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*Photograph from E. M. M. Boddy*

## A WILDFLOWER GARDEN

Foreground L to R:- *Acacia aculeatissima, Tetratheca ciliata;* Central L to R:- *Helichrysum cinearum, Pimelea rosea, Leschenaultia biloba;* Background L to R:- *Boronia denticulata* and a mixture *Grevillea, Prostanthera,* etc.

HOW TO MAKE A WILDFLOWER GARDEN AND WHAT TO PLANT

FLANNEL FLOWERS — Page 63

HOW TO GROW TERRESTRIAL ORCHIDS, GREENHOODS, ETC.

# This Issue . . . Growing Wildflowers

The primary aim of this publication is to provide simple instructions on the growing of Australian wildflowers in home gardens. We vary our style in this issue for those who wish to establish:-

A WILDFLOWER GARDEN (51)—How to establish a wildflower garden for the:

SHOWY WILDFLOWERS (55)—Mostly small plants chosen for display which includes: WESTERN AUSTRALIAN WILD FLOWERS (60)—With special reference to *Beaufortia*.

ISOPOGON & PETROPHILA (62)—Part 1 of a series introducing three species for the garden.

FLANNEL FLOWERS—THE GENUS ACTINOTUS (63)—A comprehensive article of special interest.

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WILDFLOWERS FROM SEED (67)—A challenge and more methods of competent propagators.

WATTLES—Their Propagation (69) and Cultivation (70).

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THE GREENHOOD ORCHIDS, *Pterostylis*—Autumn flowering (75), of South Australia (79) of Tasmania (81).

WILDFLOWERS OF CENTRAL AUSTRALIA (84)—Part 1 of a series with mention of showy plants for dry areas.

BOTANY—The Plant Body Part 2 (89)—An excellent series on plant botany for beginners.

EUCALYPTS—Quick results for New Gardens (95).

NEXT ISSUE . . . Rock Gardens, Miniature Gardens, *Pileanthus*. Please send notes.

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# A WILDFLOWER GARDEN

*by E. M. M. BODDY*

## SOIL TREATMENT FOR THE AVERAGE GARDENS

The majority of our native trees and the larger shrubs will thrive under average soil conditions where drainage is reasonably good, this would include the Acacias, Eucalypts, Angophoras, Casuarinas, Grevilleas, Kunzeas, Melaleucas, Callistemons, Banksias, Hakeas etc. There will be exceptions within the various species which is understandable owing to the size of the Continent, with its range of soil and climatic conditions and varieties of many species of plant life distributed in each State.

The root systems of the trees and larger shrubs will penetrate stiff soils into clay where they will thrive and become firmly established, but many of the smaller shrubs and plants are not so easily established unless the soil and physical conditions are similar to their native habitat.

Many of the densely populated areas of early settlements have followed agriculture where the soil has been selected as being heavy and more suited to farming than much of the light sandy soils where many of our choice plants are found. In consequence, many city and town collectors of small and colourful native plants are looking for means whereby they can build up gardens to make the conditions more suitable.

With the advent of trace elements, agriculture is being extended into light scrub country which will be ideal for the introduction of choice plants. Gardeners in many parts of the Victorian Mallee have been enjoying this advantage for a long time.

The successful growing of the Leschenaultias and many of our small plants is difficult in stiff soils and it is recommended that native plant collectors make a study of soil requirements before purchasing some of the rare species and variety of native plant life.

An inspection of areas where small native plants occur naturally and a duplication of these conditions by artificial means may be necessary in many gardens. Areas for inspection would be comparable to portions of the New South Wales Coast, portions of Victorian Mallee and Mornington Peninsula, the Brisbane Ranges adjacent Geelong, the 90 mile and Little Deserts, portions of the North East Coast of Tasmania, the Victorian Grampians, portions of the Victorian Wimmera, the many situations in Western Australia and Eyre Peninsula South Australia. In these situations the soil will be light and friable, well drained, and covered with natural mulch and humus from falling leaves and twigs over the ages. The soil will remain cool during the dry periods, and regardless of heavy rain and occasional flooding of flat country, the area will not remain saturated to smother and rot systems of often sparsely rooted plants.

It is considered that the three main factors controlling the successful establishment of many of these small native plants are:-

1. A cool and well drained root system.
   The raising of beds 6"-8" with light friable sandy loam will assist drainage and a cool root system may be achieved by heavy mulching and close planting, in order that the soil is quickly covered by foliage.
2. The majority of our small plants require a slightly acid soil, with a P.H. value between 5 and 6. A neutral soil has a P.H. of 7. Many light sandy soils which grow bracken fern are extremely acid with a P.H. of 4



TULIP BELLS — *Darwinia macrostegia* (Turcz.) *Benth.*

The tulip bells grow on Mondorup & Rees Peak in the Stirling Range, W.A. There are six species of Darwinia confined to the Stirling Range (except one which is also found on Middle Mount Barren), *D. collina* (COYANARRUP BELL), *D. hypericifolia* (FUSCHIA BELL), *D. leiostyla* (WARRUNGUP BELL), *D. squarrosa* (ISONGERUP BELL), *D. meeboldii* (MONDURUP BELL) and *D. macrostegia* (TULIP BELL). Each has its own locality and grows at a certain altitude. The plants vary from 18 inches to 6ft. high and flower in Spring. They are totally protected. Comments and photograph—Rosemary Gibbons.

*Editor's Note*: Colour plate reprinted from *W.A. Plants*, see page 60. We will do an issue on these very beautiful bells if readers would send me their experiences in propagation and growing of these and other species of Darwinia.

or under, which may be corrected with the use of agricultural lime — approximately 6-8lbs. per cubic yard. It is easier to reduce acidity than to reduce alkalinity therefore care must be used in the use of lime by not being too extravagant. The use of tanbark and sawdust as a mulch will reduce alkalinity, and an application of Iron Chelate will correct the effects of alkalinity on individual plants.

3. The root systems of our native plants will not tolerate continual movement in the wind. In their native habitat plants grow closely together with mutual support. Tripod staking of young plants which may be effected with light fruit tree prunings, bamboo slithers and the like, is necessary to prevent swivelling in the wind.

*TRIPOD STAKING*

These light stakes may be threaded through the foliage and into the soil away from the root system. Close planting will also assist where the intermingling of foliage is encouraged.

When larger and well developed shrubs are still subject to wind, one or more lengths of ⅜" steel rod (re-inforcing) thrust through the foliage and into the ground at an angle, will serve as a permanent stake and will be quickly covered by the foliage. Lengths of material 3' to 4' long are normally required.

*PREPARING A WILD FLOWER GARDEN IN A POOR SITUATION*

Our conditions in Geelong are difficult, the land is flat, the alkaline soil is stiff and poorly drained, of 12"-18" depth over soft limestone. Recent plantations that have been given initial soil treatment, have produced results that have been phenomenal. Visitors from overseas, Western Australia, and elsewhere have been amazed to see the variety of plant life thriving and flowering, having diverse native habitats but all growing under the same soil and climatic conditions.

Tasmanian—*Bauera, Baeckea, Coprosma, Pimelea, Billardiera.*

New South Wales and Queensland—*Grevillea, Hibbertia, Isopogon, Eriostemon, Crowea, Boronia, Epacris, etc.*

Central and Western Australian—*Astroloma, Beaufortia, Baeckea, Verticordia, Darwinia, Thomasia, Thryptomene, Scholtzia, Grevillea, Rulignia, Adenanthos, Eremophila, Chamaelaucium, Hypocalymma, Dampiera, Banksia,* and *Dryandra* etc.

Victorian species include *Epacris, Astroloma, Correa, Micromyrtus, Grevillea,* etc.

Plant life collected from 4" to 60" and 80" rainfall areas, from varying soils, is all thriving under the same conditions. Plant growth was rapid and twelve months after planting many specimens had reached a height of 6 feet, and in the 34 months following, at least three large utility loads of material has been removed in the process of pruning.

*SOIL PREPARATION*

The soil preparation did not present any difficulty, the main plantation 160' x 6' wide was topped up with 6" of light, acid, sandy loam from a bracken fern stand, and a 2" depth of rich chocolate, volcanic mountain soil from the Victorian Dandenongs. The additional soil was rotary hoed into the basic soil, smoothed over and left fallow for 12 months, during which time it was used as a storage area. Weed growth was kept in check, and the soil received the desired consolidation.

*PLANTING*

Planting was carried out during late February and early March, small individual holes being made to a depth of 6" for each plant, with the bottom of the holes quite firm to give the plants a hard root run into solid soil. In some sections soil consolidation was to such a degree that holes could only be dug by the use of a pick or mattock, care was taken that the holes had vertical and not slopping sides. The response from the plants was remarkable and growth beyond expectations.

Plants were closely spaced with the intention of covering the soil with plant foliage as quickly as possible in order to keep the root systems cool, and to create a mass of vegetation whereby neighbouring plants would

protect one another and prevent undue swaying in the wind. The area being subject to wind from all directions.

All plants were tripod staked with bamboo stakes, and mulching to depth of 2" with ¾" blue metal screenings. The mulching was deferred for a month in order that anticipated weed growth following watering, would be easily removed. Planting was avoided on windy days, but hot days did not interfere with the programme.

The larger shrubs have been encouraged to grow through the industrial mesh fencing, which has provided good support for the rapid growth of many specimens.

*WALLS FOR SMALL GARDEN AREAS*

Built up walls are ideal for some of the hard to grow plants and in particular if the planting site is subject to excessive moisture. We had an area where we wished to make a display, but which was always subject to watering of surrounding stock. An 18" high by 2' wide double wall was built with Besser bricks using a minimum of bricklayers' mortar on the joints. The soil mixture was as follows: 7 parts 5-6 P.H. sandy loam, 1 part mountain soil (heavy volcanic with natural humus), 1 part rotted compost, 1 part coarse sand.

The selected plants included Eremophilas from Alice Springs, Verticordias, Baeckeas, Thryptomene, Anigosanthos, Leschenaultias, Calytrix etc. from Western Australia and plants from the Eastern States and Tasmania. Plants from Kalgoorlie are receiving the same amount of moisture as those from Tasmania. Hand watering has often been necessary due to the good drainage provided by the elevation of this bed.

It is considered that many plants exist in poor dry soils, but that they will also relish good soils and moisture, provided that soil drainage is adequate.

All plants are tripod staked and the soil surface was mulched with ⅜" instead of ¾" blue metal screenings to improve the appearance. Crushed brick or river gravel would also be good mediums.

Plants from 4" to 60" and 80" rainfalls are all growing with equal results under the same conditions. Small rockeries and pockets may be constructed under the same lines, but the edges of rockeries and walls of rough stone may contain air pockets and dry out excessively, therefore avoid placing plants too near these edges, 6" being a minimum.

*PERMANENT MULCHING*

The original plantations in our grounds were mulched with tanbark in order to counteract the high alkalinity of the soil, but the tanbark os it decompcsed provided so much food value for the plants that root systems remained too near the surface. It soon became almost impossible to achieve any penetration of moisture from rain or artificial watering.

Blue metal screenings were used originally on a steep bank to prevent soil erosion, some plants adjacent showed an improvement in growth and colour and the potential of ¾" blue metal to a depth of 2", as a mulch, quickly became evident. We now mulch all permanent planting areas with a 2" depth of ¾" blue metal for a radius of 2 feet around each plant, or in closely planted areas the complete bed is mulched in this manner. Maintenance in weeding and watering is then kept to a minimum.

Other permanent mulches which may be used with advantage are river gravel from ½" to 4" sections, slate or large rocks. Blue metal has the

disadvantage of absorbing heat during extremely hot weather, but it also has an advantage during cold weather as a means of retaining warmth.

*WATERING*

Many plants in their native habitat, reaching up for light and without very much foliage and top growth, can survive long dry periods, they have grown slowly with their root systems deep into the sub soils. Introduced plants in native gardens, grow more quickly and produce immeasurably more foliage with subsequent increased moisture transpiration. It is evident that under these circumstances some watering is necessary and can only be gauged by testing the soil for coolness.

*PRUNING*

Regular pruning of native plants is often neglected in native gardens. Our plants are all improved by regular pruning (say yearly) and if this work is carried out after the flowering period, improved flower may be anticipated the following season. The plants will improve in appearance, being thick with foliage instead of being gaunt, leggy and woody.

Much of this work may be done with hedge clippers and the response of new growth gives a fresh appearance. This is very noticeable on Tea Trees, Melaleucas, Calothamnus and many of the Grevilleas, Banksias and Eriostemons.

*REMOVING PLANTS FROM CONTAINERS*

The majority of native plant nurserymen raise their plants for resale in containers with parallel sides in order to obviate root binding.

Parallel sided containers are necessarily tins, and special attention is required, as follows, in the removal of plants from these containers.

1. If the plant is well established and the soil is firm, it is recommended that the tin be immersed in a bucket of water and left there until bubbles cease to rise (5-10 minutes).
2. Run a heavy knife such as a wooden handled carving knife (rarely suitable for carving beef) around the inside of the tin top to bottom. Exert some pressure on the handle towards the centre of the tin and the blade will follow the inside of the tin without cutting into the root system.
3. Give the edge of the tin a hard blow on a post, edge of a barrow or some convenient object and the plant should slide out of the container.
4. If the plant does not remove freely, cut down one side with a pair of tinsnips. Don't use an axe, has often been used in the past.
5. If the plant has the appearance of being freshly planted, a dip in and out of water should be all that is necessary, but allow the trapped water in the top of the tin to drain through the soil before removing.
6. The first five minutes in the handling of plants is the vital period. Never plant tin and all.
7. The hole in the soil should never be deeper than necessary to house the plant and the bottom of the hole should be tamped firmly (i.e. consolidated) Do not dig a pit 3' deep as this may fill up with water like a sump. The water will not drain away, and the tree or shrub will normally die.

# SHOWY WILDFLOWERS

## TO MAKE A BRILLIANT DISPLAY IN THE WILDFLOWER GARDEN

*by E. M. M. BODDY*

### THE LESCHENAULTIAS

The Leschenaultias of Western Australia have become known to gardeners in the Eastern States by the introduction of *Leschenaultia biloba* ("The Floor of the Sky") which is recognised as one of the outstanding blue flowers of the world.

The Leschenaultias require sunlight and well drained, cool soil conditions. The soil should be friable and not extremely acid. These plants have light root systems, and blowing around in the wind may cause breaking of the roots and failure. Tripod staking with bamboo slithers or light fruit tree prunings is necessary. Cutting back after flowering will produce bushy plants to their advantage.

### *LESCHENAULTIA BILOBA AND ITS VARIOUS FORMS—*

*Leschenaultia biloba* (blue) may be produced as a small bush 1' x 1' and is often planted in groups of three at 8" to 12" centres, when one plant supports the other.

*Leschenaultia biloba* "Blue Peter" has a cascading habit and is bright blue with a white centre and very dainty.

*Leschenaultia biloba* "Boddy's Myall" is a vigorous upright plant with large deep blue flowers and a tendency to suckering.

*Leschenaultia biloba* "Suckering" is of upright habit with a strong suckering habit; the flowers are of a light blue.

*Leschenaultia biloba* "Boddy's Giant" is extremely vigorous with upright growth from 2'-3' with large deep blue flowers 1¼" across, being at least twice the size of the ordinary *Lesch. biloba*.

*L. biloba* "Boddy's Pale Blue" is of upright habit with soft pale blue flowers.

*Leschenaultia biloba* "Alba" is of upright habit with flowers of pure white.

### *LESCHENAULTIA FORMOSA AND ITS GARDEN CULTIVARS*

LESCHENAULTIA FORMOSA has been found in many different forms and may be prostrate and upright from 12"-18". The flowers are smaller than those of the Biloba forms and range from orange to deep red producing very bright colour displays.

*Leschenaultia formosa* bright red and orange flowers has fine foliage with a trailing and prostrate habit and a suckering tendency.

*Leschenaultia formosa* "Beaumaris Red" is quite prostrate with bright red flowers over a long flowering period. It is recommended that its prostrate habit be impeded and that growth be encouraged over large stones, or to hang over a wall otherwise the foliage is liable to trap too much moisture, causing rotting during periods of humidity or long rainfall.

LESCH. FORMOSA "BODDY'S GOLDEN GLOW" is an upright plant developing into a compact bush of spreading habit. The bright orange flowers are present over 6 months of the year. The foliage is steel grey.

*Leschenaultia formosa* "Sunset" has similar habit to "Boddy's Golden Glow" with steel grey foliage and bright orange flowers with a tinge of red.

*Leschenaultia formosa* "Boddy's Scarlet O'Hara" is low growing with masses of extremely bright red flowers; the brightest of all the Leschenaultias.

*Leschenaultia formosa* "Boddy's Brilliancy" is an upright form growing

to 12" producing masses of large bright red flowers for 9 months of the year.

*Leschenaultia formosa* "Boddy's Captain Blood" and "Boddy's Cardinal" are ot similar habit to "Boddy's Brilliancy" with slightly different tonings.

*Leschenaultia formosa* "Boddy's Wallflower" grows to 12" with masses of very bright and distinctive mustard yellow and soft red flowers.

*Leschenaultia formosa* "Boddy's Tango" is of compact growth producing masses of tangerine flowers.

*Leschenaultia formosa* "Boddy's Princess Pink" is of compact growth producing a mass of magenta to rose pink flowers.

*OTHER LESCHENAULTIA FOR THE GARDEN*

*Leschenaultia macrantha* (Wreath Leschenaultia) produces red and orange flowers on the perimeter with dense foliage in the centre, from which habit it derives its common name. It is slightly frost tender and should be given some space—12"-18"—in which to develop unimpeded.

*Leschenaultia hirsuta* (Hairy Leschenaultia) is sparse in habit. The foliage is slightly hairy and the flowers are large deep red.

*Leschenaultia linarioides* is of upright habit with long bright yellow flowers.

*L. floribunda* "Boddy's Forget-Me-Not" has minute bright blue flowers approx. 3/8" in dia. and are produced in mass on a compact bush, making a very bright show of flowers. This is some doubt about the species name.

*Leschenaultia formosa* "Boddy's Columbine" is of sparse twining habit through other plants. The interesting flowers with a lime gren base and red centre stand upright on the branches. The species name is in doubt.

*Editor's Note*: It is obviously time we did a special issue on the beautiful *Leschenaultia*. Will readers please advise o ftheir experiences with these plants. I personally have a current project to collect and grow every species and form. Will readers please send me cuttings in a plastic bag. As many as you can.

*MICROMYRTUS CILIATUS (SYN. BAECKEA PLICATA)* —

These small myrtles may be found on sandy slopes throughout the Victorian Wimmera and Mallee where moisture is trapped in the light soil providing a cool root system during the heat of summer. In these areas they often produce large quantities of seedlings which vary quite considerably in density of foliage, flower and habit.

The foliage is minute and dark green, the buds are bright red, the white petalled flowers are dense and from 1/8"-3/16" in dia.; on fading, the flowers darken producing a deep red calyx. The buds open from the base of the stems upwards which produces a variation of colour from red to white over the whole bush.

Areas containing these plants have been regularly inspected and cuttings have been selected from plants of special merit.

These plants are easily grown in gardens and rockeries where the soil is light and friable with good drainage and cool root system, slightly filtered sunlight.

*Micromyrtus ciliatus* "Boddy's Jewel" is an outstanding prostrate form, having the appearance of an expensive piece of jewellery; it may be layered to produce definite shapes.

*Micromyrtus ciliatus* "Boddy's Starwheel" is semi prostrate, producing regular radial branches from the centre; the flowers are very dense.

*Micromyrtus ciliatus* "Boddy's Heather" develops into a compact upright bush 12"-18" with dense flowers.

*Micromyrtus ciliatus* "Boddy's Little Heather" is compact and of

upright habit. The flowers are smaller, very dense, producing a mass of white flowers, gradually turning to pink and red.

*Micromyrtus ciliatus* "Boddy's Cascade" is a more open shrub with long arching branches that will cascade over and down rockeries producing a very interesting effect.

*Micromyrtus ciliatus* "Boddy's Lowan" and "Boddy's Dadswell" have both been named after the area in which they have been found; both of these plants are of vigorous and of compact growth, producing a very good flower display.

*Micromyrtus stricta* is a slim upright shrub which will grow to 2' with a diameter of approx. 6"-8". Growth is very compact and it should be planted in a position where there is some movement of air in order to avoid the trapping of excess moisture in the dense foliage which could cause rotting during humid conditions.

*VARIOUS SPECIES OF RECENT INTRODUCTION*

*Astroloma ciliatus* 18"-2' from the Darling Range, Western Australia, grows into a dense shrub with curving branches of fine deep green foliage and masses of long red flowers with bright yellow tips, in the autumn, winter and spring.

*Hypocalymma angustifolium* varieties. This plant occurs in the Darling Range in Western Australia, and normally produces long dainty sprays suffused with pink and white flowers as separate entities, clustered along the stems like miniature peach blossom. Growing from 2'-3' it is very showy, "Boddy's Cream" and "Boddy's White" are of the one colour and show up well against a contrasting background.

*Darwinia meissneri* is quite spectacular. This shrub to 2' is very compact with fine bronze green foliage and producing large pink bells turning to red on fading, the plant flowers for at least 4 months, winter and spring. The internal design of circular spots adds to the interest. Individual flowers last over two months.

*Darwinia rhadinophylla* 2'-3' also develops into a shapely shrub with fine grey green foliage and producing a mass of pink and white, conical, terminal flowers in early summer. Synonomous with *D. leiostyla*.

*Alyogyne huegeli* to 6' makes a dense shrub with soft yellow, red throated flowers of the same size and shape as the blue *Cienfugosia hakeafolia*, flowers for six months during the warmer periods of the year.

*Eremophila calorhabdos* has grey green, sticky, short foliage and a bright cerise flower. Flowers spring and autumn, a plant of vigorous habit, very erect generally on a single trunk to 5'.

*Dodonaea humifusa* (Native Hop Bush) from Coolgardie which is prostrate has similar foliage to *Dodonea cuneata*. Unimpeded this plant will cover a large area without exceeding a height over 1" to 2".

Plants of *Epacris longiflora* have been developed from a cutting off a plant which had almost pure white flowers. This white streak in the red bells is most attractive. Plants mature at 18" to 3' dependent on conditions, flower is during most periods of the year.

*Oxylobium tricuspidatum* as a ground cover is excellent, the foliage is mid green, quite flat and the small pea flowers are bright yellow and orange. Ground cover is approximately one sq. yard.

*Acacia suaveolens* "Boddy's Variegatum" 5-6' has been developed with half the leaves bright yellow and the remainder pale green with

splashes of lighter green, making a most interesting plant which is still of vigorous growth, regardless of the plant being variegated. Pale yellow ball flowers in early spring.

*Beaufortia schaueri* (pink) and *B. purpurea*, deep red, 1'-2' have similar small pointed dark green foliage. The flowers in late spring are bright round bottle brushes 1" in diameter.

*Brachysema latifolium* is quite prostrate with round deep green leaves with a silver underside and short orange red flowers along the branches. Winter and spring flowering. Ground coverage approx. 1 sq. yard.

*INTERESTING PLANTS FROM TASMANIA—*

*Boronia citriodora* from the high plains of Tasmania grows from 18"-2' and has a strong citrus aroma in the foliage and bright pink flowers.

*Dampiera adpressa* occurs on well drained moist flats on the North East coast with almost leafless foliage and bright, small, deep blue flowers.

*Boronia rhomboides* 2'-3' also occurs on the high plains of Tasmania. The foliage is wide and although smaller, resembles that of *Boronia serrulata*. The pink star flowers are very bright.

*Zieria smithii* grows as a small tree 8'-15' in the forest areas and gullies of Tasmania. The triple foliage is long and pointed giving off a strong odour when crushed. The small pink petalled flowers in the spring are very dainty.

*Anopterus glandulosum* (Tasmanian Laurel) may be developed into a large dense shrub 6'-12' dependent on conditions, with large bright green, glossy foliage, and large sprays of creamy white bells.

*Eucryphia billardieri* (Tasmanian Leatherwood) grows into a dense and shapely tree of 20', the white Gordonia like flowers with delicate tonings of light mauve have a delightful perfume which is re-produced in the honey. This tree is grown widely in Britain.

*Phyllocladus asplenifolius* (Celery top Pine) will grow from 20'-30' in the high rainfall areas of Tasmania. The wood is very ornamental and may be used in the rough, after the bark has been striped, as an interior post where the architectual requirements suggest this treatment. The adult "leaves" are small needles and the juvenile "foliage" resembles celery tops.

*Atherosperma moschatum* (Southern Sassafras) 15'-20' is a symetrical tree with dark glossy serrated foliage, which, like the creamy flowers is pleasantly fragrant. A good tree for cool moist conditions in areas such as Tasmania and the Victorian Dandenongs, etc.

*Nothofagus cunninghamiana* (Tasmanian Myrtle or Myrtle Beech) 30'-60'. This very ornamental tree may be found in the high rainfall areas of Tasmania and Victoria. The dark green bronze foliage is akin to maiden hair fern, the fresh growth in the spring is butter yellow. In many gardens it would require a well drained moist soil and will thrive in a cool shady situation. Growth may be limited to 15'-20'. This tree is also excellent as a potted indoor plant.

*Prionotes cerinthoides* (Climbing Heath) with thick scarlet bells, occurs on the trunks of trees in high rainfall areas.

*Cyathodes acerosa*, *C. glauca* and *C. dealbata*, *Trochocarpa thymifolia* and *T. gunni* all produce coloured berries and are suitable for cool climates of high rainfall.

*Athrotaxis cupressoides* 20'-40' (Pencil Pine) and *Eucryphia billardiera* 20'-30' being two good tree types for cool climates of high rainfalls.

# WEST AUSTRALIAN PLANTS

*A Descriptive Catalogue Edited by J.S. Beard and issued by the King's Park Board, Perth.*

Most Australians know of the fantastic wildflowers of Western Australia. In every issue we describe dozens and feature many in colour. Similar references are scattered over the botanical literature of the world but never before has the entire flora of flowering plants of Western Australia been published. It has now, and by your Society. What is more important to growers of wildflowers, apart from the full botanical name, the usual botanical jargon has been deleted and in its place, the pertinent facts that we as growers want to know have been added.

What do we want to know of a wildflower when introducing it to the garden? Name, where it occurs naturally and what the natural conditions are, such as soil type, etc. bush height, flower colour, and its period of flowering. This is precisely what we have been given in our new publication, "Catalogue of Western Australian Plants." The section on *Beaufortia* is reprinted below. Abbreviations were necessary, fl.—flower, followed by flower colour with the numbers indicating the month of flower. The letters refer to areas on a key map.

The information will appear rather scanty to some but it does provide all the information you need to assess the plants performance in the garden. Other features of this very valuable book besides its beautiful presentation on art paper with many full colour photographs, stiff coloured cover etc. are articles headed "Planning, Making and Growing a Native Garden", "Notes on Growing W.A. Plants", "Recommended Subjects for the Beginner," "Propagation", etc.

A very valuable reference book at the fantasically low price of 12/- plus 1/6 postage. Available by mail from the Editor in late April, 1965.

**BEAUFORTIA** Shrubs with showy flowers, type of Bottlebrush.

**B. andisandra Schau.** Shrub 1-2ft. fl. purple/red 12-4 Sse stony.
**bracteosa Diels.** Small shrub fl. dark red 9-11 Sad E co sand heath.
**cymbifolia Diels.** No data.
**dampieri A. Cunn.** Straggling tortuous shrub fl. pink 9 Si.
**decussata R.Br.** Erect shrub 2-3ft. fl. red 1-12 Ssw sandy.
**elegans Schau.** Shrub 4-6ft. fl. reddish/purple 9-1 Sid sandy swampy.
**eriocephala W. V. Fitzg.** No data.
**heterophylla (Turcz.) Domin.** Low shrub fl. pink/maroon 8-2 Sst sandy gravel.
**interstans F. Muell.** Shrub 2ft. fl. maroon/purple 11-1 Sa E co sand heath.
**macrostemon Lindl.** Shrub 4-7ft. fl. yellow, green and red 9-1 Sds laterite.
**micrantha Schau.** Low decumbent shrub 1-2ft. fl. mauve 10-3 Se mallee heath.
**orhifolia F. Muell.** Shrub 5-7ft. fl. red 11-4 Se stony.
**purpurea Lindl.** Shrub fl. bright crimson 9-12 Sad.
**schaueri Preiss.** Shrub 2-3ft. fl. pink 9-12 Sse granite.
**sparsa R.Br.** Erect shrub 6ft. fl. red/white 1-5 Ssw in jarrah.
**squarrosa Schau.** Shrub 4-10ft. fl. red 9-4 Siadw sand heath.

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The colour plate illustrates four species and is an example of the many colour plates used to illustrate the book. We will have a special issue on these excellent garden plants if readers will forward their experiences. Present indications are that they are ideal for gardens with good soil to those with heavy soil, possibly even clay. They appear to grow in any soil if they get enough water, a lot in the lighter soils. *Beaufortia sparsa* has provided a spectacular sight in the Sydney area and is the most widely grown species. *B. orbifolia* has done well in Adelaide requiring summer watering in dry spells. The dwarf shrubs may prove to be a valuable addition to gardens because of their small statue and brilliant abundant flowering. Mr. Boddy recommends two species on page 58.

*Beaufortia elegans*



*Beaufortia orbifolia*





*Beaufortia heterophylla*
*Photographys F. W. Humphries*



*Beaufortia macrostemon var. incana*

# ISOPOGON AND PETROPHILA

*PART 1 — by D. LEWIS, c/- P.O. Bindoon, W.A.*

To myself and no doubt to most wildflower lovers without botanical training, *Isopogon* and *Petrophila* are so similar as to be discussed together. With the patience and support of other readers interested in these lovely flowering plants I hope to struggle through the species that are of special interest to gardeners. This will, I hope, benefit those with even less knowledge of them than myself or enthuse those who have not had the good fortune to see the "cone bushes" and "drumsticks" in all their glory.

The first three plants are described below. I believe *Isopogon latifolius* and *Isopogon cuneatis* are considered the best as both have large purple flowers in winter but these must wait until I am more familiar with them.

*Isopogon divergens*—There are large patches of *Isopogon divergens* on the ranges north of Perth. Smoke bush, Conospermum teretifolium, and *I. divergens* often grow together. During September and October they flower together. The smoke bush with its soft grey plumes and the Isopogon covered with large pink flower buds make a lovely show. The Isopogon suckers extensively from the top of the root forming a dense head both bushes growing from chest to shoulder high and usually as wide. The main stems have short branches near the top with terminal flower heads which occasionally cluster to form a very large flower head. Individual flowers are long and very slender fringed with a yellow style.

The leaves are long and pliant, never sharp and prickly. They are terete (like wire) except at the ends of the branches where the leaves are divided. *Isopogon divergens* will stand heavy frost, and once established, will last for five years in the hardest of soils. I do not water mine even when the temperature is over 100°.

*Isopogon roseus* will flourish in garden soil fertilized with poultry manure. No garden plant would grow where my *Isopogon roseus* are. Too wet in winter, and it needs a pick to break the heavy clay in summer. There is one on the side of the gravel road to Jurien Bay. A nice healthy plant on coastal limestone. They grow on sand north of Perth on gravelly hillsides in the ranges. *I. roseus* grow waist high but mine are not quite 3 feet, a rounded compact bush. The stiff little leaves are about 1½' long with three leaf segments. The two side segments are 3 lobed and the centre one 5 lobed. They are not so much prickly as hard and pointed at the ends. The flower heads are pink, similar to *I. divergens*.

*Petrophila striata* is a small bush. On the back gravelly hillside they grow about 1½-2ft. high when they tend to become straggly, die back and sucker from the top of the root again. In more favourable localities they may grow larger. In spring a nice bush can be covered with little fluffy yellow flowers. Flowers are on the end of the branches but in damper soils are also axillary, extending down the branches. The flower head is cone shaped about one inch across. Seeds are retained in the receptacle through winter and this is possibly the reason the plants do not form thickets.

*Editor's Note*: Mrs. Lewis is leading a study section (see page 95) on these beautiful plants. Readers interested in growing them should contact her as above for seed and advice. Unfortunately we could not spread the finance for a colour plate of a species in this issue (suitable shades were not available either) but eastern bush lovers will know these plants as Drumsticks, *Isopogon*, and Conesticks *Petrophila*. Beautiful form and character plants.

# THE GENUS ACTINOTUS

*by A. BLOMBERY*

The "Flannel Flower", belonging to the genus *Actinotus* and the family *Umbelliferae*, is amongst the better known Australian plants. The name *Actinotus* comes from the Greek "Actinotos" meaning "furnished with rays" and refers to the flannel-like bracts, resembling petals, which radiate from the floral head.

The genus with 17 species is represented throughout Australia; 16 species are endemic and one is found in New Zealand. The flower heads resemble those of the daisy family (Compositae), but differ in that each tiny flower has a short stalk and there are a number arranged in an umbel; that is, they radiate from a central point similar to the ribs of an umbrella. In the daisy family the small flowers are without stalk and arise from a base or receptacle.



*Actinotus leucocephalus* *Actinotus minor* *Actinotus helianthi*

The species which are herbs vary from small annuals to perennial types but the latter are somewhat short lived, rarely exceeding a period of 4 years. The annual species, *A. forsythii*, is probably the most attractive with the flower head approximately one inch in diameter and pink flowers and



*Photography by Joe Glass, Geraldton.*

A WEST AUSTRALIAN FLANNEL FLOWER — *Actinotus superbs* O. H. Sargent

The well known eastern flannel flowers are whiter and not quite so furry. The furry, flannel-like bracts (this is their correct botanical term but to the laymen they appear as petals) are formed like rays of flannel around the flower heads. The actual flowers are shown grouped in the middle to form a compact head, each on a small stalk radiating out from a central point as in an umbrella. They belong to the family of plants known as the *Umbelliferae*.

white bracts; the divided leaves are dark green. This particular species is restricted to the Blue Mountains of N.S.W. Amongst the small perennial types, A. *minor*, of N.S.W. is a representative, being a scrambling herb with flower heads approximately half an inch in diameter; both flowers and bracts are white and the small leaves are greenish grey. Of the larger perennial species, A. *helianthi* of N.S.W. and Qld. and A. *leucocephalus* of W.A. may be regarded as amongst the most attractive. The flower heads of some species are up to three inches in diameter and the flowers and bracts are white but often tipped with green. Although A. *helianthi* usually grows from twelve to eighteen inches in height, some vigorous forms reach 5 feet with large attractive grey foliage.

Under their natural conditions, "Flannel Flowers" germinate in large numbers after a bushfire, with the annual species flowering and dying down within the year. In the perennial species only a few of the plants reach

flowering stage within the one year but in the second season flower profusely; during the third season, only a percentage of the original plants remain whilst in the fourth year, most have died. In between periods of fire, a number of seeds continue to germinate and grow to flowering stage. With further fires or clearing of an area in which "Flannel Flowers" normally grow, the same pattern is repeated. From the above it will be seen that for best results under cultivation, the perennial species are best treated as biennials and continued plantings should be carried out to ensure there are always new plants coming into flower.

Collection of seed is relatively easy and is as follows:- After flowering, the bracts close around the ripening fruit, which consists of a carpel with one seed. When the fruits are ripe, the bracts open and fall from the plant, leaving a tufted head of fruits resembling a small "Dandelion." At this stage the fruit is ready for collection, usually from the end of November to January.

Seeds germinate readily, although frequently a number are infertile; thus allowance should be made for this by sowing seed fairly thickly. To sow seed, fill a small seed box with sandy soil, containing a percentage of leaf mould but free from clay. Consolidate the soil by watering well, then sprinkle the seed over the surface and cover with fine sandy soil to twice the thickness of the seed. Germination usually occurs three to four weeks after seed has been sown. Seedlings are best handled while small, that is when the first or second leaves have formed. Tins provided with drainage holes at the side adjoining the bottom are considered the most satisfactory in which to transplant seedlings. To transplant seedlings, fill the tin with light sandy soil, having first placed a layer of stones or ashes in the bottom for drainage. Make a hole in the sand with a small stick and then fill the hole with water. Prick out a small seedling and place into position in the hole and firm the soil around the small plant; then water well and place in a shaded position for a few days before gradually exposing to full sunlight. Seedlings should be kept in the tins for approximately 3 months, when they are ready for planting out in the garden.

A well drained sunny position is desirable for best results. Care should be taken in planting to disturb roots as little as possible for the plants are sensitive to root disturbance; after planting, water well.. Mass planting makes the most attractive display. Watering should not be neglected during the establishment stage. To ensure a continued display in the garden, new plants should be continually added.

Providing the simple rules as described are followed no difficulty should be experienced in the cultivation of the genus Actinotus.

*Actinotus schwarzii* of Central Australia is most closely related to N.S.W. flannel flower *Actinotus helianthi*. It is utterly confined to a few sheltered localities in the Macdonnell Ranges, notably at Stanley Chasm where it is fairly plentiful high up on precipitous rock faces. This is perhaps an asset in its chances of survival against the increasing tourist traffic there.


## YOUR GUIDE TO NATIVE PLANT SEEDSMEN

*Nindethana*, Box 5, Dripstone, N.S.W. For all Native Seed. Packets, ounce or pound lots. Free list on application. Special supplies of West Australian Seed.

*Australian Seed Co.*, Robertson, N.S.W. Bulk or packet lots. Stamped envelope brings lists.

*Western Wildlife Supply*, Gilgandra, N.S.W.—Bulk supplies of natives and exotic tree and shrub seed to the trade—Special collections to order.

*King's Park Seed Supply*, King's Park, Perth, Western Australia—Seed list 1/6 post free, seed 3/- pkt.

# TASMANIAN NOTHOFAGUS

*Part 1 of a series on Tasmanian Plants by A. M. GRAY*

*Nothofagus gunni* occurs on most west Tasmanian mountains at altitudes from 3000'-4000', it forms extensive tangled groves amongst other alpine shrubbery. In the autumn it is most conspicuous when the leaves which resemble those of the European beech (though smaller) turn bright, golden yellow, prior to falling. It is the only truly deciduous tree occuring in Australia.



The common name applied to this shrub is very apt. It is known as "tanglefoot." The roots and lower branches become tangled and gnarled as they creep over boulders and logs. It grows on high exposed ridges of the mountains, down to the upper limits of the rain-forests; on boulder-fields (characteristic of Tasmanian dolerite mountains) or on fairly deep soil in gullies and hollows. It tolerates a neutral or fairly acid soil, and a rainfall varying from 50" to 100" p.a. but likes to be well drained.

*Nothofagus gunni Hook.—Fagaceae*, a spreading, much branched shrub or small tree, the branches often somewhat tangled with each other, and forming compact shapes. The leaves are from ¼" to 1" long and broadly ovate or nearly orbicular in outline, the upper surface is deeply impressed with the diverging veins. They are obtuse at the apex, and have very short petioles, they occur alternately along the branches. The flowers are very inconspicuous, unisexual, and occur singly in the axis of the upper leaves; the fruiting is coarsely tuberculate and contains three flat, winged seeds.

Propagation—Perhaps the easiest method is from seeds, these fall from the capsules in January or February. They germinate quite readily if sown soon after this, in a simple mixture of ½ fine sand and ½ well shredded peat moss (by quantity). Germination takes from six to eight weeks, and during this time, and until the young seedlings have gained their secondary leaves, they should be kept in cool, shaded, moist conditions. Once the secondary leaves have appeared, the seedlings may be transplanted into pots or straight into the ground. The best soil is one composed of equal parts of half decayed leaves and similar compost, gravel, coarse sand, and any light textured, slightly acid soil.

The rather slow growth of this plant makes it most suitable for bonsai or similar miniaturising techniques and treated as such makes an extremely attractive specimen. If however, it is desired to plant it in a garden, a cool moist position is favoured with rocky soil for drainage and support of its root-system, which though not extensive in a single plant, likes to grow where it can "feel the rocks." Ample water should be provided during the summer months. In winter very little care is needed as the plant is then dormant. No fertilizers or manures are necessary.

Seed is available free of charge by sending a stamp addressed envelope to the Editor.

# WILDFLOWERS FROM SEED

Part 2 — A review by the Editor. Part 1 in the No. 15 issue gave details of how the most experienced amateur can grow about 80% of our wildflowers from seed. Many of the remaining 20% have frustrated even the most experienced propagator and a review of the fundamental requirements appears essential. My thoughts on the matter are given to evoke, not only the criticism I will no doubt receive, but also to encourage or possibly to shame a few readers into experiments in this problem. My difficult plants are *Verticordia Calytrix, Pimelea, Boronia, Eriostemon* and *Epacridaceae*. Any seed with a woolly or water resistent coat gives difficulty.

A flower exists to produce seed. Having accomplished this task it dies leaving a dormant living organism to withstand adverse conditions and to ensure survival of the species when suitable conditions occur. Structually the seed is a resting embryo plant which is surrounded by a seed coat (testa). There may be additional tissues principally for food storage. The embryo has several parts, the radicle or young root, the plumule or young shoot and one or two cotyledons or modified leaves.

Provided the embryo is living and mature, our problem is to awaken it and induce it to grow. To do this it must receive the correct conditions of water, temperature, light and air. Nature has many ways of delaying the germination of a seed until conditions are most suitable to its survival. As we want good germination under artificial conditions we must (a) frustrate all these obstacles imposed by nature, and (b) determine the correct conditions for the development of the seed.

## (1) *Seed Viability.*

Is the seed good, "alive", seed to start with? This obvious factor is the cause of many disappointing results. Experiments and research into the usual percentage of poor seed and methods of determining this factor are essential. Those methods of seed treatment that involve removal of the seed outer coat or testa give a clear indication of this. Out of a whole packet of *Pimelea* seed I got only two good ones to plant.

How long will seed remain viable or fresh? Seed of many species of plant will last hundreds of years whereas others last as little as a week. If the outer seed coat is frustrated I consider that all seed may be treated alike and planted as soon as the season is right.

Is the seed mature? Sometimes the embryo is not completely formed or ripened at the time it is shed from the plant, and the embryo continues to develop until the correct time for germination. Experiments are essential to determine this factor for our difficult natives. Is it necessary for seed to lie on the ground under the bush to mature? Striatification is the term applied to the process of "maturing" the seed artificially. The seed is stored for a period in a refrigerator in one method. I have not found a proven explanation as to the reason for this or its effect on the seed. It no doubt originated from experience by propagators in countries with severe winters, but is it reasonable to bother with this for natives in our climate? Does such treatment effect the embryo or the seed coat? If the latter, removal of the seed coat should frustrate this safeguard of nature.

### *(a) Frustrating Nature's Obstacles*

Nature's armour is usually the seed coat. Where this coat is very hard it is often sufficient to soften it by immersion in boiling water, or making a hole in it by nicking or filing, to allow water to enter. An early issue described a method of chemical attack on the coat and another method is given by J. Howard in this issue. He also describes a method of completely removing the seed coat physically by peeling, that has been most successful with seed of *Grevillea*. For difficult seed such as *Verticordia, Calytrix, Ptilotis,* etc., experiments along these lines appear to offer the best prospects of success. A further development of this method is described by Mrs. H. L. Cole in this issue.

### *(b) Conditions for Germination*

A simple aseptic method of seed germination has been described by H. Boyd in previous issues. Essentially this is sowing the seed on an almost sterile medium such as vermiculite, in a clean crocked pot which is placed on a bench to receive full sunlight. It is a simple method not requiring any special facilities and within the ability of the rankest amateur gardener.

This method is again described by I. G. Holliday in this issue, the principal variation being the covering of the seed with porous gravel to conserve water from evaporation and to hold the seed and vermiculite in place. Under these conditions of outdoor propagation, temperature and light are regulated to a degree, as they are in nature, by change in the seasons. Best results appear to come from early spring planting although many propagators prefer early summer or early autumn planting. Research indicates that the period of darkness (i.e. length of night) has a significant effect regulating the time of germination in nature. Readers could experiment using this method wtih seed taken from the same batch, but planted at different times of the year and with different seed coat treatment.

The use of germination stimulants should be tried on the difficult species. Such stimulants are potassium nitrate and thiourea, gibberellic acid and kinetin.

(2) *Treatment of Harsh Coated Seed by J. S. Howard*

I have tried a version of treating the skins of *Kennedya beckiana* seeds and with very good results. Firstly, I soaked the seeds in neat commercial hypochorite bleach (White King) for two hours, then removed, rinsed and treated with boiling water, twice for good luck. With a day of soaking in between, 2-3 weeks after sowing on top of "perlite" (a sterile media) in small pots, most of the seeds were swollen with splits visible in the seed cases. The white seed was visible inside and some were starting to shoot. Within a month of sowing, most of the seeds were shooting, which is a much better result than obtained in previous sowings of Kennedya seeds of several species which were treated with boiling water only. These seeds took a good deal longer to germinate.

*Editor's Note:* In Issue No. 2, Mr. H. Boyd described in detail, a method of treatment of seed with Calcium hypochlorite. The Kennedya seed used above, obviously has a very hard coat. Other seed may be damaged by such treatment, but Mr. Boyd's method is subject to fine control if carefully observed. Supporters for the mechanical damage method to the seed coat such as nicking or filing a hole in the hard seed coat will no doubt jump in and advise Mr. Howard he could get the same result with less effort using their method. They also claim that chemical or boiling water treatment of the seed coat destroys any friendly mechanism that may be attached to the seed coat to assist the plant to become established. It has been proved that some seed coats contain a chemical that actually retards germination until it is leached out but I have not yet seen evidence that a friendly organism does really exist to produce the reverse result in some cases. Who will buy into this argument?

One advantage of Mr. Boyd's method is that it can be used on very fine seed, seed too fine to be held or have its coat damaged by mechanical means.

3. *Removal of Seed Testa (Coat) by Mrs. H. L. Cole, Nedlands, West Australia—Germination of W.A. Grevilleas.*

I have been trying the method of germination recommended by J. S. Howard in "Australian Plants Journal" Vol. 2, No. 15 on some of the West Australian Grevilleas. (The seed coat is removed from the seed after soaking in water, by careful manipulation of a scalpel or razor blade). It has proved to be a quick method with the species, *G. candicans, G. juncifolia, G. leucopteris* and *G. excelsior.*

After peeling the testa from the seed, I place the seeds in small plastic bags which have been wetted inside with boiled water. The seeds and bags are then placed so that the seeds are kept vertical with the growing point downwards. The radicle then grows straight downwards, and when it is 3/8 inch long and some root hairs have formed, it is placed in a slit made in a pot of soil. The cotyledons are placed above the soil surface, and soon open up and become green. Until germination takes place the plastic bags are kept in the dark, and a further addition of water may be necessary, but all excess should be drained off. The more fleshy seeds such as *G. candicans* and

*G. leucopteris* are best started in a cotton wool sandwich until the radicle starts to grow.

For the successful germination of *G. petrophiloides* I have used a different method. The testa is loosened but left on the seed except for removing a small portion at the growing (pointed) end which allows for observation. The seed is placed vertically in a layer of moist vermiculite and inspected after a week for root growth. When a root of ¼-⅜ inches has formed the seed is inserted into soil.

SEED GERMINATION—*My method by I. G. HOLLIDAY, Adelaide, S.A.*—

Use a terra cotta pot, no larger than 4 to 5 ins. and *fill* with Vermiculite. Thoroughly wet and squeeze down in the pot, then top up with more Verm. and wet again. The Verm. medium should be dense enough once wet to pretty well maintain its level in the pot, otherwise seeds tend to wash well down. Once this is established I carefully firm the seeds in the top surface of the Verm. and cover with a light coating of clean porous gravel (one-eighth of an inch and less) screenings. The pots are placed on a covered terrace facing north where they receive some morning sun and daylight throughout the day. Verm. retains moisture so well that often germination occurs without watering being necessary, depending on weather conditions. In any case, an examination every two to three days determines whether I water or not. Watering is done by immersing the whole pot in a bucket of water. Warmth is certainly necessary. I find October-November good months for seed sowing. Germination is poor once the weather turns cold.

Regarding the transplanting of seedlings, I have never liked the method of pricking out young soft seedlings. I grow them on until thoroughly hardened, sometimes 3 to 4 inches high but usually less and then shake all the roots free of soil and transplant individually into a permanent container, usually a tin containing good potting soil. I always wait for a cold wet spell to do this and stand the plants out in the rain. I think all amateurs and professionals alike have batches which fail when transplanted usually due to some soil fungus or such like which will cause the plants to fail at certain times and not others.

# ACACIA FROM SEED

*by W. G. TUCKER*

Many methods are used for the germinating of Camellia seeds, but a method used by myself and other members of the Australian Camellia Research Society is to mix a number of seeds with damp peat moss and put them into a glass jar. (I use about 12 seeds to the average size pickle jar—the peat moss is kept just moist and I keep the jars in the kitchen where a fairly even temperature is maintained). The seeds begin to sprout in about ten days—some of course take longer. When the tap-roots are about 1" to 1½" long, the seeds are picked out of the moss and planted in individual flower pots or tins, and grown on in larger pots or tins as they make growth. I myself pinch off the tip of the taproot to encourage root branching as 90% of the seedlings will remain in pots for about 7 years — most of them are later used for grafting as the chances of growing an outstanding Camellia variety from seed are slim.

Camellia seeds like seeds of many of our natives, including acacias, are hard-shelled and when reading the difficulties experienced in our Acacia Group Newsletter, I thought I would use the same method on acacia seeds.

On Boxing Day, 26/12/62, I harvested 48 seeds from my Acacia Deanii (being the only wattle of those I am growing which set seed) and planted them in moist peat as explained above. By the following Tuesday—New Year's Day, 12 of the seeds had germinated and by Saturday, 5th January, 1963, every one of the 48 seeds had germinated. As I was proceeding on my annual holidays on this day I did not bother to plant the seeds out into individual pots, but from observation of the very quick growth which took place, would think the seeds should be examined each day and as they germinate, be placed in tins or pots for growing on.

It is interesting to note that Thistle Harris in her book "Australian Plants for the Garden" recommends a similar method at Page 47 where she says, "A simple and reliable method of germinating seeds is that of placing them in a box containing damp sawdust covered with a damp cornsack. The box may be placed either indoors or in a shaded part of the ground . . . etc."

# WATTLE IN THE GARDEN

*This article by A. C. Keane is reprinted from the Acacia Study Section newsletter where it was headed "The Cultivation of Wattles with Special Reference to Pruning"*

Acacia require attention particularly in their first two years when it is often difficult to give certain varieties a good start. Some claim that short stumpy plants—two to three inches—do best. It is said they catch up with and even pass older or better grown specimens in a year or so. This is quite possible but there is a big if—if they survive their first year. My experience is that the smaller plants are a gamble and I usually lose about 25%. With better grown specimens, 5 to 9 inches, I have had more satisfactory results. We could in this regard, take a deal of notice of the Government Nurseries. If you purchase from one of these you will note most are 5 inches or higher; rarely is anything under 5 inches sold and these experts must have their very good reasons for this. I therefore, recommend the purchase of plants at least 5 inches high, longer if possible.

When to plant? Most recommend Autumn. This could be so for light soils but in heavy wet soils one finds the Spring much better, provided water is available during the coming Summer. Autumn planting if followed by heavy rains often results in the plants being swamped.

Apropos of "attention", I am aware there are two schools of thought in this regard. Some say treat them rough as in the bush; others suggest care in their early days. We can only find out by trying both methods. Either way our object is to improve the bush type specimens to fit into average gardens both large and small. For apart from the comparatively few nursery specimens, wattles are known only as plants growing in the bush, long and stringy, reaching for the sky where is the light and heat essential for their survival. Beautiful for a brief few weeks each year and afterwards dull and often times disease ridden, not worthy of even a passing interest. To complete the picture, if near the road, where most

see them, covered with dust. tl is natural that little or no interest is taken by gardeners in the second largest and most attractive family of native trees.

Gardeners object that acacias are short lived and therefore, not worth the trouble, and this indeed, seems to be the main reason for their lack of popularity. But note this applies to a number of members of most genera. I agree it applies to some of the very rapid acacia growers. It is nature's method to have slow growers like a long time and vice versa. But many wattles do live a long time, some a very long time indeed.

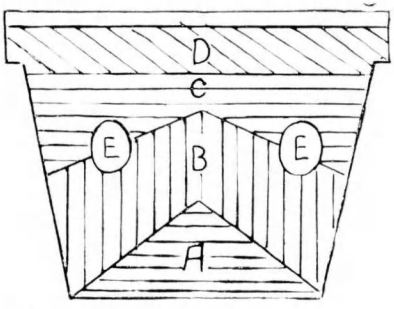
Whichever school of thought you belong to it seems reasonable to believe that bush plants must, for garden use, firstly be made shapely. Secondly, they must be treated to flower to their fullest extent. Thirdly, they must be made to set seed in quantity, and finally, they should be able to withstand weather conditions such as wind, frost and excessive moisture. The first three conditions can be largely fulfilled by suitable pruning. The common acacia *A. baileyana* is an outstanding example of what can be achieved by this type of attention. Those seen in the open country are long and streaky, usually with no branches for the first 6 to 8 feet, the top only has reasonable foliage, and it is not worthwhile except when in flower. Try cutting according to a system and you have a shapely specimen covered in foliage almost to the ground and eyetaking even in the non flowering time. In short, a small tree barely resembling the well known open type. Almost in fact, a new type of Cootamundra. On a par with this one, given the same treatment, is *A. pycnantha* (Golden Wattle) which, covered with branches and leaves to near ground level is, in appearance, only a relation of the usually seen type.

Such results can be achieved for taller wattles by commencing pruning after the first year's growth. They will be about 2 to 3 feet high and the top 6 to 8 inches of the main branch should be nipped off. Next year they will be 6 to 8 feet high and at least 2 feet of the main branch should be removed and the laterals shortened to shape. At the end of the third season a good specimen will be 15 feet high and at least 4 feet of the main branches should be lopped, and you can cut even harder in specimens of this type which thrive on hard pruning. After this they require no further attention as they are shapely trees and only occasional removal of unsightly trailers is necessary. Most of the tree varieties (15 feet and over) of Acacia, can be hard pruned as above. Examples are *A. melanoxylon, A. pruinosa, A. pravissima, A. dealbata, A. mearnsii* (formerly *A. mollissima), A. terminalis* (formerly *A. elata), A. implexa, A. prominens* and *A. normalis*. Watch this latter one and keep it cut back even until it has finished its fourth year. This is a lovely specimen and often disappoints by blowing over when just reaching its prime. It is a surface rooter and stands wind badly. From early days it should be staked to a long piece of iron piping. Wooden stakes are useless when the tree grows to any size.

*Editor's Note*: For those readers who wish to join in the work of the Acacia Study Section send a stamped addressed envelope to the Editor. We shall have a series of articles on "Dwarf or Small Acacia for the Garden." Please send any notes you can on species you know. See the Acacia on the front cover. This should change view ideas of readers on the value of ornamental dwarf Acacia.

# GROWING TERRESTRIAL ORCHIDS

by R. C. NASH




Mr. Nash is leader of the Native Orchid Study Section—Terrestrials, and will welcome comments of support from readers in his quest to determine how to grow all our native orchids. The following description is based on his experience with orchids of South Australia.

AREA A — Broken pot—limestone pieces and
B — Sand, coarse or fine, washed, must not hold large amounts of water, or be capable of staying damp.
C — Sand sawdust mixture.
D — Sawdust top band.
E — App. location of tubers.

*Potting Mixtures:—*

The following four methods have proved successful

1. *Pterostylis curta, P. pedunculata, P. cuculata.* Areas B & C to be proportioned 20/30% sand, 70/80% sawdust. *P. nutans* prefers this method also but with more shade.
2. *Pterostylis robusta, P. alata, Acianthus exsertus, A. reniformis, Diuris maculata, D. palustris.* Areas B 70/80% sand, 20/30% sawdust, C 50% each sand and sawdust. *Diuris brevifolia* prefers this treatment also but must be kept damper in early summer. *Corybas dilatatus* and C. *diemenicus* also like this treatment if the pots are kept in a well shaded cool damp location.
3. *Caladenia latifolia.* Area B 100% sand, C 80% sand, 20% sawdust.
4. *Pterostylis barbata, P. mutica, P. vittata, P. cycnocephala, P. pusilla, P. longifolia.* Area B & C good washed sand, allow sawdust on top to rot down into sand, replenish every 3 years only. *Caladenia cardiochila* and C. *filamentosa* var. *tentaculata* prefer this No. 4 mixture but should be planted in a cluster.

During each summer remove about ½ inch of top soil from pots and fill to top with new sawdust. I use fresh dry sawdust that is about 3 years old from Eucalyptus camaldulensis, before it is used I damp it down well. I have used sawdust from other Eucalypts. Spray every 3/4 weeks with Urea and apply super phosphate lightly once a year. Spray to control mites, thrip, aphid, snails, etc. Dusting and bait setting can also be used. If rot sets in on leaves spray with a weak solution of chloride of lime.

Watering of plants—allow as much natural rain to reach plants as possible, in a dry winter it is necessary to hand water if pots become dry. A little water in summer is helpful with discretion.

When collecting plants I remove all the soil except for the little that clings to the plants. Correct drainage is very important. Keep all weeds down in pots, some small native plants could become pests, moss must be removed each summer.

A method I have used to help overcome dryout in summer and it helps drainage in winter too is, lay down a concrete slab large enough in area to accommodate the number of pots to be used (this slab must have sides around it). Place on top of slab a one inch layer of ½ inch metal (gravel), place pots on top of metal, spaced about 3 inches apart. Fill the spaces between pots with clean sand to just below the ridge of pots.

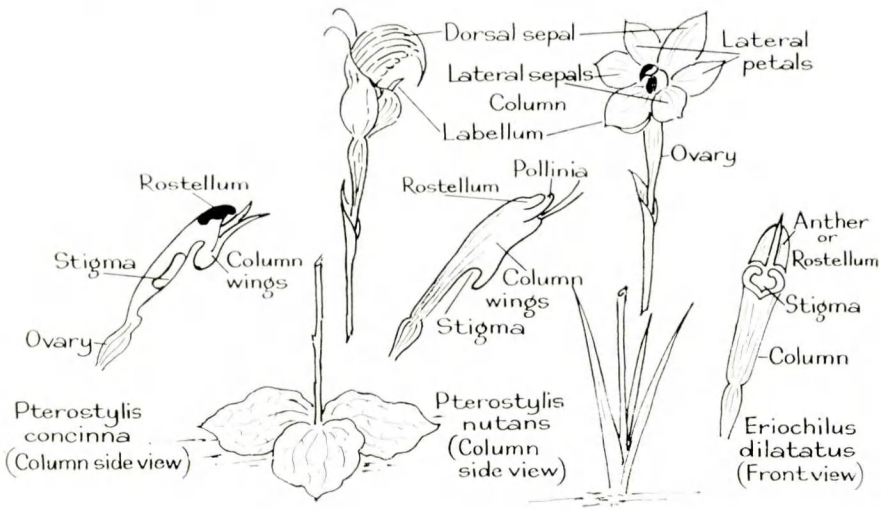
# ORCHID POLLINATION

*by D. L. Jones*

Pollination of the orchid family basically follows the pattern of other families of flowering plants. However, certain structures and modifications found in the flowers of orchids may confuse beginners and it is hoped that this article may help to remove some doubts.

Pollination in all forms consists of the transference of the male gametes or pollen grains onto the receptive stigma or female organ of the flowers. Subsequent growth of the pollen grains brings about fertilization and the formation of seed. Thus the sexual parts of the flower are divided — on one side we have the male organs, the stamens, producing pollen and on the other we have the stigma of the female organs for receiving the pollen. However, in orchids the set-up is different and we have the one single unit known as the column, containing both male and female organs. The organs are not similar in appearance to those found on other flowers, but are greatly modified and are found on separate parts of the fleshy column, which is believed to be an extension of the axis of the plants above the ovary. A further modification of the pollinating devices is the clumping together of the pollen grains into aggregate units known as pollinia. There are generally two or four such masses, the individual pollen grains being joined by elastic threads. Apparently they are necessary to ensure adequate fertilization of the innumerable ovules or seeds found in the seed capsule.

The column can be readily picked out in most orchid flowers. It is a sturdy generally curved fleshy structure found at the base of the dorsal sepal. In front of it and often in close association with it is the labellum or lip of the flower. On the underside of the curve generally about midway along the column and always closest to the lip is a broad generally sunken stick area. This is the stigma and the stickiness is for the retention of the pollinia. At the tip of the column there will be seen a small cap



of varying shape and size. This is removable and is known as the rostellum. It contains the pollinia which may or may not adhere to it. Upon removal of this cap the pollinia can be easily obtained.

With some orchids the column may not be obvious being enclosed by certain floral parts, e.g. *Pterostylis, Cryptostylis.* To get at it, these floral parts may have to be removed and this should be carried out carefully so as not to damage the sexual parts of the flowers. The columns of some particular species may contain additional structures not present in all orchids but the basic structure will be there and the position of the various organs can be readily determined. A good example of this is the wings surrounding the stigma on the column of the greenhood genus Pterostylis.

Before attempting orchid pollination you should familiarize yourself thoroughly with the orchid parts. Once this is done it can be seen that the procedure is fairly simple. The only equipment I use is a petre dish — a clean glass saucer will do — and a dissecting needle, which is simply a needle mounted in a light wooden handle. It is most convenient and quick if the required pollinia are obtained first in the saucer and then these are placed onto the stigmas. The pollinia are picked up by means of the tip of the needle. Lick the tip of the needle or otherwise wet it and lightly lift the rostellum. The pollinia should be visible and they can be easily picked up with the wet point of the needle. The saucer should be close to the flower as sometimes the rostellum containing the pollen masses may fall right off. The easiest way to collect these types is to gather the rostellum and all and remove the pollinia later. After a bit of practice you become very adept and experience little difficulty. The pollinia are applied to the stigma with the point of the needle and they should stick if the stigmas are receptive. One per stigma will give satisfactory results but more can be applied for surety if available. A metal label containing the nature of the cross should now be tied to the flower — don't rely on memory. On the crosses that have taken the flowers will wither quickly but the ovary below them will remain green and begin to swell. If growing conditions are kept regular the ovary will continue to swell and change colour. Finally, when mature, small slits will show along its length and the seed will begin to shed. If possible the capsules should be harvested just before this stage is reached — the best criterion here is experience. The seed is then stored dry in a paper envelope. Its viability will be greatest in the early years ensuing from its harvest.

# Collecting Native Orchid Seed

*by R. C. NASH*

Select good healthy plants to collect seed from. It is best to pollinate the flowers by hand, using a pencil to pick out the pollen from the flower. This flower generally will be a younger one, as the pollen will most likely be ripe before the stigma is ripe in any one flower. Put the pollen into a flower a few days older than the flower it was taken from (one that has been open longer). The pollen is placed on the stigma and gently rubbed over the stigma. If pollinization is left to insects hybridization may result.

After the flowers have been fertilized, mark them with a small strip of white paper or cloth, putting the name of the plant onto the material. I use

strips of Kleenex tissue, tied around the stem of the plant and some pieces are also fixed to a bush or tree as a marker.

When a few weeks have past after the flowers have been fertilized, go and examine plants for good fertilization. The ovaries should have started to fill out. If there is some likelihood that the seed will ripen before the next visit, the carpels should be bagged. The bags should be made from light paper which is very strong and airy. I have used cigarette paper, but this is not strong enough to withstand heavy rain or hail. The glue used to glue the bags must be waterproof, a celluloid base glue is a good type. Make bags at least 6 inches long and 1 inch or more in diameter.

The bags are carefully slipped over the carpels and the bottom carefully wrapped around the stem, then lightly but firmly tied with a heavy cotton or light string. Put the plant's name on this bag before fitting on the plant.

If carpels are to be collected without being bagged, wait till they start to change colour, usually they will be a lighter shade. Experience will tell when the time is right. Then pick the stems and place them in a glass of water. Again experience will tell when the seed is ripe and ready to fall. Pick the capsules and place them in a clean paper bag, again correctly named. The capsules should be picked 12 hours before seed fall.

Keep the seed capsules in the bags in a cool dry place till thoroughly dry, then separate the seed from the husk and store, or pack and post to the persons who will attempt to grow or collect them for redistribution.

*Editor's Note*: Our No. 21 issue described in detail, a method of orchid seed germination for those keen enough to try it. Other issues have given simpler methods. There is a desperate need for a break through in reliable germination of terrestrial orchid seed. Who can assist?

# The Genus Pterostylis in Australia

*PART 1 — by L. CADY, Kiama, N.S.W.*

The genus *Pterostylis* is one of the largest of the Australian orchid family, containing upwards of 70 species. Quite a large number of these are rare plants, and would rarely be seen by anyone other than the ardent taxonomist. With this in mind the writer has selected those of the genus which are the more common and the most attractive, and shall deal with them in three sections. 1. Autumn flowering; 2. Winter and Spring; 3. Summer and Multiflowers.

## *CULTURE*

This genus lends itself well to culture, growing and multiplying vigorously—in fact so much so at times one must repot every year. The compost used is 50% fine grey sand, 40% peat moss, 10% charcoal and leaf mould. The pot is first crocked for ¼ with gravel or the likes, then filled to within 2/3rds of the top or so as to leave ¾ inch at the top of the pot. The tubers (approx. 6 to a 6" pot) are planted approx. 1" below the soil surface. The 6 tubers to the pot should give enough room for 2 years growth, although some of the species, e.g. *P. curta* or *P. concinna*, can produce up to 6 new tubers per year.

Watering is always a controversial subject, but it is found that if the plants are kept moist when growing and rather dry when dormant, little or no tuber rot is experienced.

Most of the "Greenhoods" respond to frequent doses of rather weak liquid manures or one of the many foliage sprays now procurable, but remember to use it weak as it will tend to burn the foliage.

Shading—All species require shade or semi-shade. Any exception to this will be mentioned in the text. The bush-house is the ideal type of environment, but any sheltered place in the garden or under a shrub with the pot plunged to its rim in the ground would be suitable. If this method is used, place a handful of sand under the pot.

SECTION 1. Autumn Flowers

**1. *P. obtusa* R.Br.** "Blunt tongued greenhood"

A slender or moderately robust plant of neat appearance growing usually in colonies, sometimes dense, but usually more scattered. Leaves cauline (stem bracts only, with no rosette attached to base of the flowering stem), variable in length and shape—usually broad lanceolate. The flower, rarely two, is approx. 1.5 to 3.75 cm. Colour wholly green or green with brown tonings or rarely wholly brown. The dorsal sepal is often as not tipped with a short, or at times rather long, filiform tip. Labellum broad-linear, red-brown, very obtuse and very slightly curved, about as tall as the column.

Flowers: January to April, or at times later.

District: Queensland, N.S.W., Victoria and S.A.

This species is probably the commonest of the autumn flowers and takes well to culture, flowering and multiplying well. This is also one of the species that often forms its new tubers in the drainage hole or at times even under the pot. A lot of the ground orchids tend to form their new tubers around the sides of the pot. This is noticeable in the genus under discussion and also in *Chiloglottis*. Possibly it is for coolness as it is often noticed in nature that they form tubers near a stone.

**2. *P. alata* Reichb. f.** "The Striated Greenhood"

A very slender plant up to 26 cm. high, rosette separate from flowering stem. Stem leaves bract-like or sometimes fairly well developed. Flowers one, rarely 2, 2-3 cm. long, pale green or whitish to greyish with brownish or brown green stria. Dorsal sepal ending in a short filiform. Labellum narrow lanceolate to 10 mm. long, the apex acutely pointed, as long as the column.

Flowers: Late autumn to early winter.

District: N.S.W., S.A., Victoria and Tasmania.

**3. *P. reflexa* R.Br.** "The Moss Greenhood"

A slender and graceful plant up to 24 cm. tall, although usually smaller. Cauline leaves, linear to narrow lanceolate. Flowers usually one, smallish 1.5 to 1.75 cm., green with darker bands and suffusions. Galea curving from the basal swelling for the whole of its length and segments all filiform, decurved. Labellum linear, very dark and deeply decurved at its acute tip, approx. 15 mm. long.

Flowers: Autumn.

District: Queensland, N.S.W., and Victoria.




*KEY TO PLATE*

A. *P. obtusa* with labellum. Side and top view.
B. *P. robusta* with labellum. Side and top view.
C. *P. revoluta* with labellum. Side and top view.
D. *P. alata* with labellum. Side and top view.
E. *P. reflexa* with labellum. Side and top view.
F. *P. pedoglossa* with labellum. Side and top view.
G. *P. ophioglossa* with labellum. Side and bifid tip.
A-G Approx. half natural size. All other segments variously enlarged.

**4. *P. revoluta* R.Br.** "The Autumn Greenhood"

A much larger plant than *P. reflexa* (a species that it has been confused with) up to 28 cm. high. Leaf bracts sheathing, lanceolate to linear. Flower large, up to 5 cm., translucent, green with darker bands, sometimes almost white. Galea up to 7 cm. round the curve, gibbous at the base then almost straight, curving round to an acuminate or even filiform deflex point formed by the dorsal sepal extending past the petals. Lower sepals erect, united about 1/3rd their height, the sinus forming a wide obtuse union. Labellum broad linear to narrow linear (rarer), up to 2.5 cm. long, tip decurved at apex.

Flowers: Autumn to early Winter.

District: Queensland, N.S.W., Victoria.

**5. *P. robusta* Rog.** "Sharp Leaf Greenhood"

A slender glabrous plant to 20 cm. high. Stem leaves lanceolate or acuminate to 5 cm. long. Flowers green, large to 3.5 cm. (with filiform). Lateral sepals erect, much extending the hood with its filiform tip. Labellum almost straight lanceolate tapering to a fine point, approx. 15 mm. long—almost as long as column.

Flowers: May to August.

District: S.A., Victoria, W.A.

**6. *P. ophlioglossa* R.Br.** "Snake Tongue Greenhood"

This species with the following are of the group that has the rosette at the base of the flowering stem, and not as a separate one as in the preceeding (5).

A slender to fairly robust plant, up to 25 cm. high. Leaves in basal rosette shortly petiolate (stalked), ovate. Stem often lacking in bracts. Flower usually one, variable in size, green with brown or pink markings. Flowers usually with a slight forward bend. Dorsal sepal at times deflexed at apex. Lateral sepals extend from an obtuse sinus high above the galea. Labellum oblong-linear to 16 mm. long, recurved, or at times sharply reflexed at right angles, normally protruding through the sinus of the lower lip. Apex of lamina deeply and narrowly bifid. Column as long as labellum.

Flowers: April to July.

District: N.S.W., Queensland, New Caledonia.

*P. ophioglossa* var. *collina* Rupp.

Flowers smaller. Dorsal sepals not longer than petals. Galea deep red brown. Lower sepals not greatly prolonged. Labellum very dark.

Flowers: June to July.

District: N.S.W., N. Queensland.

**7. *P. pedoglossa* Fitzg.** "Prawns"

A small plant very slender, to 14 cm. tall. Leaves 3 to 6 in rosette at base, petiolate, ovate to 20 mm. long, sometimes extending up the flowering stem. Stem bracts one. Flower one, small to 16 mm. from top to base of the galea. All sepals extending in filiforms, petals short acute. Labellum oblong very short, the basal appendage as long or longer than lamina. Column very straight, approx. 3 times as long as labellum.

Flowers: April to July.

District: N.S.W., Victoria and Tasmania. Much more common in the southern States than N.S.W.

# SOUTH AUSTRALIAN PTEROSTYLIS

by R. C. NASH

The following *Pterostylis* have been grown quite successfully. For the methods used in the preparation of pots and their care refer to "Growing S.A. Terrestrial Orchids."

**Pterostylis curta.**

Blooms July to September.

Habitat—sheltered, shaded gullies of the central Mt. Lofty Ranges, rare and found in colonies.

Growing care—place pots in a position well drained and in broken direct sunlight, away from heavy wind. Allow plants to receive as much natural rain as possible, keep pots moderately damp in summer (the dormant period) if they dry out do not water and allow to dry out again, this will cause the tubers to rot, but put in a protected position in shade. During the growing season and until plants start to wither try to keep soil in pot damp or over damp.

Pot population—these plants like to be moderately crowded. The best method is to start about 3 plants off in a 4 inch pot and when crowding starts to be apparent, transfer to a larger pot and so on till it is absolutely necessary to divide into smaller pots again.

If any of these plants should appear in any pot with other orchid types remove them as in a few years they will take over the pot completely.

**Pterostylis pedunculata.**

Blooms August to October.

Habitat—sheltered parts of the Mt. Lofty ranges and the South East of South Australia. Sometimes found in open colonies.

Growing care—same as *Pterostylis curta,* except keep soil in pots dryer during the wet season.

**Pterostylis cucullata.**

Blooms September, October.

Habitat—shaded sheltered areas of the Mt. Lofty Ranges. Rare sometimes found in groups or singularly.

Growing care—same as last two types, but nearer to the conditions of *P. pedunculata.* This form will not multiply very well without the application of Urea.

Pot population—I have found that this species does not propagate under crowded conditions, limit plants to no more than 3 to a 4 inch pot, watch that new tubers do not grow out of bottom of pot. This species will grow better if placed in deeper shade than the last 2.

**Pterostylis robusta.**

Blooms May to August.

Habitat—shaded banks, at the base of trees mostly on the south side on plain lands and lower hills. At the base of trees and under bushes with a northern aspect in the higher hills and mountains. Mt. Lofty Range; Sand hills west of Gawler; Mallee Lands, in South Australia. Found in colonies, the juvenile plants being most prominent and numerous. Under the best growing conditions 2 flowers may be obtained on the one stem, usually as twins in one growing season.

Growing care—place pot in a position where it will drain well, be fairly well shaded and have plenty of head room and be moderately free from wind. Keep damp but a little on the dry side during the growing

season, place in a cool moist spot in the summer. This species likes to be on the crowded side. As crowding becomes excessive, repot into a slightly larger pot.

**Pterostylis barbata.**

Blooms September, October.

Habitat—amongst bushes in the Central districts of South Australia. It appears that these plants need very well drained conditions with heavy shade. See article on "Growing S.A. Terrestrial Orchids." Keep a layer of sawdust on top of the sand in the pot, let it rot down into the sand. Overcrowding could be detrimental, if it is possible to get this many plants. When repotting use lime stone gravel instead of broken pot.

**Pterostylis mutica.**

Blooms July to September.

Habitat—Mallee lands, usually in shallow soils overlying limestone. Keep a layer of sawdust on top of the sand in the pot, let it rot down into the sand. When repotting use limestone gravel instead of broken pot. Plants collected from the Flinders Ranges are more robust and tolerate a damper location.

**Pterostylis vittata.**

Blooms May to July.

Habitat—sandy or light loamy soils, Adelaide Plains, Mt. Lofty Range, Mallee Lands. These are very temperamental, sometimes they grow well then suddenly all die, the moisture content of the soil may be the trouble. They may have a set life span as they seem only to propagate from seed, very rarely by vegetative propagation.

**Pterostylis longifolia.**

Blooms July to early October.

Habitat—Mt. Lofty Ranges, Mallee Lands and Adelaide Plains.

Growing care—same as for *P. vittata* with a very small amount of sawdust added to the top inch of sand.

**Pterostylis nutans.**

Blooms September, October.

Habitat—in the higher rainfall areas of Mt. Lofty Ranges in sand and sandy loam soils or soils derived from sandstones. Grows well under the method used for *P. curta* with more shade.

**Pterostylis nana.**

Blooms July to October.

Habitat: In the wetter parts of South Australia in a variety of soils. Those plants found in the Mallee are a different form from those found in the Mt. Lofty Ranges. The Mt. Lofty Range form appears to multiply only from seed, whereas the Mallee form is a vegetative multiplier as well. This latter form, forms small loose colonies. Cultivate similarly to *P. curta* but with more shade.

**Pterostylis pusilla.**

Blooms in October.

Habitat—York Peninsula, Mallee Lands, Flinders Ranges and a few in Mt. Lofty Ranges. Found generally in loamy soils close to limestone but does occur in heavier soils. Use the same culture as for *P. mutica.*

**Pterostylis cycnocephala.**

Blooms in September-October.

Habitat—Mallee Lands in red sand overlying limestone. Culture as for *P. mutica*.

**Pterostylis alata.**

Blooms May to July.

Habitat—Sandy scrub in the Southern Mt. Lofty Ranges and Adelaide Plains. Culture as for *P. mutica*.

**Pterostylis vereenae.**

Blooms August-September.

Habitat—Parts of the Mt. Lofty Ranges, rare, in sandy soils. Culture as for *P. nana*.

**Pterostylis hamiltonii.**

Blooms June to September.

Habitat—York and Eyre Peninsulas. Sand over limestone. Use limestone chips in the bottom of the pot and follow the culture for *P. robusta*.

**Pterostylis rufa.**

Blooms November to February.

Habitat—Lower and Northern parts of the Mt. Lofty Ranges, Flinders Ranges and Eyre Peninsula, light grey soils. Culture as for *P. mutica*, but they like good shade, not too deep, wth a little morning sun, winter and summer. Try to keep the pot on the dry side in winter and just damp in summer, till the plants wither, then let them dry out in a shady spot.

**Pterostylis squamata.**

Blooms October-November.

Habitat—Near Mallee Lands. Culture as for *P. rufa*.

For those people unable to obtain good clean coarse sand, vermiculite should make an excellent substitute.

Sawdust—The sawdust from any timber that is neutral and will not pack down easily could be used in place of native timber. Also well rotted horse manure and very old rotted pine sawdust has been used on *P. curta* and *P. pedunculata* successfully.

*Author's Note*: Only 22 species have been recorded in South Australia. The five not mentioned above are:

*Pterostylis concinna*—As far as I know only one plant has ever been found in S.A. I have a few plants sent from N.S.W.

*P. furcata*—I have never located as yet. It is supposed to be common on part of Kangaroo Island.

*P. obtusa*—I have not seen this species in S.A. I was unlucky with 2 plants from Victoria.

*P. parviflora*—Two forms, one from Victoria and the other from near Mt. Gambier, S.A., lasted only 18 months. Another plant from the swamps of Mt. Compass also failed.

*P. mitchellii*—I believe this species is quite rare. I have seen a flower only.

# TASMANIAN PTEROSTYLIS

*TASMANIAN ORCHIDS—Part 1 by JOHN FIRTH*

The Greenhoods which are least demanding in their requirements for growth, and which, in consequence, are most widely scattered through our bush, are Nodding Greenhood, *P. nutans;* Maroon Hood, *P. pedunculata;* and Tall Greenhood, *P. longifolia*. The first two mentioned are usually to be found in shady locations, and often in quite damp soil. *P. nutans* flowers at any time from July to November; but Maroonhoods are likely to bloom only in the August to October period. Tall Greenhood is just as widespread as the other two, but it is less often noticed as it never occurs in large colonies. At most, only half a dozen plants are usually seen together. See colour plate, page 96.

The Dwarf Greenhood, *P. nana*, is also very widespread, but, since it is so tiny, and since it is usually surrounded by heath, bracken, other small

shrubs and native grasses, it is usually overlooked. The Tiny Greenhood, P. parviflora, is another very small member of the genus which is usually overlocked. It is readily recognised from the fact that when several flowers are carried on the same plant, they face one another in pairs.

One of our most difficult orchids to find is the Tailed Greenhood, *P. pedoglossa*. It has leaves only about a quarter inch long, and it is found on shrubby heaths amongst reeds and native grasses. As its flowers rise only a few inches from the ground, and since its green colour is an excellent camouflage in the sea of green which makes up a heath, it is very seldom found. It prefers a moist soil between drier heathland and the wetter soil where Fairy Bonnets flourish. To find this elusive orchid, it is necessary to part the branches of the heathland shrubs, and study the ground at their feet, searching for the little rosettes of leaves pressed against the soil. Once a group has been found, it will be noticed that many hundreds of plants cluster together in a few square feet. A soil test will show that this little plant requires a very acid soil (down to pH 3.5) for growth.

The Bearded Greenhood, *P. barbata*, is a most attractive species with a very unusual flower. Its yellow-bearded, thread-like labellum terminating in a shiny brown tip is quite unique for the genus. Favouring dry areas among eucalypts, it seldom occurs in large numbers; but some localities have this orchid spread over such wide areas that, taken altogether, though thinly scattered, in all, there must be many plants in the region. Quartzite hills where heath is common often carry quite a few of these orchids. This is a species that could well be cultivated. See colour plate, page 96.

Our showiest Pterostylis is, undoubtedly, the Superb Greenhood, *P. grandiflora* which is occasionally given the picturesque name of Cobra Orchid. It is a very robust species with red-brown ledges on each side of the hood which is spreading, giving the impression of a cobra's head poised to strike. I have found these orchids only on granite slopes on our East Coast, where winter and early spring weather is more temperate than in other parts of the State. Usually these plants grow amongst bracken where they are difficult to see. Plants are usually solitary or few together, numbers of more than half a dozen in a small area being most uncommon. Two years ago, I found a solitary specimen, standing a foot or more high, amongst rocks on a bare granite slope. This plant carried a magnificent flower which remained fresh and showy from early June to late August; quite an unusually long period for a native orchid to carry its flower. Last year the plant again produced a flower but this time it lasted only about a month. Our Helmet Orchids flower about the same time as *P. grandiflora*. It is quite a picture to see the Fringed Helmet Orchids, *Corybas fimbriatus*, crouched between the stems of Superb Greenhoods, their curious little faces seeming to peer upwards in admiration of their stately companions.

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*CAPTION TO COLOUR PLATE ON THE REAR COVER* —

PTEROSTYLIS: This word literally means "Winged Style" referring to the characteristic column of the genus. The dorsal sepal of the flower is curved over, and the lateral petals are closely pressed against it, so that the three form a hood (*galea*) completely hiding the column. The lateral sepals are joined to form a lower lip. Sometimes the points of these two sepals rise above the hood as in *P. nutans* and *P. pedunculata*, but at other times they are directed downwards as in *P. barbata* and *P. longifolia*. Usually the labellum is hinged and often it is very irritable, a feature which assists in pollination.

*P. nutans*, Nodding Greenhood, one of our commonest orchids.

*P. barbata*, Bearded Greenhood, our only greenhood with a bearded labellum.

*P. pedunculata*, Maroonhood, the flower top ranging in colour from bright red-brown to almost grey.

*P. longifolia*, Tall Greenhood, noted for its irritable labellum which springs back when touched.

Other Pterostylis which favour similar areas to *P. grandiflora* are the Blunt Greenhood, *P. curta;* the Striped Greenhood, *P. alata;* and Trim Greenhood, *P. concinna*. Curta has a curious twisted tongue. It is often found in colonies of some hundreds of plants; quite a striking sight when all are flowering together. They can stand a shallow soil. I have found them growing quite happily in an inch thick skin of soil over solid rock; but the most robust specimens are usually found in deep soil in shady places.

I know of only one rather limited area where Banded Greenhoods grow. This is a few hundred feet up a granite slope where glimpses of the sea can be gained through the branches of Blue Gums, Native Box, and Casuarinas. Here there are only a hundred or so of these lovely flowers with their transparent hoods delicately marked with faint green lines, sheltering between granite boulders from winter storms.

The third member of the trio, Trim Greenhood, is also a winter flowerer; but, as one specimen completes its flowering period and seeds, another is just opening. Thus you may find Trim Greenhood, in favoured areas flowering for six months of the year, from May to October. Apart from Dendrobium which is quite a different type of orchid, Trim Greenhood is the commonest orchid on the granite slopes of our East Coast. Many thousands must occur in each acre. So common are they that one is apt to overlook their beauty. What a curious tongue they have with its notched tip, and how straight they stand!

After the rush of spring flowering orchids the Summer Greenhood, *P. decurva,* comes into its own. Though not as robust and showy as *P. grandiflora* it is a very attractive plant. The slender, leafless stalk lifts the large flower with its generous sweeping curves high into the air. It is a plant that seems to care little about altitude. I have found it in eucalypt forest only a few feet above sea level, and I have found it two thousand feet up a mountain, on mossy boulders, completely sheltered from the sun by musk and myrtle.

Amongst our minute orchids an appealing plant is the Swan Greenhood, *P. cynocephala*. I know of several areas just behind the sandbanks of the sea coast, where this orchid can be found in large numbers. Here, in the shelter of marram grass, and surrounded by rushes, I have found it growing with Pink Fairy Orchids, *Caladenia latifolia*. Flowering together these two orchids provide an interesting pattern of pink and green. Swan Greenhoods tolerate sandy conditions, and should be easy to grow. Strangely enough, although its main habitat is by the sea, there is a colony of these orchids in Epping Forest many miles from their usual haunts and in quite different soil.

Of the Alpine Greenhoods *P. alpina,* is the most widespread. It is distinguished by its sharply bent back lateral sepals, and by the broad gap in the lower lip. Vereenae, *P. vereenae,* is the most attractive member of this group. It has a large leafy bract on its flower stalk, and the flower, although resembling that of *P. alpina,* is narrower, and the lateral sepals are not sharply swept backwards. The Forked Greenhood, *P. furcata,* is the least common of the three. It has a smaller bract on the stem, a very narrow gap between the lateral sepals, and these bend forward. All three of these mountain greenhoods favour myrtle forests, or beech forests as they are sometimes called. Here, on the shady forest floor, sheltered from winds and from the hot summer sun, they flower in late December and in January, are seldom seen except by the most ardent orchid lovers. I know one delightful spot where *P. alpina* and *P. furcata* grow beneath the branches of myrtles just a few feet from a tumbling waterfall. Truly a striking scene.

(Continued on page 88)

# Wildflowers of Central Australia

*PART 1 — by D. J. NELSON*

Possessed by a desire to grow Central Australian "Pussy-tails" (*Ptilotus* species, hardy bushes of attractive foliage with often very colourful fluffy flower heads resembling a pussy's tail) I began by planting seed, but to no avail. To introduce the plants to my garden so that the problem could be more readily studied, I found the following method quite successful.

I discovered a patch of *Ptilotus nobilis* north of Alice Springs. Selecting a young plant, I carefully dug it up removing the root whole. With the root inside a large paper bag, the bag was then filled with soil from the same spot to within an inch of the top. The dirt was well watered to set the plant and then all the inflorescences and buds and some leaves removed, to compensate for root damage. On reaching home I dug an appropriate sized hole and placed the bag in it, packing the earth around it. The plant was then watered heavily each day for a week and once or twice



*Photography by W. H. Payne*

*CALANDRINIA BALONENSIS*, LINDL.

Another slide showing a plant as just a mass of pink flowers could have been printed but this gives a better idea of how the plant will look most of the year.

a week thereafter. The *Ptilotus nobilis* thrived and produced large inflorescences for months.

Other *Ptilotus* species that have been successfully grown by this method are *Ptilotus atriplicifolius, P. obovatus, P. macrocephalus* and *P. polystachyus.* All these are beautifully flowered small bushes suitable for your garden or rockery. They were fully described in the No. 19 issue of "Australian Plants."

*ANNUALS ESPECIALLY SUITED FOR GARDEN OR ROCKERY—*

CHENOPODIACEAE

**Atriplex halocarpa,** *A. lindleyi* and *A. spongiosa.* Three ornamental annual saltbushes with spongy fruits. The fruit of *A. lindleyi* becomes pink on maturity. Attractive border plants, foliage a grey-green.

**Chenopodium rhadinostachyum.** A fragrant light green herb with unusual crumbly seed spikes to 6 inches long. Grows in the barest of areas.

PORTULACACEAE (Succulents)

**Calandrinia balonensis Lindl.** "Broad-leaved Parakeelya." A succulent growing best in sand. Under cultivation it has attained 4 feet in diameter. Bears masses of pink flowers to 1 inch across which last only one day but are replaced by more blooms on succeeding days. A hardy plant of the red sandy deserts, much sought after by cattle. Lasts up to 2 years under cultivation but as with all succulents would be easy to propagate.

**Calandrinia ptychosperma.** A small "Parakeelya" succulent to 6 ins. diameter, for that rockery or miniature garden. Flowers are small, pink.

**Calandrinia remota.** "Narrow leaved Parakeelya." Similar to *C. balonensis* but more hardy, lasting over two years under cultivation in sandy soil. Attains two feet in diameter, with pink flowers in profusion on slender stalks to 1 foot long. Parakeelyas flower the year round.

LEGUMINOSAE

**Swainsona canescens var. horniana,** a "Vetch." Regular watering produces fine results with this species. A spreading habit to 4 feet diameter with masses of purple flowers on six inch long flower spikes. It is seen at its best in the cooler months.

**Neptunia dimorphthantha var. clementii.** "Sensitive Plant." Possesses fern-like leaves which fold on being touched. Produces large golden balls similar to wattle flower balls. Grows prostrate to 2½ feet diameter under cultivation. Acts as an annual but has a perennial root which originates new growth in spring.

GERANIACEAE

**Erodium crinitum** and some other small Erodium species. These "Crowsfoots" or "Native Geraniums" attained 1 foot under cultivation. Flowers are blue. Originally transplanted by the paper bag method they subsequently grew from seed which the original plants had shed.

COMPOSITAE

**Calotis latiuscula,** a daisy with yellow flowers over half inch across. It grows to 18 inches tall with a two foot spread and bears a profusion of blooms.

## *CENTRALIAN BOTANICAL SERVICES*

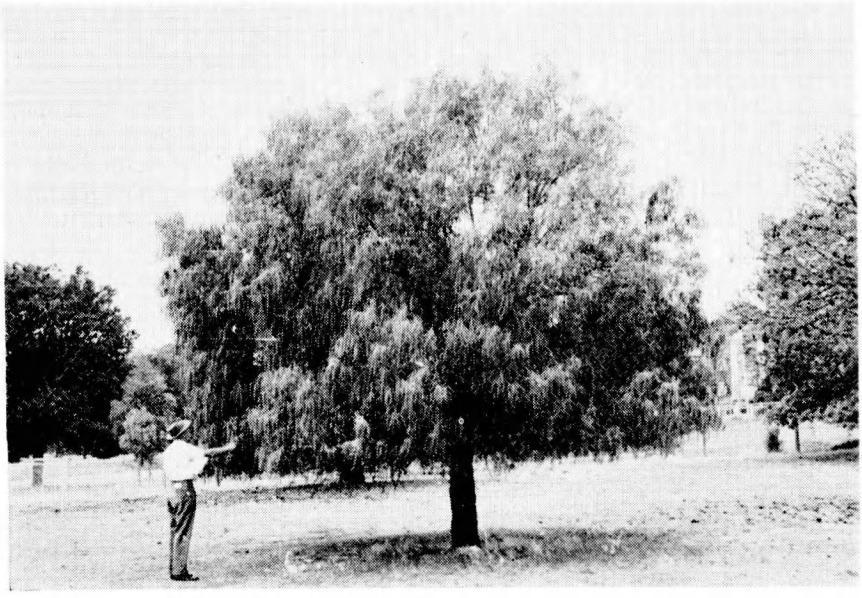
*Editor's Note*: Mrs. D. J. Nelson has commenced a business known as "Centralian Botanical Services." One service is the supply of seed at 3/- packet. A seed list will be sent on receipt of a stamp addressed envelope. Enquiries are invited from chemists, research workers, etc., who want material collected from the Centre for commercial reasons.

# THE WILGA (Geijera parviflora) A STREET TREE?

*By J. ROS. GARNET*

Why not? Everybody knows Boronia. The rather knowledgeable people are well enough acquainted with one or more of the Correas, Eriostemons or Phebaliums and most of them know that they are generally aromatic plants belonging to the same botanical family as the various citrus species and the popular garden shrub Diosma. But there is one purely Australian member of the family which has taken my fancy—the Wilga.

I haven't heard of it as a street tree but it should be a good one if grown in the right place.



THE WILGA — *Geijera parviflora*
A 24-year-old specimen, 18ft. high and 20ft. in diameter.

Thirty years ago the Wilga was accepted as one of the rare indigenes of north west Victoria but so much land clearing had taken place in that part of the State that botanists questioned whether it still existed anywhere in Victoria except as a cultivated tree. However, at last came news that some were still to be found growing in their natural habitat at a place called Narrung, between Piangil and Euston. How long they will survive in this little pocket of territory remains to be discovered but, meanwhile some folk have it in cultivation in their gardens or plantations so it looks as though it will be saved from actual extinction in the country south of the Murray. To the north it is not so restricted in its distribution and on the western Riverina plains one may see it flourishing as a handsome, shapely and shady tree in the savannah woodlands, by the roadside or near creeks and rivers.

Of the five recognised species of *Geijera*, *parviflora* is the only one with any potential as a street tree. The others are too small and shrubby. Our Wilga has a wide range throughout the western districts of New South Wales and Queensland and occurs also in a few South Australian localities and from observations of the situations where it thrives one may conclude that it would do well in the sandy soils of places where the well-distributed annual rainfall is between ten and eighteen inches. It can survive the blistering heat of an inland summer so long as the water table is not beyond reoch of its deep penetrating roots and, like many desert plants, it will tolerate frost above ground so long as its underground parts are in a well-drained situation, protected from immersion in cold water.

It is not a fast growing tree. A twenty-four-year-old specimen at the Waite Institute near Adelaide is now about 18 feet high and perhaps twenty feet in diameter. It is growing under exceptionally good conditions and, as the accompanying photograph shows, it has those features which a conscientious curator of parks and gardens (or any other tree-planting authority) demands of a street tree—moderate height, grace and shapeliness, umbrageous foliage, a clean trunk to somewhere near head height and no tendency to sucker. Its drooping branchlets and the greyish and rather narrow ovate-lanceolate leaves are aromatic when crushed—as one would expect in a member of the family Rutaceae to which it belongs.

Although only of academic interest to municipal councils and their staff it may be noted that the foliage is eaten with relish by sheep, cattle and rabbits which, to some extent, explains why young plants are a rare sight in the places where the Wilga has established itself. It also explains why, in cattle country, the foliage is so neatly pruned to the height of a cow's up-stretched neck. A well-established tree suffers no harm from this form of pruning by herbivores so it may be concluded that it would respond quite favourably to the more judicious trimming by saw or seccateurs should the need arise.

The tree flowers in the winter months and sometimes in spring. Occasionally it will burst into bloom in June and again some months later but the flowers do not always produce fruit. The individual flowers are small but grouped together in somewhat loose pyramidal panicles so that, when in full bloom, a Wilga suggests something in silver filigree.

Yes, I like the Wilga and would be glad to see it become a ponular street tree. Perhaps it already is in places ministered by discriminating people but I haven't heard of them. The Society for Growing Australian Plants, through the editor of this journal, would be glad to learn of any such places. There is nothing like a good example to encourage emulation.

The casual reader may wonder why I choose to write about and even recommend the Wilga as a street tree when so little is known about it. The reason is simply that it is uncommon and likely to become even more so unless it can capture the fancy of growers of Australian plants and to do that there will have to be, here and there, an avenue of them in a northern, southern, eastern and western township or city.

HOW FROST RESISTANT ARE WILDFLOWERS

This important problem will be investigated and all growers who are interested or can assist with observations should please contact C. W. Frazer, 175 Marsh Street, Armidale, N.S.W.

TASMANIAN PTEROSTYLIS—Continued from page No. 83

These are the "greenhoods" likely to be found. Of the others you may, once in a very long time, find Sickle Greenhood, *P. falcata,* a very impressive but uncommon orchid. Or, in the mountains, you may happen upon *P. acuminata* with its brown-tipped, pointed flowers. Then again you may see the Ruddy Hood, *P. pusilla,* noted for its peculiar irritable labellum, decorated with a few long hairs.

With the gradual spread of settlement and the clearing of large areas of natural bush in our coastal areas, it is now necessary to go to the mountains for some of the greenhoods that used to be found near the sea. Slender Greenhood, *P. foliata* must now be looked for inland, and Leafy Greenhood *P. cucullata,* is likely to be found only in the mountains amongst the Cushion Plants and *Richea* of highland heaths.

One of the most controversial greenhoods is the small Greenhood, *P. aphylla.* Most authorities suggest that this does not differ in any way from *P. parviflora.* In Tasmania there is, however, a very small greenhood to be found in the summer months deep down between button grass tufts in swampy places. It is even more difficult to find that *P. pedoglossa* because only isolated plants ever occur ,and these are leafless, or have just a few dead leaves at their bases. Superficially this plant resembles *P. parviflora;* but it is more robust, and, instead of flowers being spread along the flowering stalk, they are massed near the end.

Mentone Greenhood, *P. toveyana,* is likely to be found near where *P. concinna* and *P. alata* grow together. It is thought to be a natural cross between the two. It is nowhere plentiful. The Banded Greenhood, *P. vittata,* is not found on the Tasmanian Mainland, but it is not uncommon on Bass Strait Islands. It somewhat resembles *P. longifolia,* but it is rather more showy with nodding flowers which are attractively striped with brown.

The Midget Greenhood, *P. mutica,* is very seldom seen. It resembles *P. cynocephala* but is more robust and the tongue projection points inwards, instead of outwards as in the Swan Greenhood. Another Orchid very rarely found in Tasmania is Scaly Greenhood, *P. squamata.* Only a very few specimens have ever been found here, and these have come only from the healthy plains of the Far Nor' West.

Undoubtedly this fascinating genus contains many species eminently suitable for the shady, mossy corners of gardens near ponds; or for drier areas shaded by trees. Wherever they are tried a genuine attempt must be made to give them similar conditions of soil, and water, and sun to those of their natural bush haunts. Nothing is worse than to see bush plants struggling in unsuitable conditions. By studying plants in their natural environment, many valuable pointers can be found to their successful culture. Apart from the utilitarian value of such a study, most people find bush excursions both stimulating and inspiring.

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NATIONAL PHOTOGRAPHIC COMPETITION

The first of an annual National Photographic Competition will be conducted in association with the Australian Wildflower Festival of 1965 to be held in Canberra on September 11th, 12th and 13th. Unfortunately for many readers the first competition for colour slides will not be started until 1966, the competition this year being confined to two classes as nominated by the Canberra Photographic Society. For further information and entry forms contact the Secretary, Canberra Photographic Society, Inc., P.O. Box 4, Ainslie, A.C.T.

# THE PLANT BODY

*PART 2 — by HELEN LEE*

In the previous article the chief tissues of flowering plants were mentioned. Now the most common cell types of these tissues will be described.

1. CELL TYPES OF THE GROUND TISSUE.

**(a) Parenchyma cells.**

These cells may be found in masses as a tissue called parenchyma or they are found associated with other types of cells in other tissues, e.g. in the vascular tissue. Parenchyma cells vary in shape but they usually have thin walls and are many-sided. The cells may be more or less box-shaped or slightly elongated. (See Fig. 1). In some tissues the cell walls can become relatively thick.

An important point about parenchyma cells is that the protoplast is always living even when the cells are mature. At maturity the protoplast is often contracted to form thin layer on the inside walls of the cell walls. The space inside the cell is then filled with a liquid, the cell-sap, the composition of which is very variable. Many different substances are found in the cells, depending on their physiological function. Tannins, proteins, sugars and various crystalline substances may be stored in the cells. One of the most common storage materials is starch which is deposited in the form of small grains in parenchyma cells in a variety of tissues and organs.

Certain parenchyma cells have a photosynthetic function, i.e. they are able to synthesize sugar from carbon dioxide and water in the presence of light and chlorophyll. The chlorophyll is a green substance found in the cytoplasm in special bodies called chloroplasts. The photosynthetic parenchyma is sometimes called chlorenchyma and is found in leaves and green stems.

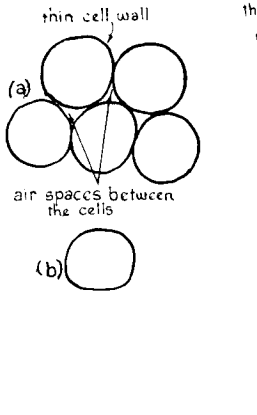



Fig. 1—Diagrams of Parenchyma cells in longitudinal (a & c) and cross-section (b & d). Magnified about 300 times.

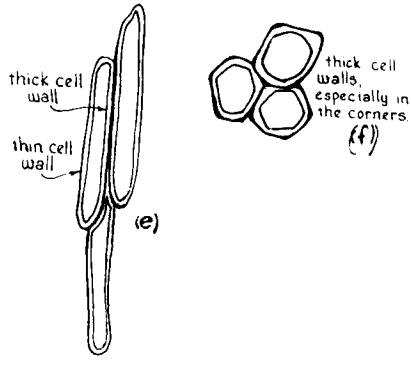



Fig. 2—Diagram of collenchyma cells in longitudinal (a) and cross-section (b) Magnification approx. 600 times.

**(b) Collenchyma cells.**

These are sometimes regarded as a type of parenchyma cell with a special structure and a supporting function. The cells are slightly elongated and have thick primary walls. (See Fig. 2). The thickening in the walls is unevenly distributed and is often found in the angles where several cells meet. Collenchyma cells have living protoplasts at maturity and sometimes the cells contain chloroplasts.

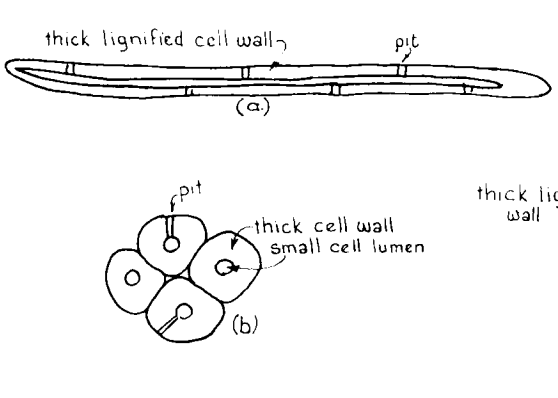



Fig 3—Diagram of a fibre in longitudinal section. (b) Diagram of a group of fibres in cross-section (Mag. approx. 800 times).

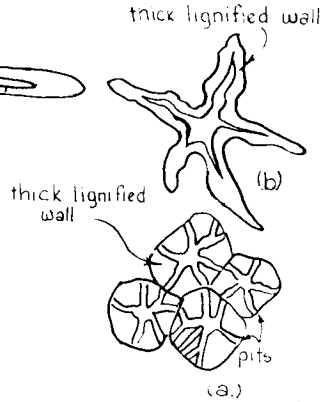



Fig 4—(a) A group of brachysclereid Magnification approx. 400 times. (b) Star-shaped type of scleroid Magnification approx. 200 times.

Collenchyma tissue, which is composed of masses of collenchyma cells, seems to be adapted for support. It is frequently found in the cortex of young stems. In celery e.g., it is found in strands in the ribs of the stem and can be removed as "strings." It also forms a continuous layer on the smooth inner side.

**(c) Sclerenchyma cells.**

These generally have thick lignified walls and their function is usually mechanical. They are thought to provide support for plant organs and to protect thin-walled cells. Sclerenchyma cells are very variable in structure and development but in general they can be grouped into (i) fibres and (ii) sclereids. However, these two categories are not always clear-cut and many intermediate forms occur.

**(i) Fibres.**

Fibres are usually elongated tapered cells with very thick walls in which numerous pits may occur. The thick secondary walls may be lignified or consist entirely of cellulose (See Fig. 3). Fibres are found in most tissue systems. Xylary and phloem fibres commonly develop simultaneously with xylem and phloem cells in the vascular tissue. Other fibres, often referred to as the extraxylary fibres are found in various plant tissues such as the cortex. Many of the commercial fibres are phloem fibres, e.g. flax comes from *Linum usitatissimum* and hemp from *Cannabis sativa*. Others are leaf fibres, e.g. hemp, which comes from the leaves of the *Agave* plant. In the case of these commercially useful fibres the individual cells vary in length from less than a millimetre to about 50 centimetres but they aggregate to form strands of considerable length and breadth.

**(ii) Sclereids.**

Sclereids are found in all parts of the plant body, vary in shape and size but all have lignified pitted walls. (See Fig. 4). Sclereids are commonly isodiametric in shape and these are known as brachysclereids or stone cells. They are common in the cortex and pith of many plants. They frequently occur in fruits and seeds, e.g. the stony particles in the flesh of pears are made up of groups of brachysclereids. The hardness of nut shells and the stones of fruits and the tough seed coat typical of many wattles and other legumes are all due to the presence of layers of sclereids.

## 2. CELL TYPES OF THE VASCULAR TISSUE

The vascular tissue is composed of the chief water-conducting tissue or xylem and the chief food-conducting tissue or phloem. Both the xylem and phloem contain fibres and parenchyma cells but the actual arrangement of the cell-types in the vascular tissue will be discussed later.

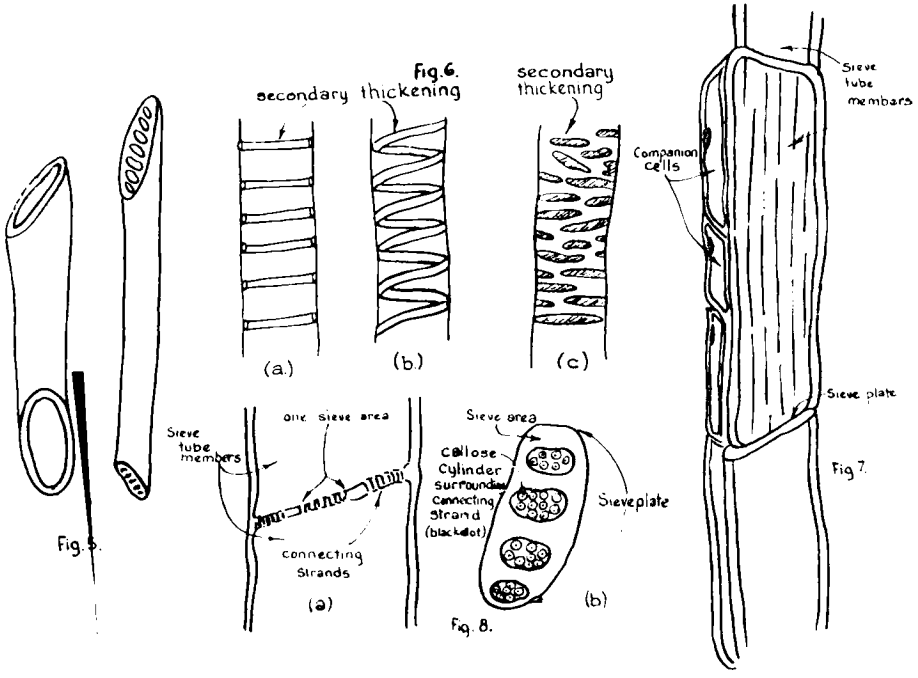



Fig. 5—Diagram of some vessel members showing types of perforations in endwalls.

Fig. 6—Diagrams of longitudinal sections of portion of vessel members showing the thickening of the inside wall; (a) Annular thickening, (b) Spiral thickening and (c) Reticulate thickening.

Fig. 7—Diagram of sieve-tube members showing adjacent companion cells and connecting sieve plates.

Fig. 8—(a) Diagram of a section of a sieve plate. Note sieve areas, callose and connecting strands; (b) Surface view of a sieve plate.

### (a) Xylem.

The most characteristic cells of the xylem are the tracheids and vessel members. At maturity the cells function as water-conducting elements and their cytoplasm is no longer living.

Tracheids are elongated cells with tapering end-walls. The walls are thickened except for the numerous pits which may be simple or bordered.

The vessel members are elongated single cells with transverse or oblique end-walls. Usually a series of vessel members lies end to end to form a long tub known as a vessel. The end-walls between each vessel member are perforated in various ways ranging from small holes or slits to a complete opening. (See Fig. 5). Each vessel member has secondary thickening which is laid down in various patterns viz. rings, bars, special bands or as a reticulum (See Fig. 6). After this thickening is deposited, the protoplasts of the vessel members disappear. The vessel walls are also pitted.

(To be Continued in the No. 23 Issue).

F. C. PAYNE

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# QUICK RESULTS WITH EUCALYPTUS

*by DON PERRIN*

We are accustomed to thinking of Eucalyptus as rather large trees taking many years to reach maturity. There are, in fact, many Eucalypts which offer you quick growth and early flowering.

When we moved into our house eleven months ago we took one look at the front patio and decided that we needed shade. That is, shade in summer and sun in winter. How could this best be done and in the quickest possible way without resorting to deciduous trees? I happened to have a good looking Lemon-scented Gum *(E. citriodora)* in a prune tin. This was the answer. It was put in with a handful of blood and bone just north of the patio in good sandy loam. Now (December, 1964) it is ten feet. That is ten feet from seed germinated 14 months ago.

The Lemon-scented Gum grows tall and straight with a graceful sparse crown so that in summer the shade will be over the patio; in winter the crown will be high enough to allow the low rays of the sun to pass beneath.

From giants to dwarfs. Two little Kruse's Mallees *(E. kruseana)* less than two feet high and less than two years old, thrilled me the other day by presenting flower buds. This little tree has very small silvery leaves and yellow flowers. Another *E. kruseana* of the same age has been constantly tip-pruned and has not budded as yet.

One of the most ornamental of small trees must be the Argyle Apple *(E. cinerea)*. The ash-grey juvenile foliage forms a pattern most striking and ornate. A friend said to me the other day that it wouldn't hurt to have one in every garden. We have eleven, some in very poor sandy soil, some in good sandy loam. Clearly, the preference is for better soil. Argyle Apples have reached a height of 6-8 feet in one year in good soil.

Another similar small glaucous tree keeping pace with *E. cinerea* is the Silver-leaved Mountain Gum *(E. pulverulenta)*. Its leaves are larger, more bluish grey and the growing tips are enhanced by a slight pink flush.

The Coral Gum *(E. torquata)* will flower in a tin in its second year. See the flowers of this small tree and it's love at first sight. This tree must have a big future as indeed must many of the other small flowering species.

Pink Flowering Yellow Gum *(E. leucoxylon variety macrocarpa "pink")* is likely to flower at about five feet.

While the two last mentioned are not as showy as *E. ficifolia*—the flowers being along the stems within the canopy—their attraction lies in the brilliance of colour coupled with highly ornamented buds.

You are invited to join the Eucalyptus Study Section and receive the benefit of knowledge accumulated from different parts of Australia on the growth of these trees. If you are growing any species at all of Eucalyptus the leader would like to hear about them. Write to D. Perrin, 20 Pitt Street, Springwood, N.S.W., enclosing stamped addressed envelope.

WILDFLOWER STUDY SECTIONS

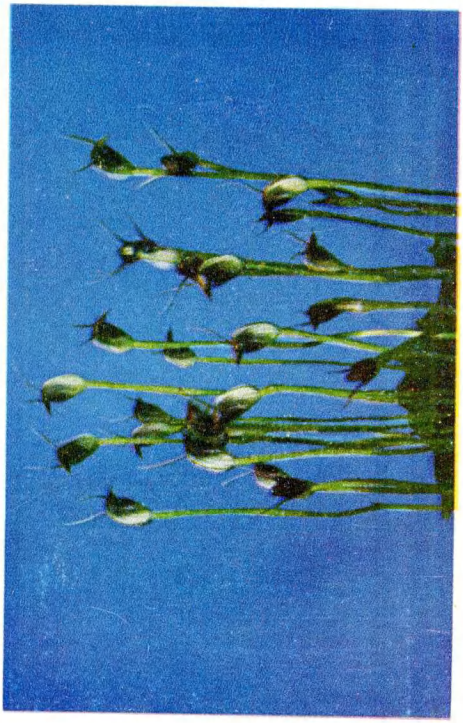
A number of readers with a common interest form a study section. They correspond, compare notes and experiences and exchange seed and plants. Research and development experiments are devised on request for those who wish to do such work at home. Contact with growers from all parts of Australia is by mail and represents the only expenditure involved. The objective of the sections is to provide a link and interest for gardeners of common interest but also to find out how a particular genus of plants will grow in the garden, record results and develop better forms.

To join, send a stamped addressed envelope to the Editor and nominate your own interest. Study Section already exist for *Acacia, Anigosanthus, Banksia, Blandfordia, Boronia, Cassia, Correa, Dampiera, Druandra, Eriostemon, Eucalyptus, Isopogon, Leptospermum, Melaleuca, Nuytsia,* Orchids-Terrestrial, Orchids-Epiphytal, *Petrophila, Stylidium, Telopea,* etc. Special groups also exist to examine certain aspects such as Photography, Propagation, Street Trees, Natives For Sea Side Planting, Frost-Hardy Natives, etc.









Type: P. [illegible] Rottam: P. longifolia