered forms have done well in sand/peat in the rockery.



ABCDEFKLQRSV	50% sand, 50% Australian peat.
HJ	60% sand, 40% Australian peat.
P	30% limestone, 50% sand, 20% peat.
MNU	100% Australian peat.
GTW	100% sand.

Lechenaultia

Many species have been tried in our existing soil type and in a bed consisting of vegetated dune sand obtained from Jervis Bay, but in most cases the plants have not thrived. While they are still short lived, the species planted so far in the rockery have grown vigorously and flowered well. Most species have been sited in sand/peat and sand/peat/limestone. A few species, such as *L. superba*, have suffered minor frost damage when planted in totally exposed positions, but when planted closer to rocks or in crevices they have received minimal damage. Species tried are *L. biloba*, *L. biloba* 'White Flash', *L. formosa* (many colour forms), *L. superba*, *L. laricina*, *L. linarioides*, *L. hirsuta*, *L. acutiloba*, *L. floribunda*, *L. juncea* and *L. macrantha*.

Conostylis aculeata

This species had a performance history in the Gardens similar to that of *Correa pulchella*, with only occasional plants becoming established on existing soils. When planted in the rockery it rapidly grew to become our largest plant of *Conostylis* and has flowered prolifically for two seasons. The inflorescences have been much larger than those on existing soils. *C. aculeata* is planted in a sand/peat mix.

Wahlenbergia gloriosa

This species was recently selected as the floral emblem of the A.C.T. The best plant was planted in a peat bed against a large rock and has spread in two seasons to cover an area of nearly 1 square metre. It appears to grow best in a morning sun position and needs supplementary moisture. Two other species, *W. stricta* and *W. communis* have also grown vigorously, with the latter having to be kept contained to stop its rapid spread.

Hakea myrtooides

While not very vigorous in even the best conditions, *H. myrtooides* provides a bright splash of colour when in flower. It is prostrate to procumbent and will grow in very exposed positions.

Hibbertia

This genus provides many species that relish rockery-type conditions, with the bright coloured flowers over spring and summer.

Hibbertia stellaris has unusual orange flowers which occur prolifically over an unfortunately shorter period than most hibbertias. *H. vestita*, with its large bright yellow flowers and prostrate habit, is very suitable for growing around rocks and drooping over rock ledges. It has proved to be tender in severe frosts. *H. pedunculata* however, can be used for the same purpose. It is frost hardy but has smaller flowers.

Epacris

These extremely showy rockery plants have proved next to impossible to establish on existing soils in the Gardens. *Epacris* species inhabit a wide variety of environments, and are sited accordingly in the rockery. Some of the species tried so far are *E. apiculata*, *E. longiflora*, *E. calvertiana* var. *calvertiana* and var. *versicolor*, *E. reclinata*, *E. impressa*, *E. pulchella*, *E. robusta*, *E. gunnii*, *E. brevifolia*, *E. paludosa*, *E. petrophila*, *E. glacialis*, *E. heteronema*, *E. muelleri*, *E. microphylla* and *E. serpyllifolia*.

Persoonia chamaepitys

Persoonia species are generally good horticultural subjects, but this must be classed as one of the best. It is prostrate with fresh, bright green foliage. It is compact and dense and is a useful species to use over walls or ledges.

Pultenaea villosa

The common form of *P. villosa* could not be regarded as a suitable or useful rockery plant. A dwarf form is available however, that has a superb, almost bonsai-like habit. The flowering season of all *Pultenaea* is short.

***Clianthus formosus*, Sturt's Desert Pea.**

Sturt's desert pea is said to be the finest "pea flower" in the world, and it certainly makes a fine rockery plant. It grows well in freely drained situations. The red flowers provide strong contrast against the grey foliage. It spreads by means of long horizontal stems, occasionally producing short vertical ones as well. It is best grown as an annual since in Canberra it is frost sensitive and is attacked by mildew fungus in autumn.

Other Species For Rockery Cultivation

Besides commoner species just mentioned, rockery cultivation, using artificial media, also enables the Gardens to establish many unusual and difficult to grow plants. Some of the species now established are on the rare and endangered flora list. *Rutidosia leptorrhynchoides* (button wrinkle-wort), *Grevillea renwickiana*, *Daviesia euphorbioides*, *Ptilotus symonii*, *Hibbertia miniata*, *Daviesia mesophylla*, *Boronia edwardsii*, *Pimelea physodes*, *Eucalyptus saxatilis* are a few of these.

The rockery has provided a means of establishing difficult to grow species although other smaller plants that are often easier to grow have been used also. The plantings are still quite young, the oldest being a little over two years old, but even so the value of the rockery has been proved.

In future years it is hoped that the use of artificial soil media will enable the national collection of flora grown in Canberra to be expanded even further.

The long awaited revision of the genus *Grevillea* is nearing an end. It is proposed to initiate a detailed study of all species and forms and readers are requested to send reports of their experiences to the Study Group Leader, Peter Olde, 138 Fowler Road, Illawong, N.S.W. 2234.

A major project is the collection of good slides of every species and form. For this we need at least 10 slides of each species showing the bush, a flowering branch and a close-up on the flower. This is an excellent opportunity for photographers to show their ability over the next two flowering seasons. Money for film expenses is available on request.

Let us make this a major project for readers all over Australia.



Grevillea alpina

Photography by R. Page

Australian Plants as Cultivars

An official release by the Australian Cultivar Registration Authority.



***Scaevola* 'Angela Ratcliffe'**

Photography by R. Hotchkiss

***Scaevola* 'Angela Ratcliffe'**

Origin:

Scaevola 'Angela Ratcliffe' was propagated vegetatively from a single plant growing on a cliff face overlooking the ocean near Catherine Hill Bay on the New South Wales central coast. The plant was subsequently destroyed by erosion caused by fishermen's vehicles. Botanists have determined it as possibly of hybrid origin but it resembles *S. ramosissima* in some respects.

Description:

This cultivar has a prostrate habit, spreading to 1 metre across. The numerous branches are densely intertwined with individual branches having a zigzag pattern. The leaves are broad and slightly succulent in appearance, 2.5-3 cm long by up to 1 cm wide at the widest point. The leaf apex is obtuse. Both stems and leaves are covered in short stiff hairs. The flowers are a purplish colour, borne at the ends of short branchlets, very much resembling those of *Scaevola ramosissima*.

Diagnosis:

Scaevola 'Angela Ratcliffe' differs from *S. ramosissima* in the following ways. The leaves are obovate and not linear to lanceolate as in *S. ramosissima* and are of a much thicker (almost succulent) texture. The leaf apex is obtuse and not acute.

Bracteoles are narrow obovate rather than linear.

Peduncles are shorter than the leaves. Peduncles of *S. ramosissima* are as long as or longer than the leaves.

Colour Code:

Outer part of petals purple group 76A; inner part of petals — purple group 77C.

Reference Specimen:

Accession number 195. Cultivar first received by the Authority on 24 March, 1980. The applicant is Mr. D. Ratcliffe, Northridge Nursery, Raymond Terrace, N.S.W.

Acacia cultriformis* 'Austraflora Cascade'*Origin:**

Acacia cultriformis 'Austraflora Cascade' is a prostrate form of the species originally selected from a number of seedlings raised by Austraflora Nursery of Montrose, Victoria. It was selected in 1974.

Description:

This cultivar is a prostrate form which grows up to 2 metres across. The maximum height attained is only 10 cms. All other features of the plant are as for *Acacia cultriformis*. The flowers are of a similar size to those of the normal form, although flowering has been noted to be a little sparse and irregular on the cultivar.

Diagnosis:

The cultivar is readily distinguished by its prostrate growth habit which is its main value.

Colour Code:

Flower colour, yellow group 9B.

Reference Specimen:

Accession number 154. Cultivar first received by the Authority on the 16th September, 1980. The applicant is Mr. W. Molyneux of Austraflora Nursery of Belfast Road, Montrose, Victoria.

Anigozanthos* 'Dwarf Delight'*Origin:**

Anigozanthos 'Dwarf Delight' is the result of a manipulated cross between *Anigozanthos onycis* ♀ with *A. flavidus* ♂. The cross was performed by Dr. S. D. Hopper of Western Australia.

Description:

This cultivar is a compact plant with much branched flower stems to 0.8 metre tall. The flowering stems are covered with plumose hairs. These hairs are sparsely scattered at the base of the stem and around the leaflike bracts on the stem. The hairs are reddish in colour. The perianth segments of the flower are green-yellow but appear apricot when seen through the reddish hairs. These two colours contrast well. The leaves are up to 25 cm long by 1 cm wide.

*Colour coding uses the Royal Horticultural Society Chart of 1966.

Diagnosis:

Anigozanthos 'Dwarf Delight', which grows to 0.8 metre tall, is midway between the $\pm$ 0.3 metre of *A. onycis* and $\pm$ 2 metres of *A. flavidus*. The flowering stems of the cultivar are sparsely covered with plumose hairs for much of their length, becoming dense towards the individual flowers. *A. onycis*, is covered in dense, plumose hairs for the full length of the flower spike while *A. flavidus* has them only on the perianth segments of the flower and for a short distance below on the stem. The majority of the stem in this species is glabrous. The leaflike bracts on the stem are the size of *A. onycis*. The flowers are intermediate in size between those of the two parents.

Other Comments:

This cultivar is very free flowering, and can be readily reproduced using tissue culture or more slowly using traditional methods of division. It also shows excellent qualities for use as a cut flower, having good colour and stem length and very narrow stems, which reduces freight costs. It has the longevity of *A. flavidus*, with some plants of this cross being known in cultivation for up to 8 years (as at October, 1981). *Anigozanthos* 'Dwarf Delight' is frost hardy. Methods of in vitro propagation of this cultivar can be found in Hort. Science 13 (6) Dec., 1978, pages 662-663 and Journal of Horticultural Science (1981) 56 (2), pages 181-183. Other references to the cultivar (discussed as *A. onycis* x *A. flavidus*) can be found in "Australian Plants", Vol. 10, p. 211-217 and Australian Journal of Botany, No. 28, p. 659-680.

Colour Code:

Plumose hairs — red group 45A; perianth tube (mature flowers) — yellow-green 145B; perianth tube (buds) — near yellow green group 6C; filaments — yellow green 144C; anthers — yellow 13B.

Reference Specimen:

Accession number 253. Cultivar first received by the Authority on 20th February, 1980. The applicant is Dr. S. D. Hopper, W.A. Wildlife Research Centre, P.O. Box 51, Wanneroo 6065, W.A.

Grevillea* 'Pink Parfait'*Origin:**

Grevillea 'Pink Parfait' was raised by Townsville Tropical Trees of 41 Framara Drive, Townsville 4815, Qld. It is presumed to be an F2 of *Grevillea* 'Misty Pink' which itself is a hybrid between *G. banksii* (compact red flowering form) and *G. sessilis*.

Description:

This cultivar grows into a slender shrub of $\pm$ 4 metres tall. The leaves are very similar in shape to *G. banksii* being $\pm$ 12 cms long by $\pm$ 8 cms wide at the widest point. The lower surfaces of the leaves have a silvery appearance due to a coating of dense hairs. The flowers are vivid pink in fairly compact racemes $\pm$ 17 cms long.

Diagnosis:

Grevillea 'Pink Parfait' grows very similar in size and habit to *G. sessilis* whereas *Grevillea* 'Misty Pink' grows only to 2.5 m tall. The leaves are very similar to *G. banksii* in shape but are the green colour of *G. sessilis*, not the greyish colour of *G. banksii*. The inflorescence is longer than in *G. 'Misty*

Pink' reaching $\pm$ 17 cms long compared with 10-11 cms in G. 'Misty Pink'. The inflorescence is slightly narrower, $\pm$ 5 cms compared with 6 cms of G. 'Misty Pink'. The flowers are less densely packed on the raceme than in G. 'Misty Pink'. The styles are very similar to the shortish straight styles of *G. sessilis* rather than the longer, more hooked styles of *Grevillea* 'Misty Pink'.

Comparative Specimen:

Grevillea 'Misty Pink' CBG 8112260 (A.C.R.A. Acc. No. 177).

Colour Code:

Style — red group 54B; perianth — red group 38B; perianth lobes — red group 53C; leaf (top surface) — greyed green 194A.

Reference Specimen:

Accession number 264. Cultivar first received by the Authority on 23rd February, 1982. The applicant is Townsville Tropical Trees of 41 Framara Drive, Townsville 4815, Qld.

***Grevillea* 'Poorinda Ben'**

Origin:

Grevillea 'Poorinda Ben' is a seedling of *Grevillea* 'Poorinda Peter', raised by L. Hodge of Bairnsdale, Victoria.

Description:

This cultivar grows into an upright, large shrub ca. 3 metres tall by ca. 2 metres wide. The leaves are ca. 16 cm long by 3 cm wide; glabrous above with clearly distinguished, light coloured veins. The leaves are generally deeply divided to within 1-2 mm of the midrib. Each lobe is tipped with a pungent point. The stems are angular, particularly on the new growth. The inflorescences are 4-5 cm long and of the toothbrush type. They are borne on short axillary stems at the ends of the branches. Individual flowers are ca. 2.5 cm long. The perianth parts are covered with fine brown hairs giving the flowers an overall brownish appearance. The styles are red with green tips. The flowering season is from spring through summer.

Diagnosis:

This cultivar differs from *Grevillea* 'Poorinda Peter' and *G. longifolia* in the following ways:

1. Flowers differ in colour with *G. 'Poorinda Ben'* being more pinkish than the purplish colour of *G. 'Poorinda Peter'* though are much the same size and shape as the comparative specimens.
2. Leaves are more deeply lobed than *G. longifolia* but not as deeply lobed as *G. 'Poorinda Peter'*.
3. New stems are angular as in *G. 'Poorinda Peter'* but more angular than *G. longifolia*.
4. Growth habit is more erect.

Comments:

Whilst showing some minor differences the cultivar does not appear superior to either *G. longifolia* or *G. 'Poorinda Peter'*.

Comparative Specimens:

Grevillea 'Poorinda Peter' — CBG 068676 (A.C.R.A. Acc. No. 82);
Grevillea longifolia — CBG 037845.

Colour Code:

Style — red group 50B; style tip — yellow green group 152D.

Reference Specimen:

Accession number 182. Cultivar received by the Authority on the 9th September, 1976. The applicant is Mr. L. Hodge, "Poorinda", Mt Lookout Road, Bairnsdale, Victoria.



***Grevillea* 'Austraflora McDonald Park'**

Photography by W. Molyneux

Origin:

Grevillea 'Austraflora McDonald Park' is said to be a hybrid between *Grevillea rosmarinifolia* and *G. alpina* that arose at McDonald Park, Ararat, Victoria. The *G. rosmarinifolia* were planted and the *G. alpina* occur naturally in McDonald Park. This cultivar was first collected and propagated by Mr. Bill Molyneux of Austraflora Nursery in 1967 and has been in cultivation ever since.

Description:

This cultivar grows to ± 15 cm tall by ± 60 cm across. It forms a dense, low spreading shrub. The stems are round and the new branchlets are short and covered in hairs. The leaves are densely packed on the branchlets and are ± 2 cm long by ± 0.3 cm wide. The leaf margins are recurved to revolute and the leaves are densely covered with silky hairs underneath and sparsely covered above. The flowers are borne in terminal racemes on the branchlets. They are red and yellow in colour and very similar to the flowers of *G. alpina*. The perianth segments are almost glabrous with some sparse hairs while the style is densely covered with silky hairs.

Diagnosis:

This cultivar is low growing and very dense. In habit it closely resembles *G. alpina*, with the density and leaf size of *G. rosmarinifolia*. The cultivar's leaves are midway between the narrow, linear sharp pointed leaves of *G. rosmarinifolia* and the flattish, oblong leaves of *G. alpina*. The margins are recurved to revolute compared to the revolute margins of *G. rosmarinifolia* and the flat leaves of *G. alpina*. The foliage and flowers are midway between the glabrous nature of *G. rosmarinifolia* and the hairiness of the leaves and flowers of *G. alpina*. The newer growth is hairy but not as much so as *G. alpina* and more so than *G. rosmarinifolia*.

Other Comments:

Grevillea 'Australflora McDonald Park' has been grown in Melbourne since 1967 and has proved reliable in that district. Older plants respond favourably to being cut back. This measure can be taken to keep the shrub rejuvenated and to produce more flowering wood. This cultivar has previously been catalogued and sold as *Grevillea alpina* 'McDonnell Park' and *G. alpina* 'McDonald Park'. These names are incorrect as the plant is of hybrid origin.

Colour Code:

Perianth tube — red .2A; perianth limb — yellow orange 15A; style — near red 47A; stigma — yellow-green 152D.

Comparative Specimens:

Grevillea rosmarinifolia NBG 020246

Grevillea alpina NBG 036418

Reference Specimen:

Accession No. 164. Cultivar received by the Authority on the 10th November, 1978. Applicant is Molyneux Nurseries, Belfast Road, Montrose, Victoria.

Grevillea juniperina* 'Australflora Lunar Light'*Origin:**

Grevillea juniperina 'Australflora Lunar Light' arose as a sport on the prostrate yellow flowered form of *Grevillea juniperina*. The plant was growing in a garden in the Australflora Nursery at Montrose.

Description:

This cultivar retains the prostrate habit of the parent plant but is variegated, and the flowers are distinctly different in colour. The leaf variegation varies from all yellow on the new growth to mature leaves showing approximately 75% green and 25% variegation. The variegation is around the margins of the leaves. The flowers tend towards orange suffused with pink. Flowering starts in November.

Diagnosis:

This cultivar is distinguished from the prostrate yellow flowered form of *Grevillea juniperina* by the variegated leaves and orange-pink flowers.

Colour Code:

Flower, perianth — yellow orange group 19C; style — red group 37C; stigma — red yellow group 7B.

Leaves, outer edge — yellow group 4C; middle — green group 137B.

Reference Specimen:

Accession number 232. Cultivar first received by the Authority on 1st December, 1980. The applicant is Mr. W. Molyneux of Australflora Nursery, Belfast Road, Montrose, Victoria.

Grevillea* 'Lyn Parry'*Origin:**

Grevillea 'Lyn Parry' was selected from a naturally occurring hybrid plant near Kariiong, New South Wales. The cultivar is a hybrid between *G. buxifolia* and *G. sericea*. The original material was selected about 1974.

Description:

This cultivar grows to ca. 1.3 metres tall by 1 metre across. The leaves are from 15 mm to 35 mm long, occasional silky hairs above and densely silky tomentose below. The leaves are lanceolate with an apiculate apex. The leaf margins are rolled under. The older branches have a very scattered covering of small, silky hairs while the younger branchlets are densely covered with rusty brown hairs. The peduncles and buds are covered in appressed silky hairs that are rusty red in colour. The perianth is approximately 6 mm long and a dull pink in colour. The style is a dull red. The ovary and inside of the perianth are covered with dense, long, silky hairs. The flower racemes are terminal and umbel-like. The cultivar bears occasional flowers all year with the main flowering period being spring.

Diagnosis:

The hybrid origin of this cultivar is very obvious upon closer examination.

	<i>G. sericea</i>	<i>G. 'Lyn Parry'</i>	<i>G. buxifolia</i>
Style	glabrous. no appendage above pollen presenter.	slightly silky hairy. no appendage above pollen presenter.	densely silky hairy. appendage above pollen presenter.
Ovary	glabrous.	moderately hairy.	densely hairy.
Pedicle	slender.	slender.	short and stout.
Stipe	long.	long.	short.
Leaves	10-60 mm long.	15-35 mm long.	6-20 mm long.

Colour Code:

Style — red group 48A; perianth lobe — red group 54C; inside perianth and ovary — white group 155B.

Comparative Specimens:

G. buxifolia — CBG 7807709; *G. sericea* — CBG 057389.

Other Notes:

This cultivar has been tested in a number of areas of Australia and has done well in various soil and climate conditions.

Reference Specimen:

Accession number 184. Cultivar first received by the Authority on the 10th September, 1979. The applicant is Mrs. Lyn Parry of 60 Holcombe Avenue, Narara, 2251. ■

Wildflower Rock Gardens in Adelaide — Notes by Ivan Holliday

Although there are some notable exceptions (e.g. dwarf *Acacia*, some *Correa*, *Helichrysum*, *Viola hederaceae*), most small understorey shrubs or herbaceous native plants suited to rock gardens are too unreliable to be seriously considered as subjects for average Adelaide gardens.

Most of these plants which are sought after by native plant enthusiasts naturally inhabit the wetter forest areas, or sand heaths, usually where soils are sandy or well-drained stony clays, and mainly of acid reaction.

In Adelaide they suffer from generally alkaline soils and salty, alkaline water, particularly during summer when watering often becomes necessary. More success can be achieved in the Adelaide Hills and the laterite sands of the Highbury-Tea Tree Gully area. Even in these areas, however, many of these plants are short-lived and not suited to long term landscaping.

This does not mean, of course, that some of these much sought after plants cannot give pleasure to enthusiasts who are prepared to create special conditions or micro-gardens to cater for their needs and there are many such examples in the Adelaide area. Again, however, their life span is likely to be unpredictable.

An interesting but practical, hard look at the cultivation of our wildflowers in gardens of the Adelaide 'plain'. Perhaps readers with these conditions will advise what they have successfully grown — Editor. ■



Dryandra

Dryandra for Cultivation

by Tony Cavanagh,
Ocean Grove, Victoria

Dryandra arctotidis R.Br.

Collected originally by William Baxter in 1829 near King George Sound, *D. arctotidis* was described by Robert Brown in his Supplement to the Prodomus in 1830. Grown from seed at Kew Botanic Gardens in the 1830's (also Cambridge Botanical Gardens) it was popular as a bushy greenhouse plant. Flowered at Kew in May, 1842 — see Curtis' Botanical Magazine of 1843, article No. 4035.

Dryandra arctotidis is a bushy, erect dwarf shrub to perhaps 0.5 x 0.5m. Leaves crowded along the stem, either blue-green or dark green, 10-25cm long x up to 2cm wide, divided into numerous acute lobes up to 8mm long and extending nearly to the mid rib. Lobes separated by narrow to broad sinuses (up to 2mm) with margins rolled under. Leaves white underneath with prominent brown-yellow mid-rib, the ribs of the numerous floral leaves covered in their lower part by very fine white hairs. Flower heads terminal, to 3-4cm diameter, surrounded by floral leaves and brown bracts. Colour is generally greenish-yellow, sometimes suffused with pink; base of individual flowers glabrous (without hairs) remainder with fine, soft hairs, styles to 5cm.

Dryandra arctotidis is generally reliable in cultivation and does well in near full sun on slightly raised beds. It makes an excellent rockery plant though it does not relish a very dry spot in the garden. Until recently, very few members were growing this species though it is now becoming more common and seed is readily available. Oldest recorded known plants are about 4 years old. It is in cultivation at Cranbourne.

There appear to be two distinct forms which may eventually be given species status — *D. arctotidis* R.Br. and *D. arctotidis* R.Br. var. *tortifolia* (Kipp. ex Meissn.) Benth. The latter (sometimes simply referred to as *D. tortifolia*) has short, narrow lobes separated by broad sinuses, the lobes turned in giving the leaves a distinctive "V" appearance. It is also a very compact shrub, the leaves rigid, crowded together, growing vertically and generally dark green. The 'true' *D. arctotidis* has much longer leaves which are a distinctive blue-green, with longer lobes broader and separated by narrow sinuses, flat and not "V" shaped. The leaves also tend to arch more and are far more flexible. Refer to attached leaf prints for these characteristics.

Dryandra armata R.Br.

Dryandra armata was collected by Robert Brown at King George Sound in 1801 when he was botanist on Matthew Flinder's *Investigator*. It was described by Brown in Trans. Linn. Soc. and the Prodomus of 1810. Seed was collected by Peter Good (foreman-gardener from Kew Gardens) and transmitted to London where it was one of eight species introduced to Kew in 1803. It was also grown in the Cambridge and Glasgow Botanic Gardens (the latter from seed collected by Fraser in ≈1829) and a plant flowered at Glasgow in February, 1833 (See Curtis' Botanical Magazine of 1834 article No. 3236).



Dryandra armata

Photography by C. Garrett

Dryandra armata is a small, prickly, bushy often untidy-looking shrub to perhaps 1 x 1.5m. Relatively common in the south west including the Stirling Ranges. The stems are smooth, hairless with grey-brown bark. Leaves are very variable, crowded on short branches, rigid, deeply pinnatifid, triangular with curved points, dark green on top, paler below with numerous veins. Leaves are usually 5-8cm long by 1.5-2cm wide, sometimes similar to leaves of *D. falcata* but noticeably much less cuneate, lobes much shorter and sinuses smaller. Flower heads small, terminal, yellow-green, appearing in spring often low down in the bush, usually surrounded by floral leaves longer than the flowers. Heads sometimes show short, dark scaly bracts at the base. Style up to 3cm long.

There are few reports of this species in cultivation despite its commonness, the oldest plant being about 8 years old. It appears hardy though is said to be unattractive horticulturally. English reports of last century speak of it flowering throughout the year though this is not confirmed in Australia. Grows easily from seed, not tried from cutting. NB. Seed of *D. carduaceae* has been sold as *D. armata* but the leaves of the two are very different and the two species can be easily separated even at the seedling stage.

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Prostanthera violacea

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