

Australian Plants

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The issues of this volume have produced a series of articles styled for the beginner (or rather for those who have not had great success) in the cultivation of Australia's wildflowers in their garden. A good floral display is not difficult if you prepare your garden adequately and select suitable plants.

The plants described in this issue will give rewarding results in reasonable garden conditions in all but the most northern areas.

As opposite, experienced horticulturalists are working to produce plants from wildflowers that have special horticultural appeal. This applies not only to the hybrids such as the "Poorinda *Grevillea*'s" but in an area that could offer even better rewards, the selection of natural forms of true species that by selection will produce plants reliably of exceptional value.

The Poorinda *Grevillea* cultivars — All species, page 213 with registered descriptions of *Grevillea* 'Poorinda (...)' (Beauty, Constance, Elegance, Firebird, Golden Lyre, Leane, Pink Coral, Queen, Signet and Splendour) — Pages 191-199, 213, 218, 236.

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Why do Plants Die in Good Garden Conditions?

All those with any experience will be able to tell of a beautiful shrub in full vigour, that suddenly collapsed and died. To present the very latest in world research is the other objective of this issue in the article "Healthy Plant Growth" — page 209.

AUSTRALIAN PLANT PIONEERS — by The Editor

There have been many noble men and women in the past who have contributed quite significantly to the knowledge on our Australian Flora and have, I hope, received commendable reference in other publications in the past. We rarely do this here as there are so many currently active. One thing that encourages me to continue with my work, despite considerable pressure, has been the very many really marvellous people one meets in the wildflower fraternity. Occasionally I meet someone whose personal contribution over the years makes my effort quite puny. It makes me feel humble and honoured to bring the readers' attention to such, often little known, people.

Leo Hodge is such a giant among men. Wildflower gardeners will know him for his creations, the "Poorinda" hybrids. I will remember him as a gentle (although voluble when on a theme close to his heart) man who loves wildflowers and has dedicated much of his life to the development of better horticultural forms. Our civilisation grows because of the people such as Leo Hodge and his wonderful wife.

COVER PLATE

Photography by Una Roberts

Grevillea aspera is a beautiful shrub that occurs throughout the Eyre Peninsula, including the Gawler Ranges, and also in the northern Flinders Ranges. The bush is shown on the colour plate on page 221. This plant has similar flowers and fruits to a new species described and illustrated in this issue but differs in the leaves. The sketch on page 219 shows the leaves of both species and a detail of the flower. The cover plate shows how the individual flowers of a *Grevillea* are grouped in a head or inflorescence. In this case they are hanging. The photograph is a little over twice full size. In other species the flowers are as large as those shown (sometimes even larger), and arranged in a different manner, such as upright in a bright red cone of flower as in the magnificent *Grevillea banksii* of Queensland. In others the flowers are in the form of a spider, or a wheel, as illustrated elsewhere in this issue.

Grevillea are beautiful shrubs for the garden.

Wildflowers in Horticulture



The horticultural potential of hundreds of species of plants in the Australian flora is outstanding. The exotic garden plants of today were developed from wildflowers of other lands over the years. Not much has been done in this direction with Australia's wildflowers.

One problem has been the confusion that has existed over the adequate naming of good or developed forms. Another has been recognition for the work and effort of competent propagators. This Society has at last been able to initiate action in this direction.

The Australian Cultivar Registration Authority has been formed to properly register cultivars of Australian plants in accordance with the International Code. Plants that have been found or developed, that have special horticultural significance, may be approved by a very competent authority, and their names and descriptions recorded permanently for use in the horticultural code.

Australian Plants will publish details of these registrations, with colour photographs where possible. Some have been done in past issues. This issue contains some very beautiful plants that you can purchase from the nursery trade with confidence, and especially it honours the efforts of Les Hodge and his "Poorinda" range of cultivars.

GREVILLEA 'POORINDA FIREBIRD'

Origin:

This "Poorinda" cultivar is said to have resulted from a cross between *Grevillea speciosa* and a New South Wales form of *Grevillea oleoides*. *Grevillea* 'Poorinda Firebird' can be expected to grow to a height of approximately 2 m.

Description:

Leaves are dull green on the upper surface, densely covered with silky hairs on the underside. Individual leaves are between 2.5-3.0 cm long and about 4 mm wide. Leaf edges are rolled under.

Flowers, scarlet and borne profusely in clusters. Each flower is about 1 cm long. Style is approximately 2.5 cm in length.

This cultivar differs from its parents in that the length of the leaves is intermediate between *Grevillea speciosa* (1-5 cm) and *G. oleoides* (5-10 cm). Leaf shape is not significant as various forms of both parents have the same shape. Flower colour is not significantly different from either parent.

Colour Coding:

Flower perianth limb and tube: red group 53C. Style: red group 53C.

Reference Specimen:

Accession number: 60, Canberra Botanic Garden. Cultivar received by the Authority: 15th August, 1967. Applicant: Mr. L. Hodge.

Comment by Leo Hodge:

This shrub grows to 1-1.5 m. The flowers are red pendant from the leaf axils, recalling *Grevillea oleoides*, but occasionally they are terminal (at the end of the branchlets), recalling *Grevillea speciosa*, the red form normally available. The grey leaves are long and thin as in *Grevillea oleoides* with a flowering habit resembling it also.



Photography by N. Hansen

GREVILLEA 'POORINDA QUEEN' (above)

Origin:

This cultivar is said to be a cross between a New South Wales form of *Grevillea juniperina* and a yellow flowered form of *Grevillea victoriae* from Victoria. Above colour reproduction not good — see below.

Description:

It is said *Grevillea* 'Poorinda Queen' can be expected to reach a height of about 4 m.

Leaves are glossy dark green on the upper surface densely covered with short white hairs on the underside. Each leaf is about 2-2.5 cm long by about 5 mm wide. Leaf edges are rolled under.

Flowers, apricot-pink are borne in large terminal clusters. Perianth, tube and limb, measures about 7 mm long. Style, a deeper pink than the flowers, is about 2 cm long.

The feature which distinguishes this cultivar from its parents is the apricot-pink flower colour.

This cultivar resembles *Grevillea* 'Poorinda Constance' but differs from it in having slightly smaller leaves. *Grevillea* 'Poorinda Queen' has leaves which measure 2.0-2.5 cm in length compared with *Grevillea* 'Poorinda Constance' which has leaves which measure 2.5-3.0 cm in length. Flower colour is also different, *Grevillea* 'Poorinda Queen' has apricot-pink flowers compared with the red flowers of *Grevillea* 'Poorinda Constance'. Similar also to *Grevillea* 'Poorinda Leane'. Refer to description of that cultivar for differences.



Photography by N. Hansen

***Grevillea victoriae* (above)**

A form of this very variable plant, one of the parents for a number of 'Poorinda' cultivars. The flowering habit of all the forms is similar, the flowers being pendant as shown. However, they differ considerably in colour and it is wise to select a good form. The leaves also vary considerably in size. Readers who can supply advice on the various forms of this plant and where they occur are invited to contact the Editor.

Colour Coding:

Flower perianth tube: pink flower colour codes as red group 41D. Perianth limb: greyed-orange group 166B. Style: red group 48B.

Reference Specimen:

Accession number: 36, Canberra Botanic Garden. Cultivar received by Authority: 21st April, 1964. Applicant: Mr. L. Hodge.

Comment by Leo Hodge:

Grevillea 'Poorinda Queen' has the same parents as *Grevillea* 'Poorinda Constance', but the bush is denser and the pink to apricot wheel type flowers more profuse. The leaves are a rich dark shiny green midway between the parents, but narrower. It is a slower grower.

The colour plate on the opposite page is not good as regards the true colours of the flower. This is more the fault of the colour slide I had supplied rather than the printing. The colour plate does not show the clear pink of the style and the apricot of the perianth, a feature of this plant.

GREVILLEA 'POORINDA LEANE' (Colour plate on page 236)

Origin:

Grevillea 'Poorinda Leane' is said to be a hybrid between a New South Wales form of *Grevillea juniperina* and *Grevillea victoriae*. Although this cultivar is assumed to have the same species for parents as *Grevillea* 'Poorinda Queen' and *Grevillea* 'Poorinda Constance', it is not known whether the same forms of the species were involved.

Description:

It is said this cultivar will reach a height of about 4 m and has a spreading habit.

Leaves are dark glossy green on the upper surface whilst the underside is covered with silky white hairs. Each leaf is up to 4 cm long and about 4 mm wide. Leaf edges are rolled under.

Flowers are buff to apricot and produced in terminal clusters on short branchlets. Each flower is about 1.5-2.0 cm long, styles are red and up to 2.5 cm in length.

Although this cultivar is similar to *Grevillea* 'Poorinda Queen', it can be distinguished from it by the longer leaves, its flower colour and its spreading habit.

Colour Coding:

Flower perianth tube: near orange group 29C. Perianth limb: near greyed-orange group 166C. Style: near red group 41B.

Reference Specimen:

Accession number: 37, Canberra Botanic Garden. Received by the Authority: 21st April, 1964. Applicant: Mr. L. Hodge.

Comment by Leo Hodge:

This plant came from the N.S.W. form of *Grevillea juniperina* and a form of *Grevillea victoriae* which is very variable in colour. The flowers of *Grevillea* 'Poorinda Leane' are of the "spider" type as in *Grevillea juniperina*, appearing to hang from one side of the branch. Although *Grevillea* 'Poorinda Queen' and *Grevillea* 'Poorinda Constance' have the same parents, their flowers are formed in heads resembling wheels hanging from one side of the branches. The leaves are dark green as in *Grevillea* 'Poorinda Queen' but are larger. The buff flowers are tinged with apricot.

GREVILLEA 'POORINDA CONSTANCE'

Origin:

Grevillea 'Poorinda Constance' is said to be a hybrid between a New South Wales form of *Grevillea juniperina* and a red flowered form of *Grevillea victoriae*.

Description:

It is said this cultivar will reach a height of about 4 m.

Leaves are shiny on the upper surface, but covered with short white hairs on the underside. Individual leaves are 2.5-3.0 cm long and up to about 7 mm wide. Leaf margins are rolled under.

Flowers red, tipped orange, are produced in terminal clusters on short branchlets. Each flower is about 1 cm long, the styles, darker than the flowers, are 2 cm long.

This cultivar resembles *Grevillea* 'Poorinda Queen' but differs from it in having slightly larger leaves. *Grevillea* 'Poorinda Constance' has leaves which measure 2.5-3.0 cm in length compared with *Grevillea* 'Poorinda Queen' which has leaves which measure 2.0-2.5 cm in length. Flower colour is also different, *Grevillea* 'Poorinda Constance' has red flowers compared with the apricot-pink flowers of *Grevillea* 'Poorinda Queen'.

Colour Coding:

Flower perianth tube: red group 50A. Perianth limb: near greyed-orange 175C. Style: red group 46C.

Reference Specimen:

Accession number: 40, Canberra Botanic Garden. Cultivar received by the Authority: 21st April, 1964. Applicant: Mr. L. Hodge.

Comment by Leo Hodge:

The attractive, almost shiny bright green foliage of this shrub can be pruned to shape or the size desired. The leaves are almost midway between the two parents, tending towards *Grevillea juniperina* but are not prickly. The flowers are a clear bright red in terminal pendant clusters each resembling a wheel.

GREVILLEA 'POORINDA PINK CORAL'**Origin:**

This cultivar is said to have resulted from a cross between *Grevillea juniperina* and *Grevillea victoriae*. These are the same species said to be involved in *Grevillea* 'Poorinda Queen', *Grevillea* 'Poorinda Constance' and *Grevillea* 'Poorinda Leane', however in this case a different form of *Grevillea juniperina* was used.

Description:

Grevillea 'Poorinda Pink Coral' is a low spreading shrub growing to a height of about 1 m with a spread of approximately 2 m. Leaves are shiny on the upper surface with a prominent mid rib, whilst the underside has a dense covering of short silky hairs. Individual leaves are approximately 3 cm long by about 4 mm wide. The leaf edges are rolled under.

Flowers are coral pink in colour, tipped green, terminally produced on short branchlets. Each flower is about 1.3 cm long, style up to 2 cm long and a shade darker than the flower colour.

This cultivar differs from *Grevillea* 'Poorinda Constance' and *Grevillea* 'Poorinda Leane' in that it is a smaller shrub and has coral pink flowers. It differs from *Grevillea* 'Poorinda Queen' in that the leaves are longer and slightly narrower, also the flowers of this cultivar are a shade darker than those of *Grevillea* 'Poorinda Queen'.

Colour Coding:

Flower perianth tube: red group 41C. Perianth limb: yellow-green group 152B. Style: red group 41B.

Reference Specimen:

Accession number: 56, Canberra Botanic Garden. Cultivar received by the Authority: undated specimen received prior to 1972; first dated specimen received 21st October, 1975. Applicant: Mr. L. Hodge.

Comment by Leo Hodge:

A low spreading shrub about 1 metre in height and 2 m or more wide. The leaves are noticeably light green in between the parents but tending towards *Grevillea juniperina*, being narrow. The long flowers are lovely coral pink with a green tip on the style.

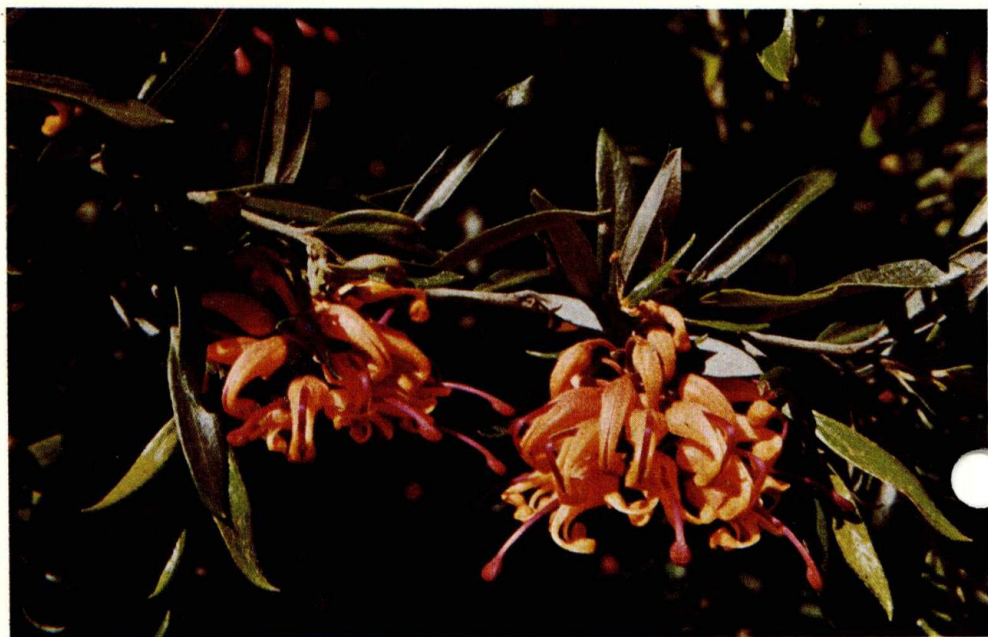
GREVILLEA 'POORINDA ELEGANCE'**Origin:**

Grevillea 'Poorinda Elegance' is said to be a hybrid between a New South Wales form of *Grevillea juniperina* and *Grevillea alpina* x *Grevillea obtusiflora*.

Description:

This cultivar can be expected to grow to a height of about 1.5 m by about 2 m wide.

Leaves, bright shiny green on upper surface, but covered with dense silky hairs on underside. Each leaf is up to about 4 cm long and about 4-6 mm wide. The edges are slightly rolled under.



Photography by N. Hansen

Description of *Grevillea* 'Poorinda Elegance' (above)

Flower perianth tube and limb: near yellow-orange group 20A. Style: red group 52A. See comment by Leo Hodge on the colour plate.

Reference Specimen:

Accession number: 62, Canberra Botanic Garden. Cultivar received by the Authority: 23rd October, 1963. Applicant: Mr. L. Hodge.

Comment by Leo Hodge:

This is a bushy medium green shrub. The principle feature is the flower which is an unusual dainty creamy yellow with a bright pink style. They are pendant in bunches as in *Grevillea obtusiflora* but there is an unfortunate tendency for the foliage to hide the flowers. The flowers are sterile.

Flowers, yellow with contrasting bright pink style, are produced in loose heads on the ends of short branches. Short leaf-like bracts are usually seen within each flower head. Individual flowers, yellow about 1.2 cm long while the bright pink styles are about 2.2 cm long.

The flower colours of yellow and bright pink distinguish this cultivar from its assumed parents.

The colour plate opposite does not do full justice to the plant. The striking difference between the pale yellow of the perianth and the bright, deep-pink style is an outstanding feature of this elegant shrub.

GREVILLEA 'POORINDA SIGNET'

Origin:

This cultivar from "Poorinda" is said to be a hybrid between *Grevillea juniperina* and *Grevillea lanigera*.

Description:

The plant is a spreading shrub of about 2 m in height by 2 m in width. It has arching branches with numerous branchlets.



Photography by Peter Althofer

GREVILLEA LANIGERA

For a description of 'Poorinda Parents' incl. *G. lanigera*, see page 278.

Leaves, dark green on upper surface, but silver-grey on underside due to a covering of dense silky hairs. Each leaf is about 1.5-3.0 cm long and between 2-5 mm wide. Leaf edges are rolled under.

Flowers, pale pink with deeper pink styles, generally produced on underside of arching branches in hanging clusters. Buds very densely covered with grey hairs, but as flower matures its appearance becomes less hairy. Individual flowers, pale pink grading to green towards the limb, are about 8-10 mm long, style, bright pink, about 1.8 cm long.

This cultivar can be distinguished from its parents in that its leaves and flowers are intermediate in size. Flower colour is lighter than most forms of either parent.

Colour Coding:

Flower perianth tube: red group 55D. Perianth limb: green group 138B. Style: the bright pink colour codes as red-purple group 58C.

Reference Specimen:

Accession number: 9, Canberra Botanic Garden. Cultivar received by the Authority: 9th October, 1974. Applicant: Mr. L. Hodge.

Comment by Leo Hodge:

This plant came from the New South Wales form of *Grevillea juniperina* and the Victorian alpine form of *Grevillea lanigera* which is a very "woolly" form. The branches of this spreading shrub "cascade" is a pleasing habit and resemble the *Grevillea lanigera* parent. The leaves are midway between the leaf shape of the two parents with dimensions as above. The flowers are what I describe as the horn type clustered to form a wheel type flower-head, hanging from the branches. They are pink, turning ivory with a red style. They are sterile.

GREVILLEA 'POORINDA SPLENDOUR'

Origin:

This cultivar is said to be a cross between a New South Wales form of *Grevillea juniperina* and *Grevillea alpina*.

Description:

Plants form a dense shrub and grow to a height of approximately 2 m.

Leaves, dark green and shiny on upper surface but densely covered with silky hairs beneath. Each leaf is between 2-3 cm in length and about 3 mm wide. Leaf edges are rolled under.

Flowers, red grading to a sandy yellow towards the limb, borne in terminal clusters on short branchlets. Individual flowers are approximately 1 cm long, styles, red are about 2.5 cm long.

This cultivar is of the same cross as *Grevillea* 'Poorinda Beauty' and *Grevillea* 'Poorinda Wonder', however it is not known whether the same forms of the respective species were used. It differs from *Grevillea* 'Poorinda Beauty' in that the leaves are between 2-3 cm in length instead of about 1.5 cm. Flower clusters are less dense and less bright in colour. Style length is also different, in *Grevillea* 'Poorinda Splendour' it is about 2.5 cm long compared with 1.8-2.0 cm in *Grevillea* 'Poorinda Beauty'.

This cultivar differs from *Grevillea* 'Poorinda Wonder' in that of habit and height of shrub. *Grevillea* 'Poorinda Wonder' is an erect shrub to about 1 m. *Grevillea* 'Poorinda Splendour' cannot be distinguished from *Grevillea* 'Poorinda Wonder' on flower colour alone.

Colour Coding:

Flower perianth tube: red group 45B. Perianth Limb: greyed-yellow group 162B. Style: red group 45B.

Reference Specimen:

Accession number: 49, Canberra Botanic Garden. Cultivar received by Authority: undated specimen received prior to 1972, first dated specimen received 21st October, 1975. Applicant: Mr. L. Hodge.

Comment by Leo Hodge:

With this bush, the undersurface of the leaves and stems are a silvery buff, whereas the upper surface of the leaves has a silvery sheen. The cross involved the same parents as *Grevillea* 'Poorinda Beauty' with the same form of *Grevillea alpina* being used and the flowers are similar except that the style is longer, recalling *Grevillea juniperina*. The flowers are sterile. The flowers of *Grevillea* 'Poorinda Splendour' reflex up in "spider flower" fashion. In *Grevillea* 'Poorinda Wonder' where a different form of *Grevillea alpina* was used, the flowers hang in pendant wheels and the foliage is tending to brownish.

GREVILLEA 'POORINDA BEAUTY'

Origin:

This cultivar is said to be a cross between a New South Wales form of *Grevillea juniperina* and *G. alpina*.

Description:

This plant will grow to a height of about 2 m, however a tendency to produce long straggly branches has been noted.

Leaves, smooth and grey-green on upper surface being very densely covered in silky hairs on the underside. Stems are covered with silky hairs. Each leaf is about 1.5 cm long by about 3 mm wide.

Flowers, red grading to yellow towards the limb, borne in very dense clusters. Individual flowers are 1 cm long, styles deep pink, are between 1.8-2.0 cm long. The flowers are said to be sterile.

This cultivar can be distinguished from its parents in that the flower clusters are more dense than either of its parents, and these clusters tend to be more spread out along the branches.

Grevillea 'Poorinda Beauty' is of the same cross as *Grevillea* 'Poorinda Splendour' and *Grevillea* 'Poorinda Wonder', however it is not known whether the same forms of the respective species were used. This cultivar differs from both *Grevillea* 'Poorinda Splendour' and *Grevillea* 'Poorinda Wonder' in leaf size. Leaves of this cultivar are about 1.5 cm long compared with 2-3 cm leaves for both *Grevillea* 'Poorinda Splendour' and *Grevillea* 'Poorinda Wonder'. Flower colour is only different in that the colour of the perianth tube is a clear bright yellow compared to the duller colour of both *Grevillea* 'Poorinda Splendour' and *Grevillea* 'Poorinda Wonder'.

Colour Coding:

Flower perianth tube: red group 45C. Perianth limb: near yellow-orange group 23B. Style: red group 53C.

Reference Specimen:

Accession number: 63, Canberra Botanic Garden. Cultivar received by the Authority: undated specimen received prior to 1972, first dated specimen received 21st October, 1975. Applicant: Mr. L. Hodge.

Comment by Leo Hodge:

The scarlet flowers hang in "wheels" from the soft foliated branches that tend towards the form of *Grevillea alpina* used in the cross.

GREVILLEA 'POORINDA GOLDEN LYRE'

Origin:

The cultivar named *Grevillea* 'Poorinda Golden Lyre' is said to be a cross between *Grevillea alpina* and *Grevillea victoriae*.

Description:

This shrub will reach a height of about 1 m.

Leaves have a dark upper surface whilst the underside is covered with dense silky hairs. Individual leaves are approximately 3 cm long and up to 1.2 cm wide. The edges are rolled under.

Flower clusters are borne terminally on short laterals. Perianth tube and limb is a rich yellow in colour and up to 2 cm in length. Style is red and up to about 2 cm in length.

This cultivar is distinguished from its parents in that it falls intermediate between them in both size of leaf and flower.

Colour Coding:

Flower perianth tube and limb: near yellow-orange group 19A. Style: red group 52B.

Reference Specimen:

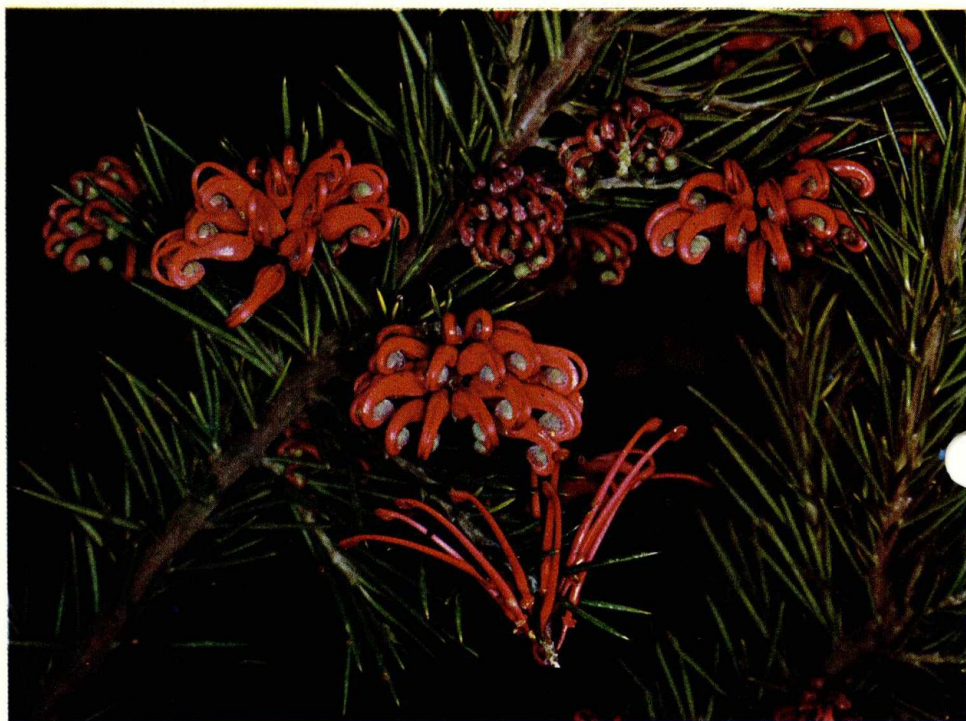
Accession number: 59, Canberra Botanic Garden. Cultivar received by the Authority: 23rd October, 1963. Applicant: Mr. L. Hodge.

Comment by Leo Hodge:

This plant came from a procumbent form of *Grevillea alpina*, and a form of *Grevillea victoriae*. It is a small compact bush to 1 m. The dark dull green leaves are nearly oval resembling the small leaved forms of *Grevillea victoriae*. The flowers are short, golden yellow, with a pink style and "lyre" shaped, held together in a small wheel formation. The flower is sterile.

MORE CULTIVARS — NOT POORINDA

The following pages will describe more cultivars that have been officially registered but are not from the Poorinda stable. Leo Hodge has produced many more cultivars of *Grevillea* as described in the article on page 213. We urgently need good colour slides of all *Grevillea* as well as the cultivars.



Photography by Murray Fagg

GREVILLEA 'CANBERRA GEM' (above)

Origin: A manipulated hybrid from *Grevillea juniperina* R. Br. X *G. rosmarinifolia* A. Cunn. sens. lat. raised in the early 1960s by Mr. P. Moore, then Chief Nurseryman at Yarralumla government nursery; under the then Parks and Gardens section of the Department of the Interior.

Description: An erect, moderately dense shrub to 2.5 m high, with slender ascending branches; leaves 15-30 mm long and 0.5-1 mm broad, ± 1 mm diameter under the limb dilating to ± 3 mm diameter below the middle, with scattered, appressed hairs, limb obtuse ± 2 mm diameter, with moderately dense appressed silky hairs; ovary on stripe 1 mm long; glabrous; style 12-15 mm long glabrous.

Diagnosis: *Grevillea* 'Canberra Gem' differs from *G. rosmarinifolia* A. Cunn. sens. lat. chiefly in its silky hairy perianth, its narrower less dilated, less strongly curved perianth tube and in its stipate ovary.

From *G. juniperina* R. Br. it differs chiefly in its relatively shorter perianth tube, more dilated below the middle, broader and more strongly curved above, and in its shorter ovary stripe, ± 1 mm not ± 4 mm.

Flower Colour Coding: (R.H.S.) Perianth: Red group 54; limb: yellow-green group, 146D; style: red group, 52A; stigma: greyed orange group, 165B.

Reference Specimen: Accession number 92, Canberra Botanic Garden.

Comment by W. Cane

From the photograph of *Grevillea* 'Canberra Gem' the parentage of *Grevillea juniperina* is evident. It is a stiffer, more open plant than *Grevillea* 'Clearview David' and much stiffer and more prickly leaved with different flower clusters to *Grevillea* 'Crosbie Morrison'.



Photography by Peter Althofer

GREVILLEA ROSMARINIFOLIA

Illustrated here as this plant is a parent of a number of these cultivars.

Grevillea rosmarinifolia is a very variable plant, a number of forms being shown in past issues. Some forms are:

Little Desert Form — A form with finer foliage than most that can grow from 1-2 m high. Careful selection could develop some very fine plants. Selection of a small-growing form resulted in the as yet unregistered cultivar known as 'Desert Flame'.

Crooked River Form — This is a larger plant with larger leaves than normal. It was used in the cross to produce the cultivars *Grevillea* 'Crosbie Morrison' and *Grevillea* 'Clearview David'.

Bendigo Form — A suckering plant though it is not vigorous.

Penola Springs Form — A dark-leaved form to 0.6 m with deep red flowers. It was sold at one time as Findleys Pride.

Hurstbridge Form — A grey-foliaged form to 1 m that appears close to *G. lanigera*.

GREVILLEA 'CLEARVIEW DAVID'

Raised by Mr. W. Cane at his "Clearview" Nursery, Maffra, Victoria. The parentage is asserted to be *Grevillea rosmarinifolia* A. Cunn. sens. lat. x *Grevillea* 'Crosbie Morrison'. Involvement of the former is almost certain but that of the latter has not been confirmed at this stage.

Description

Apparently an erect shrub to 2.5 m high; leaves 1.5-3.0 cm long and 1.5-2 mm broad, narrow linear and sometimes becoming subulate towards the fine pungent points; leaf margins recurved; perianth tube 8-13 mm long, about 2 mm diameter, moderately silky hairy, limb about 2 mm diameter, moderately silky hairy; ovary stipitate, densely silky villous; style 12-15 mm long with scattered hairs on the lower half.

Grevillea 'Clearview David' differs from *G. rosmarinifolia* A. Cunn. sens. lat. chiefly in its silky hairy perianth, stipitate and densely silky villous ovary, sparsely hairy style and in its profuse flowering habit — its flowers are said to "cover the full length of its branches".

Flower Colour Coding

Perianth tube: Red group 52A (R.H.S. Colour Chart).

Limb: Red group 51C grading to 51D. Style: 52A. Stigma: Red Group 46A.

Reference Specimen

Accession number 91, Canberra Botanic Gardens.

The large crimson flowers of this cultivar are its main attraction although its tall habit would make it a useful screen plant. It is vegetatively similar to *Grevillea* 'Canberra Gem' but it has broader leaves with recurved margins which do not completely cover the lower surface. Its flowers differ in form and colour from *G. 'Canberra Gem'*. Its perianth tube is crimson, broader above and more dilated below and its limb is a paler shade of crimson not green, and is more acute in shape. In addition, it has a densely hairy ovary and sparsely hairy style. These characters are easily discernable under a hand-lens.

GREVILLEA 'EVELYN'S CORONET'

Grevillea 'Evelyn's Coronet' is asserted to be a hybrid between *Grevillea buxifolia* and *Grevillea lavandulacea*. It arose spontaneously in the garden of Mrs. Hickey of Lane Cove, Sydney in 1972.

Description:

The plant can be expected to reach a height of about 2 m with a spread of approximately 1.75 m and exhibits an erect habit.

Leaves are shiny green on upper surface and somewhat rough to the touch, the underside is a paler green and covered with hairs. Individual leaves are about 2 cm long and about 3 mm wide. Leaf edges are rolled under. Each leaf ends in a sharp point, sometimes these points are hooked.

Flowers are woolly and pink with upright red-purple styles. Flower clusters are dense, rounded and produced terminally. Individual flowers are approximately 8 mm long, styles up to 1.5 cm long.

The plant is described as being vigorous and hardy producing numerous, readily seen terminal inflorescences. It can be distinguished from its assumed parents in that its leaves are intermediate in size and the flowers are intermediate in size, colour and formation.

Colour Coding:

Flower perianth tube and limb: near red group 54C. Style: greyed-purple group 187C.

Reference Specimen:

Accession number: 112, Canberra Botanic Garden. Cultivar received by the Authority: 16th September, 1976.

Comment by W. E. Knowles:

This is a natural hybrid — almost certainly of *Grevillea buxifolia* and *G. lavandulacea*. It was found during 1972 as a small seedling growing under a mature plant of *G. buxifolia* in the garden of S.G.A.P. member (Harbourside Group) Mrs. J. H. (Evelyn) Hickey, Lane Cove. The *G. buxifolia* which originated as a seedling, was given to her by another group member, Mr. W. E. Knowles, also of Lane Cove. The proposed cultivar first flowered during August, 1975. Plants are available at "Kentlyn Nursery".

The shrub is a hardy vigorous grower, which, to date, has not been subject to any discernable disease or infestation, is now 2 m tall and almost as wide and has held its lower growth. It flowers prolifically during Spring and then sporadically during Summer and increasing during late summer. Inflorescences are terminal consisting of 28-30 flowers grouped in a head of flower similar to those of *G. buxifolia* but having long upstanding red styles. Corolla colour changes from cream to pink to grey. Stem growth responds well to light pruning and laterals shoot in whorls of 7-12. Leaf shape is similar to *G. lavandulacea* but larger 15-25 mm, length 1.5 to 3 mm width. It appears that it would be a good hedging plant.

GREVILLEA 'PINK SURPRISE'

Grevillea 'Pink Surprise' originated as a spontaneous hybrid between a *Grevillea* sp. Mundubbera* (cream flowered) crossed with *G. banksii* (red flowered), in the garden of Mr. R. Bailey of Indooroopilly, Queensland.

This cultivar can be expected to grow to a height of about 3 m.

Leaves are compound and shiny green on the upper surface, silvery on the lower surface with a prominent mid rib. Each leaf consists of $\pm$ 20 long, narrow lobes, occasionally these being subdivided into two. Some lobes end in a small hooked point, others a straight point. The overall length of a leaf is $\pm$ 30 cm and the width $\pm$ 10 cm. Individual lobes are about 10 cm long and 2-4 mm wide. The leaf edges are rolled under.

Flowers are pink with long cream to very pale green styles. Flowers are about 15 cm long and approx. 5 cm wide and produced in dense terminal racemes. Individual flowers are borne in tight pairs and are woolly. Perianth tube and limb together measure about 1.3 cm long, styles are up to 3.5 cm long.

G. 'Pink Surprise' can be distinguished from its parents by its pink flower colour.

Colour Coding

Inner perianth tube: between red-purple group 58B & C.

Outer perianth tube: near red-purple group 63D.

Limb: near orange group 24B. Style: yellow-green group 150D.

Reference Specimen:

Cultivar received by the Authority: 8th Sept., 1976. Accession number: 101.

Comment by Ralph Bailey:—

Grevillea 'Pink Surprise' has an appearance more akin to *Grevillea* sp. 'Mundubbera' than to *G. banksii*. At about 1½ years old the plant is approximately 2700 mm (9 ft) high with a spread of approximately 1800 mm (6 ft.). It is of more open habit than *G. banksii* but tip pruning would make it bushier if desired.

Grevillea 'Pink Surprise' appears likely to grow to large shrub or small tree size and flowers continuously with occasional flushes of many flowers.

The pink and cream cylindrical flowers are carried in erect, individual or branching clusters.

Another seedling from the same source as the original 'Pink Surprise' (*Grevillea* sp. Mundubbera x *G. banksii*) has flowered in the garden of Mrs. W. Bristow of Sherwood, Queensland. This seedling is identical in leaf, habit and flower to *Grevillea* 'Pink Surprise'.

*Comment by D. Macgillivray, Botanist, Botanic Gardens, Sydney:— "In my review of the genus *Grevillea*, I have not studied this group of species in detail as yet. There is what appears to be a distinct species in the vicinity of Mundubbera, Queensland (illustrated in Issue No. 70, Australian Plants). This is probably the same species as *Grevillea* sp. "Coochin Hills" illustrated in colour on page 129 of No. 63 Issue of Australian Plants. Its affinities are possibly as much with *G. sessilis* as with any other species



HELICHRYSUM BRACTEATUM 'DIAMOND HEAD' (above)

Helichrysum bracteatum 'Diamond Head' is a natural form of *Helichrysum bracteatum* which was found growing at Diamond Head, N.S.W.

Description:

Owing to the exposed position this plant grows in, it has developed a stable prostrate habit which reduces its height to approximately 8 cm. Flower heads are held above the level of the plants adding about another 8 cm to its height during the flowering season which begins in early November and continues through to mid-February. Overall height, therefore, is approximately 16 cm. Individual plants will grow to approximately 60 cm across and are perennial.

Leaves green, approximately 7 cm long and about 5 mm wide. They are rough to the touch due to a covering on both upper and lower surfaces of short stout hairs.

Flowers bright yellow, approximately 3 cm across. The ray florets are papery and remain on the plant for some months. The centre of each flower head is orange.

The main feature which distinguishes this cultivar from other forms of *Helichrysum bracteatum* is that of its height and perennial habit.

Colour Coding:

Flower ray florets: yellow group 13A. Inner florets: orange group 24A.

Reference Specimen:

Accession number: 107, Canberra Botanic Garden. Received by the Authority: 21st February, 1977.

CERATOPETALUM GUMMIFERUM 'WHITE CHRISTMAS'

Ceratopetalum gummiferum 'White Christmas' was noticed as a natural colour variant within a population of normal red *C. gummiferum* growing at Castle Hill, New South Wales.

Diagnosis

C. gummiferum 'White Christmas' is only different from other known forms of *C. gummiferum* in that the calyx lobes do not exhibit the usual pink to red colouring. The calyx lobes remain white to green in colour throughout the flowering and seed developing period.

Habit also is identical to other known forms of *C. gummiferum*.

Colour Coding

Calyx lobes: yellow-green group 150D.

Reference Specimen

Cultivar received: 21st February, 1977. Accession number: 109.

CALLITRIS 'GOLDEN ZERO'

This cultivar was established from a mutant shoot which was noticed on a normal green-leaved form of *Callitris* sp. growing in the foothills of Mt. Zero in the Grampians, Victoria.

Diagnosis

The plant is identical to its parent except that the foliage is golden yellow throughout the year.

Colour Coding

Lower leaves yellow-green group 146A.

Leaf tips yellow-green group 153B.

Reference Specimen

Accession number 94, Canberra Botanic Gardens.

Note from Bill Cane:—

It is possible that this is a form of *Callitris rhomboidea*.

Helichrysum bracteatum 'Diamond Head'

By MAX HEWETT

I have grown *Helichrysum bracteatum* 'Diamond Head' for over 10 years and consider it to be one of my most useful rockery and front-line species.

Because of its perennial habit and profuse mid-green foliage, coupled with a continuity of flowers during the summer months, it contributes very effectively to the full look we strive to achieve in our gardens. Furthermore, it does not exhibit the fickle characteristics we have frequently come to expect from many of the small perennials. In my experience it is long lived and can be relied upon to perform satisfactorily year after year.

It seems to show little preference for varying soil types, but although it will do reasonably well in broken shade, best results will be obtained when planted in a sunny position.

For preservation of optimum appearance the old flowerheads should be removed as they become spent.

Like many species of the family *Compositae*, propagation from cuttings during the growing period is particularly easy. In fact, a two to three weeks strike with 100% success rate is not unusual.

When planting into the garden I would suggest that middle to late spring is the most satisfactory time in Sydney. In my experience specimens planted earlier have made little growth until this period, although I would not over-rule the possibility that earlier growth could perhaps be registered in seasons of above average early spring rainfall.

Finally, may I again emphasise the virtues of *Helichrysum bracteatum* 'Diamond Head', where not merely its late spring, but full summer flowering contributes well to the production of the year-round garden.

Germination of *Grevillea banksii* (R.Br.)

by M. R. Heslehurst, Queensland Agricultural College, Lawes, 4345

Seeds of *Grevillea banksii* when released from the capsule are dormant and propagation from seed has relied on peeling the seed coat from partially imbibed seeds (1, 2, 3). Some success has also been found in breaking open the capsule prior to maturity and extracting green seeds, before the seed coat dries, becoming brown and impermeable. Under natural conditions, ageing and weathering of the seed coat eventually causes permeability changes, releasing dormancy perhaps after a period of years. These methods are time consuming and an alternative chemical treatment is described, together with temperature optima for germination.

The seed coat acts as an oxidation barrier and some success in promoting germination has been achieved by the use of chemical oxidative agents. Roberts (4) has described details of the biochemistry, suggesting that seeds need to operate a specific biochemical pathway (the pentose phosphate pathway) during the initial stages of germination. Dormant seeds are often less capable of operating this pathway than non-dormant seeds, and any treatment which increases the activity of the pentose phosphate pathway (located in the soluble cytoplasm) tends to alleviate dormancy. Oxygen is a major requirement for the activity of the pentose phosphate pathway. Since the conditions within the seed are relatively anaerobic, and normal background seed respiration (Krebs cycle located in mitochondria) is a highly efficient competitor for oxygen, lack of oxygen often restricts germination. Oxygen availability can be increased by,

- increasing the supply of oxygen (removing seed coverings, increasing oxygen tensions).

- reducing the competition for oxygen (inhibiting Krebs cycle competition with respiratory inhibitors).

- promoting the activity of the pentose phosphate pathway with specific oxidising agents (in chemical sense hydrogen acceptors).

The oxidative agents used to promote the germination of locally collected seed were potassium nitrate and the sulphhydryl compounds thiourea and mercaptoethanol. Response varied with the treatment method, chemical and concentration used.

Potassium nitrate was the most efficient chemical used, applied either as a presoaking treatment for 12-24 hours or as the substrate for germination. Tetrazolium dye viability tests (5) indicated some 30% non or partial staining, which would suggest nearly all of the viable seed germinated under the

	Water	Potassium Nitrate	Thiourea	Mercaptoethanol
Maximum % Germination (25°)	0	70	50	40
Optimum (%) Concentration	—	0.2	0.02	0.10
Response occurs within range (%)	—	0.1-0.5	0.02-0.10	0.50-0.15
Incubation Period (days)	—	29	35	22

potassium nitrate treatment. Any seed coat treatment such as mechanical scarification, acid or hot water dips for various time intervals, prevented germination.

FIGURE 1

GERMINATION RESPONSE TO CONSTANT TEMPERATURE

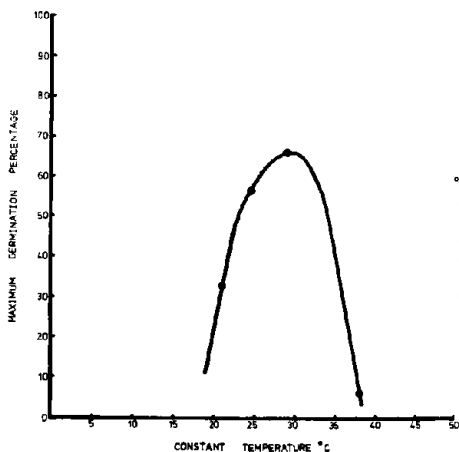
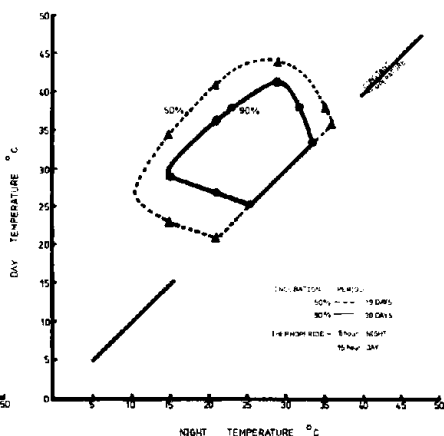


FIGURE 2

GERMINATION RESPONSE TO ALTERNATING DAY/NIIGHT TEMPERATURES



The temperature requirements for germination (which often control the seasonality of establishment) were defined by using a thermogradient bar incubator and the data treated after the method of Thompson (6). *Grevillea banksii* had a high temperature germination requirement, applied either as a constant or alternating regime. An optimum response occurred to constant temperatures (fig. 1) at 29-30°C with greater than 90% of potential germination occurring in the range 25-33°C. Alternating regimes producing 50% and 90% potential germination are defined by those day/night combinations contained within the contour lines of fig 2. Germination was depressed by night temperatures below 15°C and incubation periods increased with night temperatures below 20°C. There was a tolerance to both high night (20-33°C) and day (25-41°C) temperatures, but a depression of germination on cool days (<25°C).

SUMMARY

Collect seed of *Grevillea banksii* by placing paper bags over the inflorescence, until after the capsules have opened, releasing the seed into the bags. Avoid any damage of the seed coat.

Soak the seed in 0.2% potassium nitrate for 12 to 24 hours, completely covering the seed with solution.

TO PREPARE THIS SOLUTION:

- make up a 20% stock solution by dissolving 200 gms (7 oz.) of commercial grade potassium nitrate in one litre of water.
- take 10 cc of stock and make the volume up to one litre with water (about 30 drops in a cup of water).

Potassium nitrate is available as a commercial fertiliser, alternatively exact dilutions could be obtained from your local chemist.

Drain the solution from the seeds and place them in a germination tray (or directly into pots) containing a sandy medium (perhaps mixed with some peat or sawdust) and cover with 1 cm (½") of media. Keep the tray moist.

TEMPERATURE FOR BEST GERMINATION OF SEED:

- (a) controlled constant temperature: 25-33°C
alternating temperatures: day 24-41°C night 20-33°C
(b) not controlled

In the absence of any temperature control germinate in the summer months, perhaps with the use of a cold frame to prevent low night temperatures.

Amateur Propagation

by Pam Watson

I always sprout my seeds before planting, as sometimes seed from the seed bank or bush is immature, old, insect damaged, or just not fertile. If seeds are planted directly in a seed box one cannot be sure when seeds don't come up if there is something wrong with the seed, or if it has been watered incorrectly, or climatic conditions are wrong, or if disease or grubs have destroyed it.

To sprout the seed I take a saucer, put a piece of kitchen towel paper on it, sprinkle the seed on, put another piece of paper on top, then water with warm, previously boiled, water. All the saucers with their contents are stacked, with an empty saucer on top, to help keep the seeds dark and moist. The whole stack is placed in a plastic bag and kept in the kitchen where it is readily accessible. If seeds need to be identified a small pencil-written label is placed in each saucer.

The contents of each saucer are checked after two days and daily thereafter, and watered when the paper dries. As soon as white roots start to appear the seeds are removed with a pair of tweezers and planted.

I generally plant my seeds directly where they are to grow. A 15 cm cube of soil is forked through to make it friable, any weeds or rocks removed, and watered very thoroughly. The sprouted seed is planted at a depth about 3 times its size. An inverted flowerpot, tin with a hole in the bottom, etc. is inverted over the seed to help retain moisture, and I check in about a week. If there is foliage above ground, the cover is removed in the late afternoon and I circle the little seedling with a ring of 15 cm bits of shrub stuck into the ground for shade, and keep it well watered. If the seed doesn't come up in two weeks it usually never will.

If I don't plant the seed where it is to grow, they are planted 5 cm apart each way in a deep wooden box (e.g. a fruit box) and kept in shade and well watered.

The reasons I do not broadcast my seeds in a seed box are:

1. Often the seed does not come up, or takes a long time which is very frustrating.
2. When the seed does come up it often comes up in clumps and it is a messy business pricking out little seedlings and they are likely to die in the process.
3. What does one put ones seedlings into? If one grows them individually in pots a great supply of pots is needed and then comes the question — where does one put all the little pots so they are easy to look after. It is also a messy and heavy business filling the little pots (or bins) with dirt.
4. After growing the plant to a reasonable size it still has to be planted in the garden, hopefully without disturbing it.

I have no doubts that the traditional method of propagation works well, but I find rearing the seedlings in pots rather a drag, and usually end up with a group of rusty tins full of dirt under a tree with a little dead plant in each of them. My method works for people of extreme laziness. I have to concentrate on the seedling for a much shorter time than if it is grown until it is quite large in a pot, and there are no transplanting upsets for the plant.

Microbial Interactions in Soil and Healthy Plant Growth

A. M. Smith, Principal Research Scientist, New South Wales Department of Agriculture, Biological and Chemical Research Institute, P.M.B. 10, Rydalmere, 2116.

Microbial interactions in soil play a key role in the biological control of plant diseases, the turnover of organic matter, and the recycling of essential plant nutrients. An understanding of the mechanisms involved may lead to more efficient methods of growing plants, whether they be food crops in agriculture or native and ornamental plants in gardens.

Before these interactions can be discussed, however, it is essential to reaffirm the unique position that plants have in any ecosystem. They are the only living organisms that can directly utilize the energy of the sun and in the process they transform this energy into forms available to other living things. The green pigment, chlorophyll, in their leaves traps the light energy from the sun and an interaction occurs in leaves with carbon dioxide gas from the atmosphere to produce carbon compounds which are chemical forms of energy. These carbon compounds are then available as energy sources to other living things, including man, other animals, insects and micro-organisms when they consume plants or plant remains.

Although plants have this unique ability to trap the energy of the sun and transform it into the chemical energy they need to grow, metabolise and reproduce, they also require other materials that they are unable to produce directly. For example, they require various elements, including nitrogen, phosphorus, sulphur, calcium, magnesium, potassium and trace elements. The soil is the reservoir of these elements, but to obtain adequate supplies plants must alter the environment around their roots to mobilize these nutrients. One important way the plant achieves this is by stimulating the activity of micro-organisms in soil around their roots and the microbes then enhance nutrient mobilization. The plant stimulates microbial activity in soil by supplying chemical energy in the form of root exudates and litter. Thus, an intimate relationship exists between the plants and soil microbes. Unfortunately, in many of the conventional methods used in agriculture this relationship is impaired, resulting in problems of nutrient supply to the plant and an increase in the incidence of disease.

The latest research indicates that during the life of the plant up to 25 per cent of the chemical energy in the form of carbon compounds that is manufactured in the leaves is lost by the plant into the soil directly adjacent to the root. This material is lost either as root exudates or as dead, sloughed plant cells. On a first examination this seems to be a highly inefficient, wasteful mechanism. The plant goes to considerable trouble to trap the energy of the sun and convert it to chemical energy, but then loses almost a quarter of the energy into the soil! One view is that nothing in nature is perfect and "leaky" roots are inevitable. I certainly do not subscribe to this view. I firmly believe that if some living system is apparently wasting a quarter of the energy that it goes to the trouble to manufacture, then this loss must ultimately benefit the organisms directly. If this is not the case, then evolution should have resulted in the selection of plants that lost less of their energy.

How does this loss of carbon compounds into the soil benefit the plant? Most importantly, these compounds are energy sources for the soil micro-organisms which proliferate in the rhizosphere, i.e. the soil zone directly adjacent to the plant root. These micro-organisms multiply so rapidly that they deplete the soil of oxygen at numerous microsites in the rhizosphere. Thus, oxygen-free or anaerobic microsites are formed. The formation of these anaerobic microsites plays an important role in ensuring the health and vigor of plants.

Ethylene Production in Soil

Our research shows that ethylene, a simple gaseous compound, is produced in these anaerobic microsites. Furthermore, this ethylene is a critical regulator of the activity of soil micro-organisms and, as such, affects the rate of turnover of organic matter, the recycling of plant nutrients and the incidence of soil-borne plant diseases. Concentrations of ethylene in the soil atmosphere rarely exceed 1 to 2 parts per million. Ethylene does not act by killing soil micro-organisms, but simply by temporarily inactivating them—when concentrations of ethylene in soil fall, microbial activity recommences.

Soil ethylene is produced in what we call the OXYGEN-ETHYLENE CYCLE. Initially, the soil micro-organisms proliferate on the plant root exudates and deplete the soil of oxygen at microsites. Ethylene is then produced in these microsites and diffuses out, inactivating without killing the soil micro-organisms. When this occurs the demand for oxygen diminishes and oxygen diffuses back into the microsites. This stops or greatly reduces ethylene production, which enables the soil micro-organisms to recommence activity. Favourable conditions are then recreated for ethylene production and the cycle is continuously repeated.

In undisturbed soils, such as found under forests and grasslands, ethylene can be continually detected in the soil atmosphere, indicating that the oxygen-ethylene cycle is operating efficiently. Conversely, in most agricultural soils, ethylene concentrations are extremely low or non-existent. This is to be expected if ethylene plays an important role in regulating microbial activity in soil. It is well established that in undisturbed ecosystems where there is a slow, balanced turnover of organic matter, efficient recycling of plant nutrients and soil-borne plant diseases are unimportant. When these ecosystems are disturbed for agricultural or forestry usage the situation changes dramatically. There is an alarming decline in the amount of soil organic matter, deficiencies of plant nutrients become commonplace and the incidence of plant disease increases dramatically. We attempt to overcome these problems by additions of inorganic fertilizers and by the use of pesticides, which increase our production costs considerably. It is also generally true that the longer we farm soil, more and more of these inputs are necessary to maintain our yields.

We argue that the trend could be reversed, at least partially, if we could create favourable conditions for ethylene production in these disturbed soils. We now know that one of the major reasons why disturbed, agricultural soils fail to produce ethylene is because our techniques cause a change in the form of nitrogen in soil. In undisturbed soils, such as under forests or grasslands, virtually all the nitrogen present is in the ammonium form with just a trace of nitrate nitrogen present. When these ecosystems are disturbed for agricultural usage, virtually all the soil nitrogen occurs in the nitrate form. This change in form of nitrogen occurs because the disturbance associated with agricultural operations stimulates activity of a specific group of bacteria which convert ammonium nitrogen to nitrate nitrogen. Plants and micro-organisms can use either form of nitrogen, but our research has conclusively shown that ethylene production in soil is inhibited whenever the nitrate form is present at more than trace amounts. Ammonium nitrogen has no such inhibitory effect on ethylene production.

Nitrate nitrogen stops ethylene production because it interferes with the formation of the anaerobic microsites. When all the oxygen is consumed in the microsite a series of complex chemical changes then occur. One of the most important changes that occurs is that iron goes from the oxidized or ferric form to the reduced or ferrous form. Iron is one of the major constituents of soil, making up somewhere between 2 to 12% of its weight. In adequately aerated soil virtually all the iron exists as minute crystals of iron oxide and in this oxidized or ferric form is immobile in soil. If oxygen is completely consumed in microsites in soil, and reducing conditions exist, these minute crystals break down and iron is then transformed into the highly mobile ferrous or reduced form. Again our research has shown that ethylene production occurs in soil only when iron is in the reduced or ferrous form. In other words, ferrous iron is a specific trigger for ethylene production. If there is no oxygen in the microsites, but nitrate nitrogen is present, then the complex chemical changes leading to the reduction of iron from the ferric to the ferrous form are inhibited. This is how nitrate nitrogen stops ethylene production.

How does ferrous iron trigger the release of soil ethylene? This form of iron reacts with a precursor of ethylene that is already present in the soil and a reaction occurs that results in the release of ethylene. Our work has established that this precursor originates from plants and, more importantly, it accumulates to appreciable amounts only in old, senescent plant leaves. When these old leaves fall to the ground and decompose, the precursor accumulates in soil. Then, when conditions become favourable for mobilization of ferrous iron, ethylene is produced.

We have also shown that different plant species vary markedly in the quantities of precursor that accumulate in their old leaves. This is important to know when selecting plant species to use as cover crops to increase the ability of agricultural soils to produce ethylene. A few of the plant species that produce high concentrations of precursor are rice, phalaris, chrysanthemum, avocado, bullrush and *Pinus radiata*. Some of the low producers include *Dolichos*, *paspalum*, lucerne and bracken fern.

In retrospect it should not be too surprising that the ethylene precursor accumulates appreciably only in old, dead plant leaves. After all, in natural communities of plants old dead leaves comprise the bulk of the litter that falls on to soil. Also, it is equally clear that in agricultural situations most of the old plant leaves are removed either during harvest or by grazing or by burning crop residues. Thus, agricultural soils are usually deficient in precursor.

It is now possible to specify the soil conditions necessary for ethylene production—(1) there must initially be intense aerobic microbial activity, at least in the rhizosphere, to ensure that oxygen-free, anaerobic microsites form; (2) conditions in the microsites must become sufficiently reduced to mobilize ferrous iron to trigger ethylene release; (3) concentrations of nitrate nitrogen in soil must be kept to trace amounts, otherwise ferrous iron will not be mobilized; (4) there must be adequate reserves of the ethylene precursor in soil.

Mobilization of Essential Plant Nutrients

A major limitation to plant growth in most agricultural soils is an inadequate supply of essential plant nutrients. This occurs even though there are adequate reserves of these nutrients in soil, but they are held in highly insoluble forms. Their high degree of insolubility prevents loss from the soil by leaching, but since they are only available to the plant in the soluble form, problems of supply rate to plants are created. Formation of anaerobic microsites in the rhizosphere of plants, which is of such paramount importance to ethylene production, can play a critical role in the mobilization and thus supply rate of these essential nutrients to plants.

This mechanism revolves around the importance of iron in soil. As already discussed, under normal conditions in soil most of the iron occurs as minute crystals of iron oxide. These crystals have a large surface area and are highly charged. As a result plant nutrients such as phosphate, sulphate and trace elements are tightly bound to the surfaces of these crystals. In this form they are virtually unavailable to plants. If, however, anaerobic microsites develop, these crystals break down and the bound nutrients are released for uptake by the plant. At the same time high concentrations of ferrous (reduced and mobile form) iron are released into the soil solution in the microsite. The other essential plant nutrients, including calcium, potassium, magnesium and ammonium, are held on the surfaces of clay and organic matter. When concentrations of ferrous iron increase so much, these nutrients are displaced by the ferrous iron into the soil solution, where they too are now available for uptake by plant roots. Since anaerobic microsites are most likely to form in the rhizosphere of plants, the nutrients are mobilized exactly where they are required by the plant. An additional advantage of this mechanism is that if the released nutrients are not utilized by plant roots they cannot be leached in the soil. As soon as they migrate to the edge of the anaerobic microsite, reoxidation of the iron occurs with recrystallization of iron oxide. These crystals then rebind the nutrients and prevent their loss by leaching.

The soil conditions necessary for this mechanism to operate are identical with those required for ethylene production. Thus in agricultural soils, where ethylene production is inhibited or impaired, this mechanism of nutrient mobilization is also restricted. Again, under these conditions, the elevated concentrations of nitrate nitrogen that occur in agricultural soils are a major inhibitor of efficient nutrient mobilization.

Successful management of soils to increase the likelihood of anaerobic microsite formation, which will help ensure a balanced oxygen-ethylene cycle and enhance mobilization of essential plant nutrients, will demand alterations to some of the established practices in agriculture. For example, techniques aimed at increasing aeration and the oxidation states of soil, which give short-term increases in plant growth but rapidly create long-term problems of nutrient depletion and increased plant disease incidence, will require modification. Treatments which stimulate rates of nitrification (transformation of ammonium nitrogen to nitrate nitrogen), such as excessive use of nitrogenous fertilizers, overuse of legume dominant pastures, or excessive removal of plants by overgrazing or forestry operations, require re-examination.

Some practical guidelines for successful management of soils include:—

(1) It is essential that organic residues be returned continually to the soil. Organic residues contain essential plant nutrients for recycling, stimulate microbial activity in soil, supply ethylene precursor, and restrict the rate of nitrification in soil. It is best to use mature plants as a source of organic amendments and it is better to return the residues to the soil surface rather than incorporate them into the soil.

(2) Techniques of minimum tillage should be utilized wherever practical. This ensures that plants are growing in soil virtually continually, that there is a minimum of disturbance to the soil and increases the amount of organic matter that is returned to the soil. Again, nitrification is restricted when these techniques are used.

(3) Whenever soil is amended with nitrogenous fertilizer it is best to apply the nitrogen in the ammonium form and to apply it in several small applications rather than one or two heavy dressings. This again restricts the chance of nitrification.

(4) In some situations it will be advisable to add chemical inhibitors of nitrification (e.g. N-Serve^(R) or Terrazole^(R)) to soil with the nitrogenous amendments to further ensure that nitrification is restricted.

The Poorinda Grevilleas

A review of the life work of Leo Hodge by Pauline Tully

Even as a small child, Leo Hodge was fascinated by the wealth of wildflowers for which the Gippsland regions are famous. At W. Tree in East Gippsland, where the Hodge family lived, there is close proximity to mountain forest, fern gully, rivers and jungle, all of which presents some of the most magnificent scenery in Victoria, and possibly the greatest variety of native plants in the State. Growing up amongst these beautiful surroundings, and with a natural love for all flowering plants, it was inevitable that from early boyhood, Leo should try his hand at growing them for himself.

He called his home after he married "Poorinda". Leo started to grow natives with the objective of preserving them, although he was laughed at and told "you cannot grow that scrub". Since then hundreds of people have visited the garden at W Tree and have been encouraged to grow natives for themselves.

Leo first became interested in *Grevillea* hybrids when some natural crosses appeared as seedlings in the garden. After this he devoted a great deal of time to the study of hybridization with the idea of producing a plant with brighter or unusual colouring, together with a form of attractive foliage. He first experimented with crossing a NSW form of *Grevillea juniperina* with *Grevillea victoriae*, and in 1952 the first Poorinda hybrids came into flower. One of these was *Grevillea* 'Poorinda Queen' with pink/apricot flowers, which gained immediate popularity when it was released to nurseries. Its pretty colouring still has a wide appeal. It was at this time he met Mr. W. Cane of Maffra who was the first to propagate the Poorinda cultivars.

From the time of sowing seed of potential hybrids, their ultimate flowering usually takes three years. However *Grevillea* 'Poorinda Anticipation' took five, and was therefore, aptly named.

The following list of Poorinda grevilleas in order of appearance shows the height attained in the garden at "Poorinda", W Tree.

1952

Grevillea 'Poorinda Queen' 10-12 ft. NSW *G. juniperina* × *G. victoriae*: pink/apricot.

Grevillea 'Poorinda Constance' 10-12 ft. NSW *G. juniperina* × *G. victoriae*: clear red.

Grevillea 'Poorinda Leane' 10-12 ft. NSW *G. juniperina* × *G. victoriae*: buff/apricot.

Grevillea 'Poorinda Pink Coral' 4-5 ft. NE Vic. *G. juniperina* × *G. victoriae*: as named.

1953-54

Grevillea 'Poorinda Golden Lyre' 3-4 ft. *G. alpina* × *G. victoriae*: yellow.

Grevillea 'Poorinda Firebird' 5-6 ft. *G. speciosa* × *G. oleoides* (NSW): red.

Grevillea 'Poorinda Joyce' 2 ft. *G. alpina* (Bruthen area) × *G. lavandulacea*: pink/ivory.

1959-60

Grevillea 'Poorinda Alice' 5 ft. *G. alpina* × *G. obtusiflora*: red and yellow.

Grevillea 'Poorinda Illumina' 3 ft. *G. lavandulacea* × *G. lanigera*: pink/ivory.

Grevillea 'Crosbie Morrison' 7 ft. *G. lavandulacea* × *G. lanigera*.

1960-64

- Grevillea* 'Poorinda Ensign' dwarf, *G. lavandulacea* × *G. ilicifolia*: bright pink.
Grevillea 'Poorinda Ruby' 1-2 ft. *G. lavandulacea* × *G. dallachiana*: red/ivory.
Grevillea 'Poorinda Beauty' 4-5 ft. NSW *G. juniperina* × *G. alpina*: scarlet.
Grevillea 'Poorinda Splendour' 4-5 ft. as above: duiller scarlet.
Grevillea 'Poorinda Wonder' 6-7 ft. as above, almost identical, more erect.
Grevillea 'Poorinda Elegance' 6-7 ft. NSW *G. juniperina* × (*G. alpina* × *G. obtusifolia*): yellow, red style.
Grevillea 'Poorinda Tranquility' 3 ft. *G. lavandulacea* × form of *G. alpina*: pastel-pink.
Grevillea 'Poorinda Refrain' 3-4 ft. NSW *G. floribunda* × *G. alpina*: red/yellow/green.
Grevillea 'Poorinda Rosy Morn' 3-4 ft. *G. lavandulacea* × *G. baueri*: deep rose.
Grevillea 'Poorinda Rondeau' 3 ft. *G. lavandulacea* × *G. baueri*: deep red.
Grevillea 'Poorinda Signet' 5-6 ft. NSW *G. juniperina* × *G. lanigera*: ivory, red style.

During this same period, between 1960-64, the first of the Poorinda hybrids with "toothbrush" or one-sided flowers made their appearance. These are:

- Grevillea* 'Poorinda Peter' 8 ft. *G. acanthifolia* × *G. asplenifolia*: red.
Grevillea 'Poorinda Blondie' 8 ft., seedling of *G. hookerana*: yellow.
Grevillea 'Poorinda Anticipation' tall, spreading, *G. lavandulacea* × *G. 'Omeo'* (*G. willisii*) white: pink.

1965-66

- Grevillea* 'Poorinda Jeanie' 5-6 ft. *G. alpina* × *G. lavandulacea*: scarlet.
Grevillea 'Poorinda Belinda' 3-4 ft. NSW *G. juniperina* × un-named yellow.
Grevillea 'Poorinda Chandelier' 4-5 ft. *G. rosmarinifolia* × *G. lanigera*: ivory/red s.
Grevillea 'Poorinda Marian' 3 ft. *G. dallachiana* × *G. 'Poorinda Ruby'*: ruby/red.
Grevillea 'Poorinda Hula' 3 ft. *G. trinervis* × *G. linearis*: orchid.
Grevillea 'Poorinda Rachel' 3 ft. *G. alpina* × *G. juniperina*: buff/cerise style.
Grevillea 'Poorinda Adorning' 2 ft. low, spreading, NSW *G. juniperina* seedling: flame red.

"Toothbrush" type flowers:

- Grevillea* 'Poorinda Enchantment' tall, seedling from *G. 'Blondie'*: pale pink.
Grevillea 'Poorinda Beulah' tall, seedling from *G. 'Blondie'*: pink/yellow style.
Grevillea 'Poorinda Regina' tall, seedling from *G. 'Blondie'*: pink.
Grevillea 'Poorinda Empress' tall, *G. hookerana* × *G. caleyi*: red.
Grevillea 'Poorinda Gemini' 2-3 ft. *G. hookerana* seedling: bright pink.

1967-68

- Grevillea* 'Poorinda Jennifer Joy' 4 ft. *G. speciosa* × *G. linearifolia*: mauve.
Grevillea 'Poorinda Pendant' 3 ft. 2 forms *G. rosmarinifolia* × *G. lanigera*: ivory/red style.
Grevillea 'Poorinda Rosalie' tall, *G. juniperina* × *G. victorlae*: rose/red style.
Grevillea 'Poorinda Vivacity' 4 ft. *G. speciosa* × *G. oleoides*: vivid red.
"Toothbrush" types:
Grevillea 'Poorinda Emblem' tall, *G. 'Poorinda Peter'* × *G. caleyi*: purple/red.
Grevillea 'Poorinda Royal Mantle' prost. *G. laurifolia* × from *G. 'Omeo'* (*G. willisii*): red/black.

Six years ago, when Leo Hodge sold his property at W Tree and moved to the new "Poorinda" at Mount Lookout near Bairnsdale, a busy time was spent in propagating a great number of plants ready for moving to their new home. Aerial layering was the method used, which Leo finds is always successful, and is highly recommended. Many shrubs were planted in hollowed-out tree trunks 10 inches deep, with a piece of tin, or flat-iron, attached to the bottom. The tin was later removed and the tree trunk embedded in the ground, enabling him to start his new garden with well established shrubs.

The garden at "Poorinda" is of tremendous interest and would delight the heart of all those who love Australian native plants. Apart from the 45 Poorinda hybrids listed, there are specimens of the parent grevilleas, as well as many other species, such as a number of different forms of *G. lavandulacea* from different areas, including the soft, grey-foliaged form from Monarto South in South Australia.

As well as this great collection of Grevilleas, the garden is extensively planted with many other native plants and, of course, the Poorinda hybrid *prostantheras*, *westringias*, *correa*, *croweas* and *eriostemons*.

When asked for information regarding the successful cultivation of grevilleas, Leo has said that in his experience well-drained soil is the most important factor. (This can be appreciated when one considers that East Gippsland has had 43 inches of rain over the past 10 months!) Watering is carried out when really necessary during the first summer after planting; after that all shrubs are left to fend for themselves. He does not use fertilisers. Tip pruning is recommended to help in developing a more compact shrub when needed.

The hardiness of the Poorinda hybrids cannot be disputed when one takes into account their survival after the severe drought in Gippsland, followed by a year of excessive rains during their first 2-3 years in a new garden, when given the minimum of attention.

The painstaking and exacting work involved over more than 20 years has been a labour of love for Leo Hodge. Any monetary gain is shared only among the nurserymen who are selling the results produced by an experienced hybridist. His reward has been in the contemplation of the beauty he has created.

Grevilleas — the "different" ones

A series for the young in spirit, by Nuri Mass

If someone asked you to describe a flower, what would you say? Perhaps something like this: "It's made up of four sets of different parts. On the outside, there's a ring of green sepals, almost like little leaves. Inside this, there's a ring of petals, spread out and colourful. Inside this again, there's a ring of stamens carrying yellow pollen. And in the very centre there's the pistil, with the ovary at the bottom (containing the baby seeds), then an upright stalk (or style) with, on the top of it, a sticky little knob (the stigma)." And this, generally speaking, would be right.

However, on Earth today, there are many thousands of different kinds of flowers — amongst which are seemingly endless variations upon this simple theme. And some of the most interesting and attractive variations are to be found among the members of family *Proteaceae*.

Think of the stately Waratah, for instance, in relation to your simple, basic description of a flower. Then think of the lovely white *Lomatia* that we call Wild Parsley — and the large wiry heads of Banksias. Think of the brilliant red flower clusters of the Fire Wheel Tree — the delicate thread-like Hakeas, the quaint little flower-groups that end up as the fruiting heads that we call Drumsticks and Conesticks. Think of the beautiful iridescent Dryandras, extinct everywhere except in the south-west corner of Western Australia. And finally — to cut the list very short indeed — think of our bewitching, elfin-like Grevilleas.

They're elfin-like from start to finish — from their funny little curled-over buds to their seed-boxes, like elfish shoes with turned-up toes. These "turned-up toes" are actually the hook-like remains of the flower's pistil, which stays on after the flower itself has died. But that's like starting at the end of a story instead of at the beginning.

Grevilleas are almost entirely Australian, and there are more than 240 different species of them. They come in a multitude of colours, including some that are quite uncommon among flowers: grey, for instance, and green. Their plants are usually shrubs, but on the other hand *Grevillea robusta* is a large and very handsome tree, nicknamed the Silky Oak because of the silky look of its beautiful oak-like grain. And at the opposite extreme, *Grevillea laurifolia* stays well down on the ground, trailing over it and looking rather like a dense green carpet — patterned here and there with tight little clusters of red flowers.

It is, of course, extremely important for flowers to attract insects — with their colours as well as with the smell of their nectar — otherwise how could they ever be sure of their pollen getting properly distributed? But with most Grevilleas, one separate flower on its own would be far too small to attract anything. This is why, so often, many of them grow together in groups (or inflorescences).

Sometimes the inflorescences are long and compact, like brushes. Other times the flowers ray out in a more or less circular head — and it's then that Grevilleas are often called Spider Flowers, for they look very leggy and spidery indeed.

The average sort of flower described at the beginning of this story wouldn't look spidery in the least if it grew several together in this kind of inflorescence — but then, Grevilleas are very far from "average".

To begin with, they have no sepals at all. Next, their petals are joined together into a tube, so that, although there are four of them, you'd never know it unless you looked very closely.

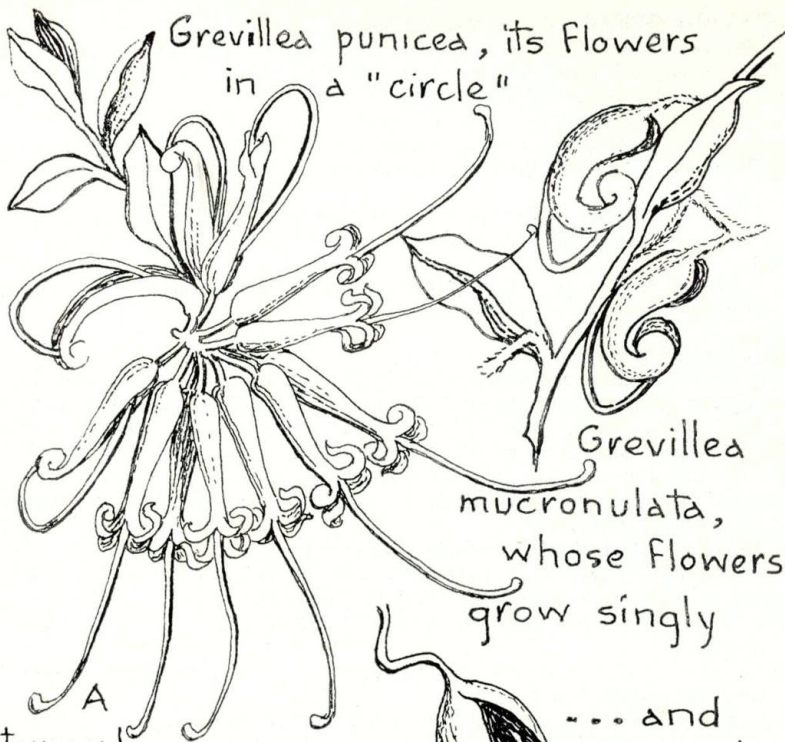
Ordinarily, stamens are made up of two parts: the anther which contains the pollen, and the filament which supports the anther. But the four stamens of a *Grevillea* don't have filaments — only anthers. And these are attached to the inside of its petal-tube, right up at the top.

Finally, the pistil of a *Grevillea* is so long that it won't fit snugly inside its bud. Instead, it pokes out in a large hoop through a slit in the petal-tube. Then, when the flower opens and the tips of its petals unroll, the pistil is free to straighten out — and it's now, with several flowers growing together in a group, that their pistils do look for all the world like the legs of some flowery spider.

In short, Grevilleas are quite different from "normal" flowers in every one of their parts. Then, at seeding time, we find that they are also different from most of the other members of their own family, *Proteaceae*. One of the special features of *Proteaceae*s is that their seeds usually have little papery wings to "fly" with, so that they can easily travel far and wide, even on the lightest breeze. *Grevillea* seeds, however — with very few exceptions — do not have wings, the most famous of those exceptions being the Silky Oak.

A shrub, or a trailer, or maybe a tree,
With flowers massed together, Grevilleas are we.
We haven't got *all* of the usual flower "things";
We each have two seeds, though they seldom have wings.
We're sometimes called "spiders" — so, as you can see,
We're flowers that are different as different can be.

Editor's Note: This series of articles is especially produced for the very young. Go and study the beautiful *Grevillea* flowers coming into bloom shortly. We hope you will try to grow some, or any other wildflowers, from seed. Try the easy methods mentioned in this volume.



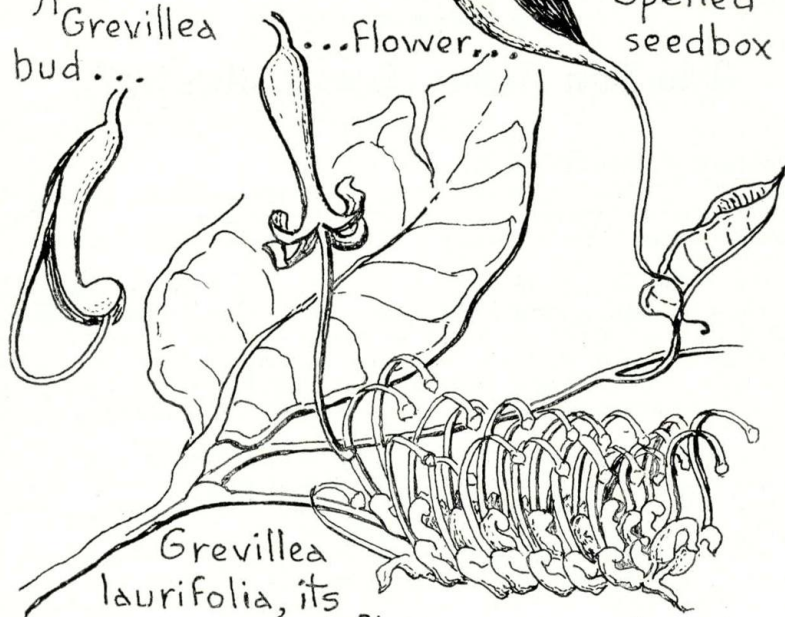
Grevillea punicea, its Flowers
in a "circle"

*Grevillea
mucronulata*,
whose Flowers
grow singly

A
typical
Grevillea
bud...

...flower...

... and
opened
seedbox



*Grevillea
laurifolia*, its

flowers in a "brush"

POORINDA GREVILLEA — The Parents

The plants used to create the Poorinda hybrid crosses are themselves worthy of special note. All are very variable plants and by selection of good forms, you have excellent garden plants.

Grevillea victoriae — a beautiful shrub illustrated on page 193.

Grevillea rosmarinifolia — a variable shrub described on page 201.

Grevillea speciosa (syn. *G. punicea*) — Described and illustrated previously.

Grevillea oleoides — An excellent hardy shrub — good slides are required.

Grevillea alpina and *G. lavandulacea* — To be featured in an issue shortly.

Grevillea juniperina — we need good slides and reports on this plant.

Grevillea lanigera — as follows:

Grevillea lanigera

A very beautiful rewarding garden plant. There is a good photograph of *Grevillea lanigera* on page 197. It shows the glabrous perianth (the shiny red with yellow tipped outer section typical of a *Grevillea* flower), and the hairy style (the protruding centre "finger" of the flower with the "knob" on the end), and the strongly recurved (curled up) margins of the leaves. There is also a tendency for the branches to be secund, i.e. with the leaves to one side of the branch.

Grevillea lanigera has a number of forms:

Lake Glenmagie Form — A bush with lime green leaves to 0.6 m used in the cross that produced the cultivar 'Clearview John'.

Alpine Form — A bush with grey foliage to 2.5 m with a compact pyramidal shape.

Snowy River Form — Similar to the Alpine Form but generally smaller to 1 m with bright flowers.

Mt. Tamboritha Form — A prostrate plant that is unique as it has not yet hybridised with *G. chrysophaea*, as the other forms have.

Grevillea from South Australia

Notes by Ken Warnes

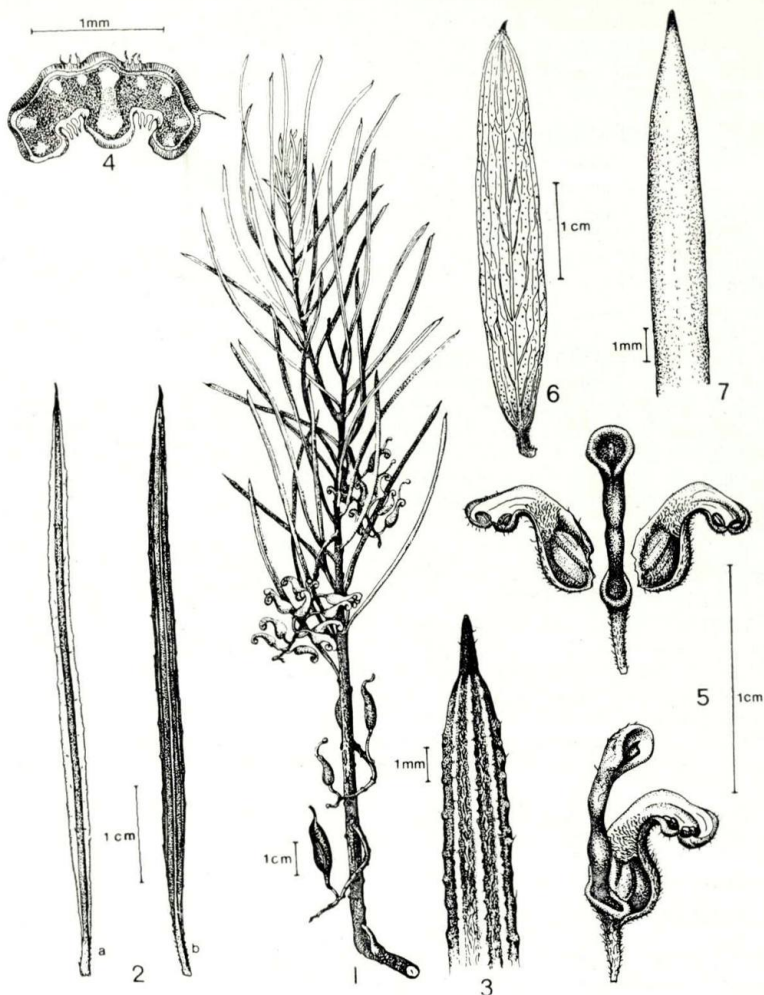
GREVILLEA PARALLELINERVIS

A new species of *Grevillea*. These notes are based on the original description of the species by J. Carrick of the State Herbarium of South Australia, Botanic Garden, Adelaide, as published in *Contrib. Herb. Aust.* 15: 1-7, 1976.

This is an intricate spreading shrub up to 2 m high and more than 1 m across, the young shoots being densely whitish-grey, becoming glabrous (without hairs on them). The leaves are entire, narrow-linear, 2.5-7 cm long and to 1.5 mm broad as shown in the line drawing. They are rigid, almost erect, with a short hard point. They are deeply two-channelled below because of the recurved margins, as illustrated, the mid rib and veins being prominent above.

The flowers are held in heads of 20-30 in pairs, hanging as shown on the colour plate. The flowers, shown in detail in the sketch, the perianth or outer "bowing" envelope being 8 mm long, bright red with yellowish tip, bearded at the throat inside, with the lobes recurved.

Grevillea parallelinervis appears to be closely related to *G. aspera* R.Br., which occurs throughout Eyre Peninsula, including the Gawler Ranges, and also in the northern Flinders Ranges. *G. aspera* has similar flowers and fruits, but differs in the leaves which are spreading, lanceolate to elliptic, with reticulate venation above and a less prominent midrib below (see the sketch).



1-5, *Grevillea parallelinervis* Carrick. 1, branchlet with flowers and fruits; 2, lower (a) and upper (b) surfaces of leaf; 3, leaf tip; 4, transverse section of leaf; 5, details of flower; 6, *G. aspera* R.Br., leaf showing upper surface. 7, *G. umbellifera* J. M. Black, leaf tip.

Of the South Australian species, *G. umbellifera* J. M. Black resembles *G. parallelinervis* in the shape of the leaves and the glabrous ovary. It is known only from a few collections at one locality, Koonibba, which is about 30 km W. of Ceduna and about 120 km W. of Koondoolka Homestead, the most westerly locality for the new species. It differs in having smooth, glabrous leaves without raised veins above, an umbellate inflorescence, globose ovary and fruit, no hypogynous gland and a style not dilated under the stigmatic disc.

There are three Western Australian species which resemble *G. parallelinervis* in having similar leaves and a glabrous ovary. *G. jamesoniana* W. V. Fitzg., from the Coolgardie district, differs in having smooth leaves, flowers in an umbel, a glabrous and large perianth (up to 2.5 cm), a semi-annular hypogynous gland, a slender style and an orbicular stigmatic disc. *G. oncogyne* Diels, also from the Coolgardie district, has smooth leaves,

erect racemes, a half-saucer-shaped hypogynous gland, a tuberculate ovary, a very long style (over 3 cm) and a clavate stigmatic disc. *G. stenophylla* W. V. Fitzg., from the Austin district, differs in having racemes forming erect terminal panicles, a white perianth, a semi-annular hypogynous gland, a slender style and an orbicular stigmatic disc.

Grevillea parallelinervis

Although collected by J. B. Cleland in the 1920's *Grevillea parallelinervis* was not described until 1976 from material collected by Bruce Copley at Yardea in 1968 (see "Yardea and other places", *SGAP Journal*, January, 1969).

Grevillea parallelinervis is confined to the southern and eastern portions on top of granite porphyry hills in the central Gawler Ranges, extending from Yardea to Hiltaba. It grows to over 1 m in height and forms dense colonies with suckers arising from the readily exposed roots which follow cracks in the rocks. There is almost a complete lack of soil, nutrients being obtained only from the breakdown of plant material.

The dense foliage is linear, 50-80 mm in length with recurved margins giving a grooved appearance to the under surface. The mature foliage is bluish-green, but young tips are bronze in colour. Flowers are arranged in racemes about 3 cm in length carried on the previous season's growth, red and gold on opening but maturing to pure red. The combination of a blue-green shrub with bronze tips and flowers in bands across the bush is most attractive.

As the plant matures the lower half becomes woody, but under natural conditions young suckers hide this to a large extent.

Grevillea parallelinervis propagates well from cuttings or suckers and the few specimens in cultivation show considerable promise although recovery from grass-hopper attack has been slow at Owen where it is growing in alkaline loam with limestone rubble at a depth of .4 m. To date there is no sign of chlorosis, but judging from the natural habitat some reaction to intense alkalinity can be expected.

No sign of suckering is yet evident but this could be due to the depth of soil with consequent deeper root system or to the immaturity of cultivated specimens.

Grevillea parallelinervis can be regarded as a species well worthy of trial in a wide range of garden conditions.

Grevillea aspera

Grevillea aspera occurs in the Scrubby Peak area some 20 km south of Yardea in very similar situations to the previous species, to which it is closely related. However, the two do not appear to grow together and probably Scrubby Peak would receive more rain than Yardea.

Grevillea aspera is usually under 1 m in height and does not sucker to the same extent. The foliage is much shorter and broader (30-40 x 5-8 mm) and rough to the touch, hence the specific name. The flowers are similar but about twice the size.

It also occurs on hill-tops in the northern Flinders Ranges and on southern Eyre Peninsula in a much wetter area.

A plant at Owen is very healthy and was not attacked by grasshoppers. It is undoubtedly a species worthy of garden cultivation.

CALCIUM NUTRITION STUDY

As a follow up to our No. 71 issue featuring the early work of Jim Webb on the effect of lime on the growth of many Western Australian wildflowers a new study group has been formed: The Calcium Nutrition Study Group. Leader, Mr. J. H. Webb (Jim), 22 Araba Place, Aranda, A.C.T., 2614. This is an excellent "doing" group for the keen types. Send \$1.00 to Jim and ask him how you can help.



Photography by Una Roberts

Top: *Grevillea aspera* — Flower heads shown on the cover.

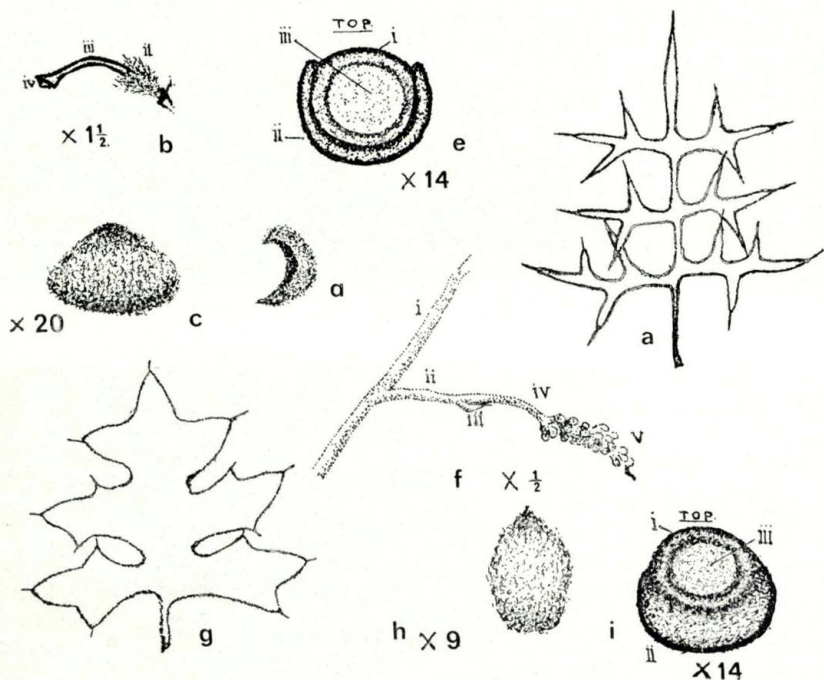
Bottom: *Grevillea parallelinervis* — The new species described here.

New Victorian Grevillea

by Bill Molyneux, Austrafflora Nurseries

Two new Victorian species of the genus *Grevillea* have been recently named, bringing the total number in Victoria to 25 with a possible further four new species to be named at some future date.

Grevillea williamsonii can no longer be considered extant, as the only known plant, which was sterile, was destroyed by fire early in this century. Repeated expeditions in the known area of collection in the Grampians has failed to turn up any plant resembling the former find, although a hybrid or mutation form of *G. ilicifolia* origin, from the Black Range area, bears some similarities.



III 11 1979.

Fig. 1—Comparison of *Grevillea microstegia* and the undescribed *Grevillea* species from Ben Major region. a-f. *G. microstegia*: a. leaf; b. pistil, i. torus, ii. densely hairy stipitate ovary, iii. style, iv. pollen presenter; c. dorsal view of floral bract; d. lateral view of floral bract; e. torus from above with stipe of ovary removed, i. torus, ii. gland, iii. base of ovary stipe illustrating central location on torus; f. i. stem, ii. lateral branch, iii. Incipient leaf, iv. peduncle, v. raceme of immature flowers. g-i. *Grevillea* sp.: g. leaf; h. dorsal view of floral bract; i. torus from above with stipe of ovary removed, i. torus, ii. gland, iii. base of ovary stipe illustrating location towards top of torus.

Grevillea microstegia, the first of the newly named species, was brought to my notice in 1970 by friends who had recently purchased a large tract of land on the eastern side of the Mt. Cassel Range in the central-eastern ranges of the Grampians. On first examination I determined that the distribution of the species was confined mainly to ridge-tops and higher slopes at between 600 and 650 m, but my more recent investigations have shown that odd plants occur at lower elevations, in particular where seeds could have been dispersed by water. Nowhere is the plant in abundant numbers and distribution is sporadic over ca 3 km.

The plant has a dense, usually straggling habit, growing to ca 0.6 m in height and 2-4 m wide. Branches are intertwined and densely layered. The leaves, 30-40 mm long, 20-40 mm wide, are divided into 5-11 prickly lobes ca 1-2 mm wide, mostly entire but occasionally again divided into 2-3 secondary lobes. As the primary lobing is almost to the midrib, the leaf is referred to as being bipinnatifid, and whilst the new leaves are pubescent on both surfaces, the mature leaves are glabrous on the upper surface and bear but occasional hairs on the under-surfaces.

Flowers are arranged in the well known toothbrush raceme on peduncles 13-20 mm long. Racemes red, ca 30-flowered, 20-30 mm long and ca 19 mm wide. The floral bracts, which attend the immature flowers, are very small and it is from these that the specific epithet is derived, i.e. micro—small, stegia—bract.

The species soil type in its natural habitat is humus loams derived from sandstone and sandstone scree, well-drained with a pH on the acid-side. In cultivation, it has adapted to open clay-based soils which are well-drained, and should prove to be a handy undershrub or used on banks in cultivation.

Grevillea willisii, the second species, named after Dr. James H. Willis the noted Victorian botanist has been in cultivation for approximately 10 years in Victoria, under various aliases, the most commonly used being "Grevillea sp. Omeo". It was earlier incorrectly mentioned as "G. flavistyla" which may have been suggested as a possible specific name, but was never right, it was included under *G. ramosissima*, which it only superficially resembles.

This new species appears to be confined to eastern Gippsland around Bundara River Bridge on the Omeo Highway ca 16 km north-west of this town at an elevation of 645 m. It is found here in association with granite and has, among its companions, two other *Grevillea* species in *G. lanigera* and *G. parviflora* and the not common *Banksia canei*. Two other taxa which closely resemble *G. willisii* occur to the east in the area of Nunniong Plateau and at Mt. Stradbroke and may prove to be related varietally to the species.

Grevillea willisii is a large, spreading shrub, up to 3m high and 3m across, often open and straggling in the wild, but developing a rigid arching habit under cultivation, making it an attractive landscape plant. The leaves ca 3-5 cm long and 2-4 cm wide are again of the "holly-leaf" type, deeply pinnatifid with ca 5-7 broad primary lobes which are again further divided into secondary lobes. The adult leaves are dark green and shiny above, but the habit of the plant allows the densely white-felted under-surfaces to be freely displayed, giving the plant a softer appearance than the leaf form would normally indicate.

The flowers are in horizontal racemes, usually terminal, but occasionally borne in the leafy axils. The overall colour is white to cream, the styles are pale yellow when fresh, colouring to a deeper yellow when pressed; it was from this feature that the original name of "flavistyla" was suggested.

As a species for cultivation, *G. willisii* has proven hardy in well-drained, though often heavily textured, soils but has never reached a high level of popularity, doubtless if it were heavily advertised under "Felted Fury" or some-such non-scientific description it would sell "like hot cakes".

A point of additional interest is the presence of a micro-lichen, which is partly responsible for the dark colour of stem hairs and other parts of the plant. I personally had not previously associated lichens with *Grevilleas* and this determination by Mr. Rex Filson was a new facet in this field for me to examine. The affinities to *G. willisii* appear to be closest in leaf structure rather than in floral characteristics and, although it is related to species such as *G. repens*, *G. steiglitziana*, *G. aquifolium* within Victoria and *G. acanthifolia* and *G. bipinnatifida*, it has certain individual characteristics which appear to set it aside from any of these quite distinctly.

Even though specimens were collected as long ago as 1939, it has only been recognised within the last few years that it was a distinct species.

DISCUSSION OF AFFINITIES (From Original Publication.—Editor)

On Bentham's classification of *Grevillea*, *G. willisii* belong to the Section *Eugrevillea*, and to the Series *Hebegynae*. This series includes a number of prickly-lobed or "holly-leaved" species— in Victoria *G. repens*, *G. aquifolium*, *G. ilicifolia*, *G. steiglitziana*, *G. dryophylla*; and outside Victoria *G. acanthifolia* and *G. bipinnatifida*.

From all of the abovementioned Victorian species *G. willisii* differs in having the following characters (1) sessile or sub-sessile ovary (2) pale yellow styles (3) stigmatic disc either round or broadly ovate-oblong in outline (viewed from above), and rising in the middle to a conspicuous cone which is frequently sharply conic or rostrate-conic (cf. the other species with conspicuously stipitate ovaries, red styles, and with the stigmatic disc elongated longitudinally, varying from ovate to elliptic or elliptic-oblong in general outline, and rising in the middle to a low blunt cone). The densely packed flower spike with numerous relatively small flowers, deeply pinnatifid lobed leaves, and the dense felted tomentum of the underside of the leaves are some of the minor characters which further distinguish *G. willisii* from the other Victorian holly-leaved species.

From *G. acanthifolia* of New South Wales, *G. willisii* differs in the much smaller flowers, shorter pale yellow styles, smaller floral bracts, sessile to subsessile ovary, the longer and often more sharply conic stigmatic disc (cf. the low blunt cone of *G. acanthifolia*), tomentum of perianth limb (short flat-lying hairs compared to long spreading hairs in *G. acanthifolia*), and in the densely felted undersurface of the leaves (glabrous or nearly so in *G. acanthifolia*).

From *G. bipinnatifida* of Western Australia *G. willisii* differs in the short compact inflorescence (long, loose, open and somewhat interrupted in *G. bipinnatifida*), shorter pedicels, shorter styles, form of stigmatic disc and hypogynous gland, leaf dissection, tomentum, etc.

The curious conical stigmatic disc of *G. willisii* could suggest affinities with the Section *Conogyne*. This section is characterised however by a cylindric instead of secund inflorescence, and by the total length of stigmatic disc and cone at least equal to or exceeding the greatest width. (In *G. willisii* total length of stigmatic disc and cone is generally shorter than the greatest width, or just equal to it, but not exceeding it.) The majority of the *Conogyne* species are from Western Australia, and combine a glabrous stipitate ovary with the lack of a hypogynous gland. Exceptions are the eastern species *G. ramosissima* and *G. triternata* with hairy ovaries.

From both these species *G. willisii* can be readily distinguished. *G. willisii* differs from *G. ramosissima* in the shorter stigmatic cone, glabrous instead of hairy style, short secund instead of narrow cylindric flower spike, leaf shape and lobing, tomentum, etc., and differs from *G. triternata* in the secund inflorescence, perianth revolute under limb instead of recurved, sessile instead of shortly stipitate ovary, leaf shape and lobing, tomentum, etc.

Grevillea willisii and *G. ramosissima*: In the past at Melbourne Herbarium several specimens of *G. willisii* were incorrectly determined as *G. ramosissima*. The Victorian form of *G. ramosissima* (from Pine Mtn.) is readily distinguishable on vegetative characters — with its silvery silky undersurface to the leaves, narrow tapering leaf lobes bearing long pungent points, etc. However, some forms of *G. ramosissima* from New South Wales superficially resemble *G. willisii* in vegetative characters. These forms have a dense tomentum of curled twisted, often ferruginous, hairs on under surface of leaves. They can, however, nearly always be distinguished by the narrow tapering leaf lobes, the much longer pungent leaf tips, and the longer more narrowly tapering leaf base which runs down into narrow decurrent wings almost to the base of the petiole.



Top: *Grevillea microstegia* — A new *Grevillea* described here.

Bottom: *Grevillea aquifolium* — A form. Closely allied to species described.

The Boab Tree

Oceanic Wanderer or Fragment of Gondwanaland's Flora?

by DR. P. H. ARMSTRONG, Department of Geography, University of Western Australia

Based on an article by the same author in the *New Scientist*, 27th January, 1977

The recent development of the concept of plate tectonics has encouraged some botanists and biogeographers to take a new look at the distributions of many plants. The precise order in which the various plates broke away from Gondwanaland, the great southern land-mass or *supercontinent* in Mesozoic and Tertiary times is still not clear, but the search is now on for Gondwanic elements in the flora of the now widely separated lands of the southern hemisphere. It is possible, however, that some specialists may have become over-enthusiastic in the re-interpretation of distributions, and, caught up in their eagerness to find applications for new ideas, have attributed the explanation of continental movement to some groups of plants and animals that attained their present distribution pattern by long-distance dispersal.

One group with a *disjunct* or disconnected 'southern' distribution is the genus *Adansonia*, the boab or baobab. This belongs to the Bombacaceae family, a group that includes the kapok tree (*Gossampinus*) and also the South American balsa. One species, *Adansonia digitata*, is widely distributed in the savanna lands of Africa south of the Sahara, between about 15°N and 25°S (there are few records from the Congo Basin or the Horn of Africa). Another, *A. gregorii* is confined to the Kimberley Division, in the extreme north-west of Western Australia. (For some reason, the name boab has become established in Western Australia, while in Africa the tree is always called the baobab.) A group of about eight species including the monkey-bread tree, *A. madagascariensis*, is endemic in Madagascar, particularly the drier western portion. The Australian species appears to have closer affinities with the African baobab than with those of Madagascar.

In many parts of its range, the conspicuous baobab has attracted around it a substantial body of mythology, folklore and ritual. In Senegal, for example, it is believed that the *griots* — a caste of scholars, poets, magicians and musicians — must never be buried in the ground lest it be rendered infertile; a hollow baobab was often used as a sepulchre instead. Many legends attempt to provide an explanation of the baobab's weird appearance. An Arab story has it that the devil plucked up the tree and pushed the branches into the ground, leaving the roots in the air. An old Bushman tale describes how God was, at an early time, presenting trees to each animal. The hyaena was late on the scene and was given the baobab, the only tree then remaining. He was so disgusted that he planted the tree upside down! The Aborigines of northern Australia appear also to have spun a web of traditional lore around this strange member of their homeland's flora: elaborate carvings of animals are known from the trunks of some *Adansonia* trees, and boab nuts have been found with elegant representations of emus and other creatures carved upon them.

Africans used to hold the baobab in awe, and gave it a wide berth after dark, maintaining that spirits met beneath its contorted branches. In many places in Africa, the baobab is a fertility symbol: barren women are brought to particular baobabs in Nigeria; rock paintings in the Limpopo valley have baobab pods instead of breasts. Various parts of the tree — bark, wood, nuts, leaves — are believed to have had certain magical or medicinal

properties. It is perhaps for this reason that traders — probably Arabs — carried the African baobab to many parts of India, Sri Lanka, Malaysia and the Philippines several centuries ago. (The species does not occur naturally anywhere in Asia.) Documents suggest that the species has been established on the island of Mauritius in the Indian Ocean at least since 1816.

While not of great stature (baobs in Western Australia are seldom more than about 12 m high, the African species may be rather larger), the baobab is of the most striking appearance because of the enormously swollen form of its trunk. The members of A. C. Gregory's North Australian Exploring Expedition thought that they had come upon diseased trees when they first encountered baobs in 1855! One early naturalist described the plant in the following terms:

A Caliban of a tree, a grizzled, distorted old goblin with the girth of a giant, the hide of a rhinoceros, twiggy fingers clutching at empty air.

Another explorer wrote:

With its aldermanic girth, when it has shed its leaves it stands bare and gaunt, and looks as if it is stretching out gouty fingers in apoplectic uncertainty.

Specimens are known from Africa with a circumference of 30 m — in Rhodesia there is a hollow baobab used as a bus-shelter that can hold 40 people! The Australian species tends to be smaller; typically the bottle-shaped trunks are about 5 m in girth and 6 m in height. The largest Australian specimen known to the author is the one near Derby, Western Australia that is alleged once to have been used as a prison cell; it has a circumference of 13.7 m at breast height. The largest and most grotesque tree-trunks are usually formed as the result of the coalescence of several stems into a single bulbous structure.

The weird, gnarled appearance of some of these trees has caused many travellers to speculate about their age: suggestions have been made that substantial size indicates great antiquity. Some writers, indeed, have hinted at ages of 4000 to 5000 years, or even more, but upon very little evidence. Nevertheless, some baobabs and baobs exist with ancient dates carved upon them. It was probably a member of A. C. Gregory's North Australian Expedition that carved the date on an old tree 'the shape of a tipsy beer bottle' close to the Victoria River in 1856; the inscription was still visible quite recently. And in 1974 a biological survey party in the Prince Regent River area in the north of Western Australia rediscovered a tree, still growing well, which had been carved by an early British Naval expedition: 'HMS Mermaid, 1820'.

An African baobab, in what is now Botswana, was about 25 m in girth when Dr. David Livingstone measured it in 1853, but had shrunk appreciably in size in 120 years, presumably through water loss. A clump of baobab trees north-west of Makarikari Pan, painted by Thomas Baines in 1862, did not appear to have changed appreciably when photographed in 1967. Because of the extreme softness of the timber, and the fact that older trees tend to become hollow, attempts to date individual specimens of *Adansonia* on the basis of tree-ring counts have not met any great success in either Africa or Australia. However, a carbon-14 dating of material from the heart of a tree at Lake Kariba gave an age of 1010 ± 100 years.

Adansonia is well adapted to the environment in which it lives. In most parts of its range it experiences a climate with strong seasonality, a very wet season being followed by several months of near-continuous drought. The soft, almost pulpy wood of the baobab enables it to absorb a great deal of water. (There was once a suggestion that baobabs might be grown on a plantation basis to provide fibre for paper making.) Typically, five or six large branches emerge from an almost globular trunk. These

taper quickly to the spiky twiglets that attracted the attention of some early commentators.

The leaves are a bright emerald green — in Australia this contrasts markedly with the blue-green tinge of many of the surrounding eucalypts — and about seven elongate leaflets grow from a single stalk. The flowers are a rich, almost sickly, cream colour and about 5 cm across. The petals coil back to leave a cluster of stamens conspicuously exposed. Bird pollination is probably frequent in the genus. In northern Australia, members of the honey-eater family (Meliphagidae), with their long, poking bills, may be seen around the flowers, and in Africa fruit-bats have been shown to be important pollinators. It may be this association with birds and bats that is responsible for the fact that, in northern Australia at least, *Adansonia* is very frequently parasitised by mistletoe. The fruits of the tree, spherical or egg-shaped are green or khaki, and can be up to 25 cm in length.

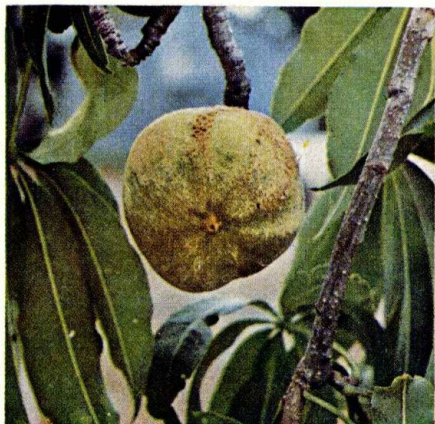
Biological relationships across the Indian Ocean are relatively few in number: Australia's linkages tend to be with South America or south-east Asia rather than with Africa. An exchange of flora between South America and Australia was possible via Antarctica until the early Tertiary (some 65 million years ago), and some movement between Asia and Australia and in the reverse direction followed the collision between the two crustal plates after the northern movement of Australia during the Tertiary. Nevertheless, despite Africa's relative isolation (that continent probably became separated from that of South America in the early Albian, about 120 million years ago, and from the Antarctic about 20 million years later), it shares a significant number of plant and animal groups with the other southern continents.

The attractive flowering Proteaceae (the group that includes proteas and the banksias) are found in South Africa, Australia, South America and south-east Asia. The distribution of the Restionaceae (the thatching weed family) is rather similar. The plant families Chloranthaceae and Winteraceae (winter's bark family) as well as the genus *Hibbertia* (guinea flowers), *Keraudrenia* and *Rulingia* are found in Australasia and Madagascar, but do not occur on the African mainland where they may have become extinct. The flightless ratite birds (like the ostrich, emu, rhea and cassowary) are found on all the southern continents as well as formerly in New Zealand (the moas, Dinornithidae, were rendered extinct by the Maoris in about 1700) and Madagascar (the elephant birds, Aepyornithidae, seem to have been eliminated about 1000 years ago).

We know that plants are capable of crossing vast expanses of ocean. How else could one explain the presence of a small but sometimes quite varied flora on some of the sub-Antarctic islands that must have been overwhelmed by glaciers in the ice Age? The possibility of long distance dispersal between continents cannot be entirely excluded. And it may be that *Adansonia*, being adapted to a particular climatic regime, was once more widespread, but has been extinguished in certain parts of its former range. Perhaps this resulted from climatic change, itself partly caused by the shifting of crustal plates relative to the major climatic belts. Failure to survive competition with other plants is also a possibility. Several Gondwanic floral elements, formerly more widespread, are now confined to isolated insular areas such as Madagascar and New Caledonia. The strange and grotesque baobabs might be another living fragment of the flora of the ancient supercontinent of Gondwanaland.

Australian Journal of Ecology

Published quarterly by the Ecological Society of Australia at an annual subscription of \$30 (sent to Blackwell Scientific Publications, Osney Mead, Oxford OX2 0EL, U.K.). This journal is for scientific papers and reports on ecological research. The first issue contains three papers which include "The Value of Structural Features in Tropical Forest Typology" and "The Effectiveness of Higher Taxonomic Ranks for Vegetation Analysis".



Photography by J. Harmer

Left: *Adansonia gregorii* — The Boab Tree, growing in stony soil at the edge of the Victoria Highway to Darwin, just coming into new leaf.

The trunk is barrel shaped, sometimes reaching up to 15 metres in circumference. The leaves are comprised of 5, 7 or 9 pointed leaflets radiating from one point; the leaflets are up to 13 cm long and 3.5 cm wide covered with soft hair and are whitish green on the underside.

Top Right: A close-up of the large fleshy flower with its many white stamens.

Bottom Right: The immature fruit of *Adansonia gregorii* covered in soft hair which becomes sparser as the fruit matures. The fruit are up to 18 cm long, 7-10 cm in diameter and contain many seeds.

Notes on Preparation of Pressed Specimens

by E. Bournes

The following notes are intended as a guide to the preparation of a permanent botanical collection of wildflowers.

(1) SELECTION OF SPECIMENS

To permit full identification and to serve as a type specimen against which fresh ones may be checked, the pressed specimen should be as complete as possible. It should show leaves, flowers, flower buds, and fruits, and so be 8-10 in. in length. In the case of some plants, bark, rhizomes and bulbs should be pressed as well. It should be carefully noted that as plants are primarily classified by the structure of their flowers, there is often considerable difficulty in identifying non-flowering specimens, especially as the leaves of unrelated species often are very similar. If for the sake of completeness of collection a leafy specimen is pressed it should be replaced as soon as possible with a flowering one. When a number of specimens are being collected a plastic bag proves very useful for keeping them fresh for some hours. When you collect a specimen you should attach a label or secure it on a small piece of blank paper which has two slits cut to accommodate the specimen. The information about the plant as indicated below under (4) should be written on this piece of paper at the time of collection. Do not rely on your memory later for the detail of labelling.

(2) PRESSING

The specimens should be placed between double thicknesses of newspapers and then pressed in a properly constructed plant press, or beneath any moderately heavy weight. A plant press consists of two sheets of light wood about the size of a newspaper, strapped about the specimens by two leather straps placed near the ends of the boards. Whatever type of press is used it is important to see that the weight is evenly distributed over the drying specimens. The press should be placed in a dry, airy place, and papers changed once a day until the specimens are dry. Specimens dry much more quickly, and with less likelihood of being attacked by mould, if the press is not over packed. The amount of material placed in the press will depend on the size and succulence of the specimens.

(3) MOUNTING

The dried specimens should be sorted, trimmed and placed on sheets of plain paper (cardstock is preferable, but thinner paper serves quite well), leaving sufficient space at the lower right-hand corner for the labels. The pieces are best held to the paper by a few thin strips of some adhesive paper placed across the stems. Only one kind or species of plant should be mounted on any sheet. The completed mount should show some flowers, foliage, and perhaps fruits and bark, etc. A demonstration will show how this is best done.

(4) LABELLING

It is standard practice to label the sheet in the lower right-hand corner, each specimen should be labelled with the information as shown below:

No.: 12 (Very necessary for future reference)

Plant Family: Liliaceae

Botanical Name: *Burchardia multiflora* Lindl.

Common Name: Dwarf Burchardia

Habitat: Swan Coastal Plain and Darling Scarp areas, on moist sandy or loamy soils.

Size of Plant: Herb up to $\pm$ 30 cm high.

Colour of Flowers: White perianth and purple stamens and ovary.

Name of Collector:

Name of Identification:

Date of Collection:

(5) ARRANGEMENT AND STORAGE OF COLLECTION

The identified specimens should be sorted into family, genus and species. Several species of the one genus may be placed in a simple paper folder, and several of these folders of genera may be placed in a slightly larger folder, labelled with the family name. In this way it is easy to arrange, systematically, an expanding collection. With such an arrangement the collector can quickly compare closely related species and gradually become acquainted with the structural features which characterise different species, genera and families, and so learn to identify new plants in the field.

Naphthalene should be added to the boxes in which specimens are stored to prevent insects attacking specimens.

MOUNTING OF SPECIMENS

In the September issue of *Australian Plants*, which I have just received, is a request from a Mr. Johnstone for suggestions for mounting specimens.

Have seen the following (my interpretation) used for mounting insects, so should be ideal for bulky seed pods and fruit.

BULKY SPECIMENS

Obtain two box lids of equal size, or two trays, or make two from stout card.

Place one on top of the other with its bottom up.

Glue a piece of stout fabric along one side. This acts as a hinge and forms the spine of the finished "book".

A suitable tie, to hold the "book" shut, may be made using a bootlace and eyelets in the opening edges.

Mount specimens on card and affix to bases of each box, so that in closing, they do not hit each other.

Your "book" may now be labelled on spine, and for added protection slipped into a plastic bag. Then it can be stood on your bookshelf for easy reference.

It is a good investment to buy a roll of pre-pasted vinyl wallpaper. End-of-line rolls may be had at greatly reduced price. Cover your box when fabric "hinge" is dry and *before* insertion of eyelets. Then "books" will be uniform.

PRESSED SPECIMENS OF LITTLE BULK

There are three alternatives here.

Method 1:

The cheapest and a very practical method is to accumulate cereal packets of uniform size.

Remove top and cut off one third of back and triangle of upper rear of each side.

Cover with pre-pasted vinyl wallpaper, making sure that overlaps are well pasted down inside. The uncut side forms the spine of the "book" and the whole again can be stood in bookshelves.

Then using a firm card, cut to give easy clearance when put in and out of "book" start mounting your specimens.

Thin slivers of stamp paper are, in the long run, more durable than "sticky tape" when tends to deteriorate with time.

If a white card is used, labelling can be done with black ink beside each specimen. Each card can then be slipped into a plastic food bag and filed in the container. Label the spine of the "book".

If each card is numbered on one corner and filed so that the number shows at the cut-away edge, it simplifies reference.

This method is also very suitable for filing small booklets or periodicals when the whole can be easily taken from the shelf.

Instead of the card being slipped into a plastic bag, there is a clear contact-film available from architect and draughtsman suppliers.

It is available in matt or clear finish and called Transpaseal. It would be less bulky than bags as only the front of the card would need to be covered.

Method 2:

Available from photographic suppliers (Kodak) are plastic ring-file pages into which photos may be put and filed in ring-file binders.

They are like an envelope with the holes along one side, leaving the page sealed except along the top.

In early 1975, 10 in x 8 in cost me 30c. If bought in bulk from the manufacturers (here several people could band together), they would be very much less.

Mount specimens and label. Thin card should suffice.

For display purposes only, one card to a page, when it can be easily removed from the binder and the plastic page mounted on a wall, etc., with transparent or masking tape. The latter peels off cleanly when exhibition is finished and page returned to binder.

For personal use, I recommend 2 cards, back to back in each plastic page, to get the maximum use for cost.

Method 3:

Kodak sell a fairly rigid card, not too heavy, called Grade White Wembley Board for photographic mounting.

Cut card to a standard size to fit the ring-file binder of your choice.

Punch holes and reinforce with gummed rings available from most newsagents or office suppliers.

Mount specimens and label leaving about ½ in margin from punch marks.

Cover with Transpaseal. File pages and Index. Label spine and stand in shelves.

Finally, to restore colour to specimens after pressing and prior to mounting, use watercolour, a sable brush and detergent. Instead of water to mix required colours.

Hoping these above hints may be of some assistance to collecting enthusiasts.

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Photography by N. Hansen

GREVILLEA 'POORINDA LEANE'

One of the Poorinda hybrids described in this issue. This cultivar is formerly published on page 194. It is a cross between *Grevillea juniperina* and a form of *Grevillea victoriae*. The latter parent is shown in colour on page 193. The flowers are of the spider type more closely resembling *Grevillea juniperina*.

AUSTRALIAN PLANTS — WHY IS IT LATE?

This publication is produced by members working in an honorary capacity. It is our privilege and pleasure to produce such a fine periodical. Those who have had any experience in producing a periodical will appreciate the problems and inevitable delays that occur. This happens principally because the writers of articles also donate their work freely and prepare it in their spare time. Inevitably the Editor is faced with a decision: publish an issue that has been prepared in adequate time or delay it until all the details have been checked and cleared to the complete satisfaction of the many authors. We prefer to produce four accurate and carefully checked issues per year, even though the issue may be late. The work that goes into checking and verifying the wealth of information published is prodigious and authors have the final say.

The issues of 1978 are well advanced in preparation and it is confidently expected that they will be published on time.