

Australian Plants

Registered for posting
as a periodical—Category B

September, 1980

Vol. 10, No. 84

75c



WILDFLOWERS — WHERE IN THE COUNTRY?

WHAT TO GROW IN THE COUNTRY?

As you will see opposite, the principal group of plants in this issue is the hardy *Westringia*. The articles are written by George and Peter Althofer, authors of the book "Cradle of Incense", that features the beautiful mint bushes, known as *Prostanthera*. Both these genera are in the family Lamiaceae, the subject of our previous issue. If you want more information on the propagation and cultivation of *Westringia*, then you should get your copy of "Cradle of Incense".

What is this "Cradle of Incense"? See page 352.

Where is a marvellous area for wildflowers in the wild "The Cradle Of Incense"? One of the wonderlands of scenery with wildflowers may be found in this "Cradle", the Warrumbungles, as described on page 376. For other places to see in this "Cradle Of Incense", see page 354 and page 357 for Mount Arthur.

What to grow in the country? "Australian Plants for the Australian Country" recommends suitable plants on page 373.

Westringia, the plants of this issue! Most people will have seen those hardy plants of the sea front, Coastal Rosemary, *Westringia fruticosa*, the most widely grown plant of the genus. It is a hardy plant for the harshest conditions in anyone's garden, but it must be a godsend to people gardening on the coast. So will the article "Gardening On Coastal Limestone In Exposed Situations" on page 369.

PRESERVATION OF THE AUSTRALIAN FLORA

Editor

The day has come for many of the species listed on page 358 to receive some assistance in their fight for survival. In another ten years this list could be ten times as large. It is hoped that this publication, over the 20 years of its existence, has contributed to knowledge that will assist the preservation of the flora. What is more important, we hope to achieve over the next few years more than we have over the last twenty. The next issue will give details of our proposals.

CONTENTS OF THIS ISSUE

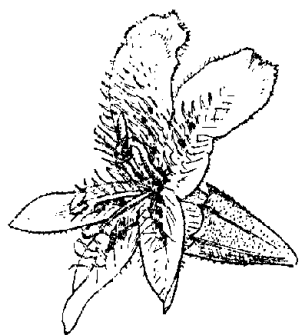
The Genus <i>Westringia</i>	G. W. Althofer and P. McD. Althofer	343
The Cradle of Incense	G. W. Althofer, O.A.M.	352
The Cradle of Incense — Areas of Interest	From notes by G. W. Althofer	354
Rare Plants In The Wellington-Dubbo Magic Circle	G. W. Althofer	355
The Flora of Mt. Arthur Reserve	G. W. Althofer and G. J. Harden	356
Australian Endangered Plant Species	John Leigh and Robert Boden	357
Preservation of the Australian Flora		358
<i>Westringia</i> , Description of Species	G. W. Althofer and P. McD. Althofer	359
Grafting <i>Prostanthera</i> Species	National Botanic Gardens	367
<i>Eriostemon australasius</i> — An Improvement of Seed Propagation	P. Nixon	368
Gardening On Coastal Limestone In Exposed Situations	Colin Officer	369
<i>Acacia sophorae</i> — Studies of <i>A. sophorae</i> and <i>A. longifolia</i>	David R. Murray	372
Australian Plants For The Australian Country	T. P. O'Rourke	373
Friends and Foes of Australian Gardens	David Hockings	375
Flora of the Warrumbungle National Park	Rhonda Martin	376
<i>Mackinnlaya macrosciadia</i>	David Hanger	383

COVER PLATE: *Tecomanthe hillii*

Photography by B. Ballingall

A beautiful climber from the rainforests that is suitable for cultivation. This and many other rainforest plants are described in our No. 76 issue. The 6-8 cm. flowers are borne in clusters on the upper portion of the plant and often, as in this case, on the lower leafless stems near the ground. Why a rainforest plant on the cover of this issue? I did not have a more suitable cover photograph, but perhaps this will stir readers to advise of their experiences with rain forest plants for another issue in preparation on our rain forests. — Editor.

AUSTRALIAN PLANTS—No. 84 Issue of Volume 10, comprising issues 77-84.
International Series Index ISSN 0005-0008. A National publication in 16600 copies.
Published by The Society for Growing Australian Plants. For details see last page.
Available to members or by subscription of \$3.00, including postage to your address.
Send to the Editor, 860 Henry Lawson Drive, Picnic Point, N.S.W., 2213.
Publication date of previous issue, No. 83, was 25th June.



The Genus *Westringia* Sm.

Geo. W. Althofer O.A.M.

and

Peter McD. Althofer.

Westringia is a group of plants especially suited for horticulture. With the exception of one species *Westringia fruticosa*, they are not nearly as widely grown as they deserve. Their close allies, *Prostanthera*, the Australian Mint Bush have been widely accepted as beautiful garden shrubs and *Westringia* generally require similar growing conditions.

Although the climatic range of *Westringia* is very diverse; from inland arid areas to sub-tropical areas of northern Australia to more temperate areas of the Eastern sea board and mountain ranges, all species appear to relish a canopy of tree cover that gives intermittent light and shade.

With one exception, *Westringia fruticosa*, which thrives in most situations including clay soils, all other species tend to favour well drained conditions. In group plantings this has been evident. Plants in low lying areas always succumb to periods of wetness, whereas adjoining plants on elevated ground show normal growth associated with better drainage.

Most species are able to withstand long periods of dry and hot conditions. They respond quickly when additional water is added.

At Burrendong Arboretum, Mumbil, N.S.W., annual rainfall of 625 mm; and with soil type slightly acid, all species grown have favoured a south-easterly aspect with a top cover of *Eucalyptus* species. Only in extended periods of dryness in summer months has supplementary water been added.

Propagation by vegetative means is the most successful. All species respond well from cutting material.

The first *Westringia* was described in 1797 and this species was *W. fruticosa* (*W. rosmariniformis*). The genus grew to eight by 1810 and in 1870 had risen to eleven species and three varieties. The genus has steadily expanded until to-day we have twenty-seven species and eight recognised varieties. In addition there is a possible new species in Western Queensland and another in Western Australia. A tiny plant collected in the Ravenshorpe district of Western Australia by the authors does not appear to fit into any existing species.

The most commonly grown species of the genus is *W. fruticosa*, formerly *W. rosmariniformis* and this has been grown since the early 1800s. Its main attribute is its adaptability to grow in a wide variety of conditions. It may be used as a specimen shrub or as a medium or dwarf hedge. Not one of the showier members of the genus it is nevertheless greatly in demand and makes a neatly clipped hedge particularly near the sea. It is very salt tolerant and therefore can stand up to salt spray better than any other species of the genus. The flowers are not large but they are produced over a long period. In recent years it has increasingly been used as a stock on which to graft *Prostanthera* species or the more showy species of the genus *Westringia*. See page 367 for details the National Botanic Gardens. These experimentalists have demonstrated that it is now possible to grow the showier *Prostanthera* and *Westringia* species in the humid coastal areas. What a boon these workers in virtual obscurity have



Westringia fruticosa

Photography by H. A. Morrison

The hardiest and most widely grown species of *Westringia* for all climates. You will find it often growing in abundance on the east coast almost in the sea spray. You will find it as a hardy plant in many commercial landscaping schemes where neglect may make it sparse, but still attractive, or where overwatering or lack of pruning produces a vigorous shrub. The leaves are crowded in whorls of four, that is four leaves in a ring around the stem with a space to the next whorl of four. The underside is hoary or silvery white as seen above on the left, but glabrous or shining on top, with the edges of the leaves turned under. The flowers are rarely as large as shown above, usually being a little more than half this size.

Westringia belong to the plant family Lamiaceae. All genera in the family, including *Westringia*, are introduced with descriptions and sketches, in our last issue. The characteristic flowers of plants in this family are shown above, the corolla (floral envelope) comprising two upper lobes partly fused or joined and three lower lobes also partly fused. In the case of *Westringia*, the upper lobes are usually fused almost to the end and appear as one petal with a cleft in the end, whereas the lower three lobes stand mainly distinct like three fingers, nearly equal in length and narrower than is usual in *Prostanthera*. With *Westringia* the corolla is usually hairy inside the floral tube, especially at the centre near the stamens as shown above. Another important distinguishing feature is the shape of the anthers as sketched in our last issue. As seen above, *Westringia* have only two stamens, whereas *Prostanthera* have four.

***Westringia brevifolia* (opposite, top right)**

Photography by John Simmons

This is a bushy shrub to a little over one metre high occurring naturally only in Tasmania. The leaves in whorls of four are rarely more than 10mm. long and of the shape and size shown on page 351. This plant was growing at Union Bridge near Mole Creek on Freycinet Peninsula and is also found on islands off the south coast of Tasmania. It is listed for King Island where it is known as "Creeping Mint". It is unfortunate a better slide was not available and this reproduction is the best that was possible.

***Westringia raleighii* (opposite, top left)**

Photography by John Simmons

Previously known as *W. brevifolia* var. *raleighii*, Dr. W. Curtis has restored this plant to full specific rank in the Endemic Flora of Tasmania (1978). The shrub is larger in all its parts than *W. brevifolia*, with leaves 11-16 mm long and calyx 6 mm long.

***Westringia glabra* (opposite, bottom)**

Photography by H. A. Morrison

A symphony in mauve and green. A thick, bushy, handsome shrub, variable as to height, often to 2 metres, with a variation in leaf size and shape, but thick and fleshy and in whorls of 3-4. The flowers are large and showy and numerous, pale mauve to violet. See page 362 for a fuller description of the plant and its varieties.



Westringia haleghii



Westringia brevifolia



Westringia glabra

gifted to the nation! Their unselfish dedication means that at long last lovers of the soft, sweet loveliness of the Mint Bush can realise their ambition to grow their favourites for far more than the previous tiny life cycle of the *Prostanthera* and its near allies in the humid coastal environment. To this can be added the fact that it is now possible to graft the showier species like *W. amabilis*, *W. grandifolia*, *W. sericea*, *W. glabra*, *W. crassifolia* and others on to a stock that not only resists the life-destroying organisms born of heat and humidity but actually gives to the transformed crown of glory a new hardiness and a new beauty. Much has been written of the beauty of the Mint Bushes but in its best elements there are several *Westringia* species which come very close to rivalling the beauty of their close relatives. The soft, ethereal beauty of *W. amabilis* and the better forms of *W. crassifolia* and *W. glabra* lose little by comparison with the publicly acclaimed beauty of *Prostanthera*. Perhaps the individual flowers do not match those of the Mint Bushes in size, but when has that attribute been of world shaking consequence.

Whilst many genera of the Lamiaceae family are extremely aromatic by reason of the presence of highly volatile oils in the leaves and other plant parts, this is not nearly so evident in *Westringia*. In fact, for the most part they approximate the *Prostanthera nivea* group in this regard in having no readily detectable oil content in their leaves.

The genus *Westringia* of the family Lamiaceae (Labiatae) is grouped with the subfamily Prostantheroideae. It is the third most prolific genus in the subfamily with 27 species and 8 varieties at least. *Prostanthera* has close to 100 species and *Hemigenia* 33 or 34 species. *Westringia* is related on the one hand to *Teucrium* and on the other hand with *Microcorys*. With *Teucrium* the division is more marked than with *Microcorys*. *Westringia* is distinguished from *Teucrium* by having the leaves in whorls of three, four or more rarely two, five or six, as opposed to the opposite leaves of the genus *Teucrium*. With *Microcorys* the division of the two genera is more confused. One section has opposite leaves whilst in the other the leaves are in whorls of three and four. As Bentham observes "the want of any concavity in the upper lip (of corolla) at once distinguishes the genus *Westringia* from *Microcorys*". Boivin in a paper read before the Royal Society of Queensland on 27-9-48 entitled "*Westringia*, an Australian genus of Labiatae" (Lamiaceae) emphasised that whilst most species have leaves in whorls of three and four some species have leaves in whorls of two, five and even six.

Westringia is a wholly Australian genus. As at present constituted the genus consists of 27 species and 8 varieties. In the classification of *Westringia* there is still considerable difference of opinion as to the number of acceptable species in the genus. Boivin in his 1948 paper gave the number as 26 with 2 varieties. Subsequently Boivin added another species *W. rolandii*. Dr. J. Willis, in his "Plants in Victoria", has since reduced one of these, *W. violacea* to a synonym of *W. glabra*, quite correctly in our opinion. So far as the specimens in our possession of *W. glabra* go there would appear to be no botanical differences of justifiable dimensions between *W. glabra* and *W. violacea*.

Boivin treats *W. williamsonii* as a separate species whilst Willis reduces it to a variety of *W. glabra*. The question of the *W. glabra* complex is a vexed one and one that cannot be satisfactorily elucidated by the mere examination of existing specimens. In spite of a tremendous amount of work on the genus by Willis, Boivin, Curtis and others, it is imperative that more field work should be undertaken, particularly in Tasmania, Victoria and Queensland. At the moment we intend leaving *W. williamsonii* as a full species until fresh specimens are available from a variety of situations. On the whole, we feel that *W. williamsonii* has smaller quaternate leaves and very short floral bracteoles as its main line of divergence from *W. glabra*. These characters appear to be constant in the limited range of material examined. Willis quotes one other difference between these two species

which undoubtedly should be taken into account. He states in "Plants in Victoria" it has "narrower hairy calyx tubes that are mostly longer than their lobes". We have found that this character does not always appear to be constant but emphasise that it is vitally necessary for us to examine a larger range of material than has come our way to date. We consider also that the vastly different aspect of typical *W. williamsonii* from the typical *W. glabra* needs surely to be taken into account. It may well be that the climatic factor has much to do with the different field appearance of the two plants. We propose to grow as many forms as possible of these two plants and to include plants of *W. glabra* var *bacchii* and the so-called *W. violacea* in field trials at Burrendong.

Boivin also created a new species in *W. quaterna* which some have regarded as a variety of *W. brevifolia*. *W. quaterna* should stand. We have several plants growing at Burrendong from Tasmania, which appear to fit Boivin's description of this plant. It will be necessary to grow this species from different areas to note variations (if any). The only other Tasmanian species with quaternate leaves (4 to a node) is *W. brevifolia*. However the leaves of *W. brevifolia* are much smaller than those of *W. quaterna* and are pubescent beneath. *W. quaterna* Boivin is not to be confused with *W. eremicola* var *quaterna* which is confined to the mainland. All four Tasmanian species are endemic. Queensland has the greatest number of species — 13, of which 7 are endemic. Of the remaining States N.S.W. has the next greatest number of species — 9, of which 2 are endemic. South Australia has the smallest number of species 3 (if we exclude Northern Territory). So far no *Westringia* species have been recorded from the Northern Territory or from any of the tropical north. It is quite possible though that *W. parvifolia* or forms of *W. rigida* could turn up in the southern portions of the territory as they have been recorded from the far west of Queensland.

***Westringia* Sm. (After Bentham)**

Shrubs: leaves in whorls of three, four or rarely more, all entire. (Note: We now modify the leaf description by the insertion of *occasionally* in whorls of six and in at least one species, *W. rupicola* with *opposite* leaves and only a few ternate leaves, though it is true that a number of other species exhibit this anomaly on rare occasions notably *W. blakeana*).

Flowers: all axillary or rarely in terminal leafy heads, with a pair of bracts under the calyx usually very small and sometimes almost obsolete. Corolla usually hairy inside the tube, especially at the insertion of the stamens.

Calyx campanulate, 5 *toothed*. Corolla with a short tube and dilated throat; the upper lip erect but flat and broadly 2 lobed, the lower spreading, 3 lobed. **Stamens** 2 (the upper ones) perfect, the anthers one celled with a short, prominent connective not produced below its insertion on the filament, the two lower stamens (or staminedia) sterile and short, the anthers reduced to a connective with 2 linear or linear-clavate parallel branches. Style shortly bifid at the end. Nuts reticulate-rugose, attached to the middle or higher up. Seeds *albuminous*.

The genus was named after J. P. Westring a physician to the King of Sweden.

***Westringia*. Description Of Species.**

Commencing on page 359 George and Peter Althofer describe all *Westringia* species.

What *Westringia* Is That?

An attempt is made in the captions to the colour plates, to provide the non botanist with a guide as to what plants are *Westringia* and features of the most common species. On page 351 there is a full size sketch of a typical leaf of each species, opposite a botanical key to the species.



Westringia rigida

Photography by H. A. Morrison

A species so widespread across Qld, NSW, Vic, Tas, to WA, with so many forms, it is probable that it may be divided into numerous distinct species in the future. This plant was photographed 200 km north of Norseman, WA. The leaves are mostly in whorls of three but occasionally four and usually glabrous, linear obtuse and rigid. In some areas it is confused with *W. cheelii* but the leaves are shorter, more rigid and less flexible than *W. cheelii*. As shown on the sketch of leaf shapes on page 351, it can be confused with *W. rubiaefolia* that is confined to Tasmania. The foliage of *W. rubiaefolia* is often "ruby", especially at heights.

***Westringia eremicola* (opposite top)**

Photography by H. A. Morrison

The most variable species of *Westringia*, this plant may exceed two metres, but is usually slender and not so rigid as other species such as *W. glabra*, *W. fruticosa* and *W. rigida*. The leaves are usually one mm. broad and up to 24 mm. long so it will be seen the flowers above are a little larger than normal size. The typical structure of a *Westringia* is clearly seen, the upper two lobes of the corolla, the floral envelope of petals, are joined with a cleft in the top, and the lower three lobes are mostly separate and nearly equal. The hairs in the throat of the corolla are not as evident in this species as they are in other *Westringia* species such as *W. rubiaefolia* above. The two only stamens also distinguish it as a *Westringia* and not a *Prostanthera* as mint bush species have four stamens.

There has been considerable debate over which species is actually photographed here. Alan Morrison photographed it at the top of Little River Gorge, Walgulfmerang in East Gippsland. Jim Willis supports this naming . . . the very close-up photograph shows only the relative lengths of upper and lower corolla lip, where the upper lip is manifestly shorter than the lower one (with *W. angustifolia* the upper lip of corolla is longer than the lower lip, the lobes all spreading in one plane). The really critical character is the shape and length of calyx teeth compared to the calyx tube. With *W. eremicola* the calyx-teeth subulate (i.e. narrow and tapered to a fine point) at least as long as the tube, whereas with *W. angustifolia* they are short and broad only to $\frac{1}{4}$ the length of the tube.

When shown the photograph, George and Peter Althofer were sure that the correct name was *W. angustifolia* that is confined to Tasmania. As it was photographed in Victoria they feel that the plant is an anomalous long leaved form confined to that area.

***Westringia eremicola* (opposite, bottom left)**

Photography by B. Crafter

This is of a plant at Monarto South, SA. Brian Crafter reports that it is a very good form, the bush, growing in the semishade of *Eucalyptus incrassata*, being almost a perfect hemisphere.

***Westringia senifolia* (opp. bottom right)**

Photography from Adelaide Botanic Garden

This is the most infocus section of the only photograph available but it will give readers some idea of the plant. It is an alpine species, a low shrub to less than a metre. The leaves as shown are in tight whorls of 5 or 6 ringed around the stem. The flowers are usually white. The plant is described on page 365.

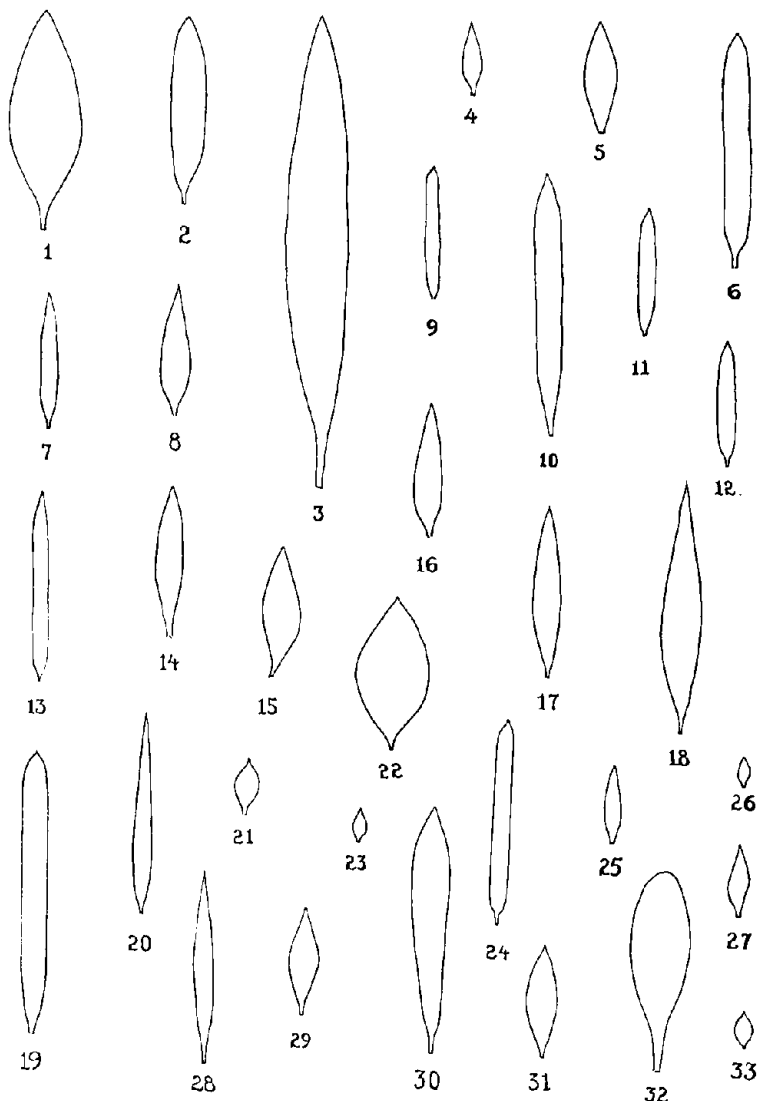


Key to the Species and Varieties Modified after Boivin

- a. Stem about 30cm. high, straight, virgate simple or sometimes slightly branched; leaves in 3's rarely in 4's. *W. tenuicaulis.*
- aa. Stem much branched.
- b. Leaves (and usually the branches) in 5's or 6's. *W. senifolia.*
- bb. Leaves in 3's or 4's.
- c. Nearly all of leaves and most of the branches in 4's.
- cc. To read this key the alternative to c, i.e. cc, will appear further down
- d. Fls. in term. heads; calyces exceeding floral leaves. *W. discipulorum.*
- dd. Flowers distributed along the branches; calyces much shorter than the floral leaves.
- e. Mature leaves glabrous.
- f. Leaves strongly revolute, so that the lower surface is hidden; calyx scarcely lobed. *W. quaterna.*
- ff. Leaves flat; calyx deeply lobed with acute sinuses.
- g. Leaves with parallel margins. *W. violacea* var. *bacchii.*
- gg. Leaves with convex margins.
- h. Leaves conspicuously dimorphous; stem leaves 2-3cm. long. *W. williamsonii.*
- ee. Leaves revolute, pubescent beneath.
- i. Leaves 5-10mm. long. *W. brevifolia.*
- ii. Leaves 10-30mm. long.
- j. Leaves 0.6-1.0mm. wide. *W. eremicola* var. *quaterna.*
- ji. Leaves 1.5-2.5mm. wide.
- k. Calyx with teeth more than half as long as tube.
- l. Calyx with rounded sinuses, the teeth only slightly more than half as long as tube; leaves 1.5-2mm. wide. *W. fruticosa.*
- ll. Calyx with acute sinuses, the teeth nearly as long as the tube, leaves 2.0-2.5mm. wide. *W. raleighii*
- kk. Calyx with teeth less than half as long as tube and rounded sinuses. *W. dampierii.*
- cc. Leaves and branches all in 3's.
- m. Flowers capitate, the heads terminating the branches. *W. cephalantha.*
- mm. Flowers not capitate, scattered along the branches.
- n. Leaves 1.5-10mm. long.
- o. Leaves conspicuously revolute and cinerous pubescent beneath.
- p. Calyx with teeth more than half as long as the tube. *W. rigida.*
- pp. Calyx with teeth more than half as long as the tube. *W. eremicola.*
- oo. Leaves flat or subrevolute, glabrous or puberulous.
- q. Leaves ovate or elliptic.
- r. Leaves 8-12mm. long exceeding the calyx. *W. lucida*
- rr. Leaves 1.5-5.00mm. long overtopped by the calyces.
- s. Leaves 3-5mm. long; peduncles 2-3mm. long. *W. longipedunculata.*
- ss. Leaves 1.5-3.0mm. long; peduncles 0.5mm. long. *W. parvifolia.*
- qq. Leaves more or less lanceolate. *W. cheelii.*
- nn. Leaves 10-50mm. long.
- t. Leaves revolute, densely pubescent beneath.
- u. Calyx with teeth less than half as long as tube.
- v. Leaves completely revolute so that the undersurface, except for the midrib, is hidden; pubescence cinerous on undersurface of leaf and on outside of calyx. *W. grevillina.*
- vv. Leaves incompletely revolute; pubescence silvery, calyx usually nearly glabrous and shining. *W. angustifolia.*
- uu. Calyx with teeth more than half as long as tube.
- w. Pubescence cinerous; leaves 0.5-1.5mm. wide, dull on the upper surface. *W. eremicola.*
- ww. Pubescence silvery-silky; leaves 2-8mm. wide. Shining on upper surface.
- x. Leaves 4-8mm. wide; calyx about 10mm. long. *W. grandifolia.*
- xx. Leaves 2-3mm. wide; calyx 8mm. long or shorter. *W. sericea.*
- tt. Leaves flat or subrevolute, glabrous or puberulent beneath, never cinerous nor silvery.
- y. Leaves with convex margins.
- z. Leaves not dimorphous; calyx with teeth longer than the tube.
- A. Leaves 3-5cm. long. *W. blakeana.*
- AA. Leaves 1-2cm. long. *W. glabra* var. *violacea.*
- zz. Leaves dimorphous.
- B. Flowers rose-coloured.
- C. Leaves ovate or ovate lanceolate. *W. amabilis.*
- CC. Leaves narrowly lanceolate. *W. glabra.*
- BB. Flowers violet. *W. glabra* var. *violacea.*
- yy. Leaves with parallel margins, very narrow, 1-5mm. wide. *W. longifolia.*
- D. Leaves in 2's very rarely in 3's. *W. rupicola.*
- Q. Leaves ovate or elliptic.
- DD. Calyx exceeding the leaves. *W. rolandii.*
- E. Flowers solitary in the axils. sub-sessile.
- EE. Corolla mauve 1cm. long. Densely hispid on outside. All 5 lobes indented with the lower one quite bilobed and longer than the others. *W. cremnophylla.*
- F. Leaves narrow elliptical. 5-15mm. long. 1.5-2.5mm. wide, margins minutely denticulate not recurved. *W. crassifolia*

What *Westringia* Is That?

A typical leaf of all species of *Westringia* is shown full size, below. A great deal of trouble has been taken to make the key to the species opposite as simple as possible. Together with the description of all species commencing on page 359 and the colour plates and captions, readers should be able to identify species for themselves.



KEY TO DIAGRAM

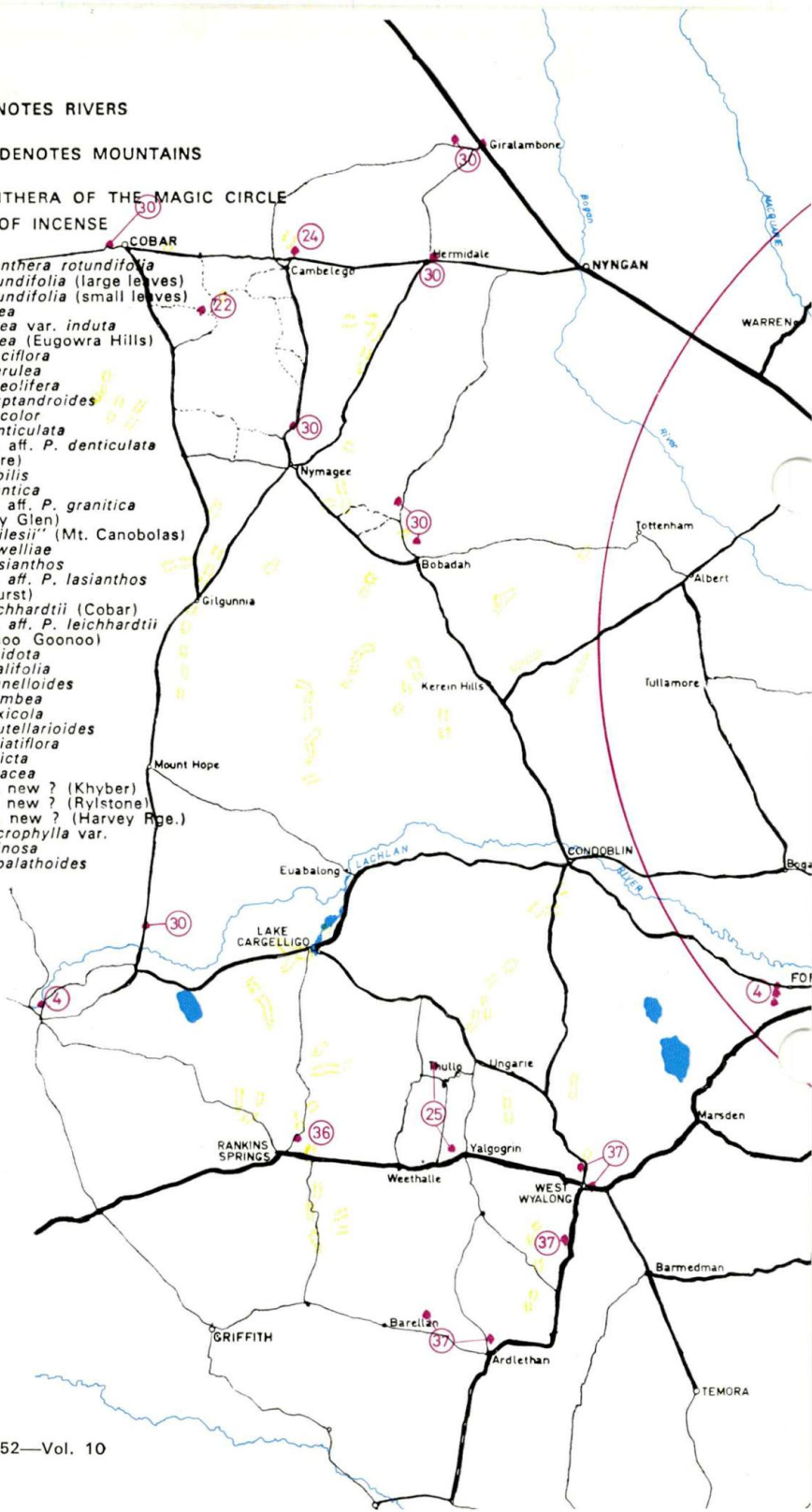
- | | | |
|---|--|------------------------------|
| 1. <i>W. amabilis</i> . | 13. <i>W. eremicola</i> var. <i>quaterna</i> . | 24. <i>W. quaterna</i> . |
| 2. <i>W. angustifolia</i> . | 14. <i>W. fruticosa</i> . | 25. <i>W. rigida</i> . |
| 3. <i>W. blakeana</i> . | 15. <i>W. glabra</i> . | 26. <i>W. rollandii</i> . |
| 4. <i>W. brevifolia</i> . | 16. <i>W. glabra</i> var. <i>bacchii</i> . | 27. <i>W. rubiaefolia</i> . |
| 5. <i>W. brevifolia</i> var. <i>raleighii</i> . | 17. <i>W. glabra</i> var. <i>violacea</i> . | 28. <i>W. rupicola</i> . |
| 6. <i>W. cephalantha</i> . | 18. <i>W. grandifolia</i> . | 29. <i>W. senifolia</i> . |
| 7. <i>W. cheelii</i> . | 19. <i>W. grevillina</i> . | 30. <i>W. sericea</i> . |
| 8. <i>W. crassifolia</i> . | 20. <i>W. longifolia</i> . | 31. <i>W. tenuicaulis</i> . |
| 9. <i>W. cremnophylla</i> . | 21. <i>W. longipedunculata</i> . | 32. <i>W. williamsonii</i> . |
| 10. <i>W. dampierii</i> . | 22. <i>W. lucida</i> . | 33. <i>W. sp. nov.</i> |
| 11. <i>W. discipulorum</i> . | 23. <i>W. parvifolia</i> . | Ravensthorpe, W.A. |
| 12. <i>W. eremicola</i> . | | |

BLUE DENOTES RIVERS

YELLOW DENOTES MOUNTAINS

PROSTANTHERA OF THE MAGIC CIRCLE
CRADLE OF INCENSE

- 1 *Prostanthera rotundifolia*
- 2 *P. rotundifolia* (large leaves)
- 3 *P. rotundifolia* (small leaves)
- 4 *P. nivea*
- 5 *P. nivea* var. *induta*
- 6 *P. nivea* (Eugowra Hills)
- 7 *P. cruciflora*
- 8 *P. caerulea*
- 9 *P. cineolifera*
- 10 *P. cryptandroides*
- 11 *P. discolor*
- 12 *P. denticulata*
- 13 *P. sp. aff. P. denticulata* (Minore)
- 14 *P. debilis*
- 15 *P. grantica*
- 16 *P. sp. aff. P. grantica* (Rocky Glen)
- 17 *P. "Gilesii"* (Mt. Canobolas)
- 18 *P. howelliae*
- 20 *P. lasianthos*
- 21 *P. sp. aff. P. lasianthos* (Bathurst)
- 22 *P. leichhardtii* (Cobar)
- 23 *P. sp. aff. P. leichhardtii* (Goonoo Goonoo)
- 24 *P. lepidota*
- 25 *P. ovalifolia*
- 26 *P. prunelloides*
- 27 *P. rhombea*
- 28 *P. saxicola*
- 29 *P. scutellarioides*
- 30 *P. striatiflora*
- 31 *P. stricta*
- 32 *P. violacea*
- 33 *P. sp. new ?* (Khyber)
- 34 *P. sp. new ?* (Rylstone)
- 35 *P. sp. new ?* (Harvey Rge.)
- 36 *P. microphylla* var. *aeruginosa*
- 37 *P. aspalathoides*



THE CRADLE OF INCENSE — Areas of Interest

From Notes by George Althofer.

"Wellington district, or more correctly, within a radius of 150 km. of Wellington, N.S.W. . . . was the melting pot of the genus *Prostanthera*, the Australian Mint Bush". So enthused with his native area, George Althofer called it *The Cradle Of Incense*. It is a unique area for many plant families in the Australian flora and a delight to the traveller. The localities of interest are:

Mount Arthur and Mount Wellesley

West 2 km. and south 1 km. of Wellington town. A well illustrated and presented 80-page book entitled "Flora of Mt. Arthur Reserve" is available from the Editor for \$4.00, plus \$1.00 postage.

Wuluuman Hills, Burrendong Dam and Burrendong Arboretum

20 km by road east of Wellington are the Wuluuman Hills with plants of interest, but south of here via Dripstone, is the amazing Burrendong Arboretum. The on-site vans and picnic areas at the dam are superb and an excellent base to explore the Arboretum. Acres of wildflowers. They will never compete with properly funded wildflower parks such as the Canberra National Botanic Gardens, Wittunga of Adelaide or King's Park of Perth, when it comes to paths and area care, but the plants will enthrall you for days.

Rylstone, Mt. Darcy, Mt. Coracudgy, Khyber Pass, Capertee to Lithgow

East then south-east from Mudgee and Rylstone, the country rises to the sandstone tangle of the Dividing Range, straddled by a series of volcanic caps such as Mt. Darcy and Mt. Coracudgy, both over 1200m, thence to Lithgow. 35 km east of Rylstone (turn at the hospital) where the valley pinches in suddenly as though the towering sandstone mountains on either side had been pulled together by a giant drawstring, is the Khyber Pass. Room is barely left for the road to the wonderland of the Upper Cudgegong River and Rotton River. The many beautiful plants include *Prostanthera* with two as-yet-unnamed species, *Boronia ledifolia*, *B. anemonifolia*, *B. microphylla*, *B. pinnata*, *B. mollis*, *Epacis rollinata*, *Chloanthes parvifolia*, *C. stoechadis*, *Dracophyllum* sp., *Pultenaea foliolosa*, *P. microphylla*, three forms of *Eriostemon myoporoides*, *Eriostemon* spp., *Telopea speciosissima*, *Dillwynia* spp., *Bossiaea* spp., etc.

Gulgong, Ulan, Lee's Pinch, Murrumbo, Cox's Gap to Muswellbrook

East from Wellington you travel through Gulgong, Ulan, Wollar (20 km. along the back road to Merriwa is Lee's Pinch), Murrumbo, past the turn off south that goes to Rylstone by the Bylong Valley, then to Cox's Gap, and, if not going to Muswellbrook, turn south on the Widden Valley Road to Mt. Dangar. Beautiful plants in the area include *Rylstonia cernua*, *Prostanthera discolor*, *P. cineolifera*, *P. prunelloides*, *Epacris reclinata*, *Boronia mollis*, *Grevillea johnsonii*, the tree form of *Eriostemon myoporoides*, *Kunzea parvifolia*, *Isopogon dawsonii*, *Petrophile* sp., etc.

Goonoo Forest, Mendooran, Timor Rock, Warrumbungles, Pilliga Forest

The Goonoo Forest extends between 30 and 60 km. on the Wellington, Mendooran Road, north of Dubbo. Timor Rock will be found 20 km. S.W. of Coonabarabran and just west of this town are the Warrumbungle Ranges. See page 376 for details of this beautiful area. The roads further north pass through the Pilliga Forest, easterly to Narrabri through Rocky Glen and Mullaalee, or north to Torrington and Copeton Road on the Howell-Barraba Road.

Goonoo Forest is renowned for its *Acacia* population of 34 species, 5 spp. of *Prostanthera*, *Boronia* 4 spp., *Eriostemon* 2 spp., *Daviesia* 5 spp., *Dillwynia* 3 spp., *Pultenaea* 5 spp., *Actinotus* 2 spp., *Burtonia foliosa*, *Westringia cheelii*, *Rylstonia*, *Hemigenia cuneifolia*, etc. The Pilliga is similarly rich whilst the Warrumbungle Ranges hold many species not found in either including *Asterolasia hexapetala*, *Acacia cheelii*, *A. forsythii* and *Prostanthera induta*.

Nyngan, Girilambone, Cambelego, Cobar

North-west from Dubbo are isolated areas of interest at Girilambone and to the south of Cobar near Nymagee and Bobadah.

Hervey Range, Bogan Gate, Cookamidgera, Upper Lachlan, Mullion Creek, Napoleon Reefs

South-west is the Hervey Range, 10-12 km. from Baldry, extending 40 km. north and south, then to Parkes and either 40 km. west to Bogan Gate, east on the back road to Molong to Cookamidgera, or south to the Upper Lachlan where only tracks lead in to a fine area from Gooloogong. Mullion Creek is on the Orange-Stuart Town Road at the turn off to Molong. Napoleon Reefs are just off the Sydney Road east of Bathurst on the way back to Sydney before a pleasant stop at the Cox's River before Lithgow.

Plants of The Cradle Of Incense

The most notable are *Prostanthera*, the Australian mint bush. No lover of our wildflowers should be without a copy of the book "The Cradle Of Incense", available from the Editor for \$15.00 post free. Go and see the wildflowers in the area for yourself and visit the dream in reality of George and Peter Althofer, The Burrendong Arboretum.

Rare Plants In The Wellington-Dubbo Magic Circle

Key: 1 = rare; 2 = localised; 3 = endangered; 4 = extinct?; 5 = established at Burrendong.

<i>Acacia forsythii</i> . Restricted to the Warrumbungles. See page 379	1, 2, 3, 5
<i>Acacia murrumbensis</i> . Not reported since first collection, Murrumbidgee	4?
<i>Asterolasia mollis</i> . Timor Rock, Warrumbungles	1, 2, 3
<i>Boronia berkerana</i> . Sparingly branched, elliptical leaves, similar <i>B. parviflora</i> . Blackheath.	1, 2, 3
<i>Boronia bipinnata</i> . Small tacky terete leaves, small white fls. Goonoo Forest, Torrington Area	1, 3
<i>Boronia rubiginosa</i> , similar <i>B. ledifolia</i> . Whitish under elliptic leaflets. Lee's Pinch and Upper Hunter.	1, 2, 3
<i>Boronia ruppii</i> , similar <i>B. ledifolia</i> . Dull under ovate 3 to pinnate leaves. Copeton Road.	1, 2, 3
<i>Boronia whitii</i> , similar <i>B. ledifolia</i> . Whitish under fine trifoliate leaves. Coonabarabran.	1, 2, 3, 5
<i>Burtonia foliolosa</i> . An uncommon pea flower of Goonoo Forest, Pilliga Forest and North Queensland.	1, 2, 3
<i>Caladenia</i> and other orchid species. Extinct in central west and seriously endangered.	1, 2, 3
<i>Dipodium hamiltonianum</i> . Another seriously endangered orchid. Coonabarabran Goonoo Forest	1, 2, 3
<i>Diuris</i> . An area especially rich in the donkey species and forms	1, 2, 3
<i>Eriostemon brevifolius</i> . Similar to <i>E. difformis</i> . Confined to West of Wyalong, Griffith and Cocoparra Ra.	1, 2, 3, 5
<i>Eriostemon ericifolius</i> . Similar to <i>Phyllothea salsolifolia</i> . Goonoo Forest, Hervey Range, Cookamidgera	1, 2, 3, 5
<i>Eucalyptus campaniflora</i> . Girilambone	1, 2, 3, 5
<i>Grevillea ericifolia</i> . A dwarf form not reported for many years. Upper Lachlan River.	1, 2, 3, 5
<i>Grevillea rosmarinifolia</i> . A distinctive form from Cox's River	1, 2, 3, 5
<i>Hakea bakerana</i> . An exception <i>Hakea</i> also on the Central Coast, Lake Macquarie to Gosford	1, 2, 3, 5
<i>Hakea pulvinifera</i> . Probably extinct. Last reported from Keepit Dam	4?
<i>Halgania preissiana</i> . Pictured on page 356. Mt. Arthur, Mt. Wellesley, Wuluman Hills	1, 2, 3, 5
<i>Hemigenia cuneifolia</i> . See No. 83 issue. Edge Goonoo Forest and Pilliga Forest	1, 2, 3, 5
<i>Homoranthus darwinoides</i> (<i>Rylstonea</i>). Localised in Goonoo Forest, Lee's Pinch, Hervey Range.	1, 2, 3, 5
<i>Kennedia procurrens</i> . Rare and localised in Pilliga Forest but also in Q'land	1, 2, 3, 5
<i>Kennedia retrofracta</i> . Rare and localised on Mt. Dangar	1, 2, 3, 5
<i>Phelialium lachnaeoides</i> . Tall shrub similar to <i>P. phyllicifolium</i> . Originally found Blackheath	4?
<i>Phelialium nottii</i> . A floral gem with pink flowers. Bearbong Road, Gilgandra, Hervey Range	1, 2, 3, 5
<i>Phelialium obcordatum</i> . Similar to <i>P. glandulosum</i> . White to yellow, from Bogan Gate near Mendooran	1, 2, 3
<i>Phelialium sympetalum</i> . Shrub. Green-yellow united petals like <i>Correa</i> . Khyber Pass area.	1, 2, 3
<i>Phelialium viridiflorum</i> . Shrub. Yellow-green flowers. Restricted to Warrumbungles.	1, 2, 3
<i>Pultenaea cambageana</i> . A seriously endangered yellow pea of the Torrington area	1, 2, 3
<i>Pultenaea canescens</i> . A rare pea flower of Mullion Creek and Napoleon Reefs	1, 2, 3, 5
<i>Pultenaea platyphylla</i> . Not reported since 1917. The Temora area.	1, 2, 3
<i>Swainsona recta</i> . A perennial herb with purple flowers at Mt. Arthur, Mumbil and Burrendong	1, 2, 3, 5
<i>Zieria obcordata</i> . A dainty plant related to <i>Boronia</i> . Wuluman Hills, N.W. of Bathurst.	1, 2, 3, 5

THE FLORA OF MT. ARTHUR RESERVE

Wellington, New South Wales — G. W. Althofer and G. J. Harden.



Australian Endangered Plant Species

By John Leigh and Robert Boden.

"Australian Endangered Plant Species" is the title of a project being supported by the World Wildlife Fund and aimed at increasing an understanding of the conservation status of some of Australia's threatened plants.

More than 2,000 vascular plant species are considered to be at risk in Australia (Hartley and Leigh, 1979)* This represents about 10 percent of the known indigenous vascular flora and emphasises the need for conservation action if this national heritage is not to be lost for ever. However before conservation strategies can be developed it is necessary to gain a detailed understanding of the distribution, habitat, and taxonomic relationships of threatened species based on studies of herbarium records and collections, field investigations and the advice of botanists and plant collectors throughout the country.

The present project is concentrating on the two hundred species thought to be in serious risk of disappearing from the wild within one or two decades if present land use and other causal factors continue to operate. An attempt is being made to obtain detailed information on distribution, population trends, conservation status, whether located in national parks or other reserves, whether presently in cultivation and if so the most appropriate propagation techniques for each of these species. It is appreciated that some species being studied may have been poorly collected and are not under imminent threat. We hope this may be the case. On the other hand, there may be species not in the present list which are indeed threatened and in urgent need of study.

WESTERN AUSTRALIA

Acacia aphylla
Acacia depressa
Adenanthos cunninghamii
Adenanthos detmoldii
Adenanthos pungens
Aotus carinata
Aponogeton hexatepalus
Balaustion microphyllum
Banksia goodii
Banksia lullfitzii
Banksia pilostylis
Boronia revoluta
Caladenia crebra
Conospermum scaposum
Darwinia carnea
Darwinia masoni
Darwinia meeboldii
Darwinia rhadinophylla
Diuris purdiei
Dodonaea hackettiana
Drakaea jeanensis
Drosera occidentalis
Dryandra comosa
Dryandra polyccephala
Dryandra pulchella
Eriostemon nutans
Eucalyptus rhodantha

Eucalyptus pendens
Eucalyptus steedmannii
Eucalyptus stoatei
Exocarpus odoratus
Franklandia triaristata
Grevillea eriobotrya
Grevillea flexuosa
Grevillea scabra
Grevillea scapigera?
Hakea aculeata
Halimolobos corymbosa
Hemimandra gardneri
Hibbertia lasiopus
Hibbertia miniata
Hibbertia sargentii
Kennedia glabrata
Kennedia macrophylla
Lambertia echinata
Lambertia orbifolia
Lasiopetalum bracteatum
Lechenaultia longiloba
Lechenaultia pulvinaris
Lyonsia diaphanophlebia
Lysinema elegans
Nigromnia globosa
Phelegmatospermum richard-
sii
Pomaderris intangenda

Ptychosema pusillum
Pultenaea skinneri
Regelia cymbifolia
Restio stenostachyus
Rhizanthella gardneri
Sowerbaea multicaulis
Spirogyrdneria pubescens
Stawellia dimorphantha
Stylidium utricularioides
Synaphea pinnata
Templetonia drummondii
Thelymitra psammophila
Thomasia montana
Thysanotus acerosifolius
Tribonanthes brachypetala
Urocarpus grandiflorus
Verticordia staminosa
Villarsia lasiosperma
Villarsia submersa

SOUTH AUSTRALIA

Acacia barattensis
Acacia gillii
Acacia menzelii
Acacia pinguiifolia
Acacia pickardii
Acacia rhigiophylla
Achnophora tatei

* Australian Flora in the Endangered Species Convention — CITES. (Hartley and Leigh, 1979).

Special Publication No. 3 of the Australian National Parks and Wildlife Service is a 95-page booklet that complements the above. It was prepared to acquaint the public in particular that section of the community trading in flora, of species subject to regulations. This publication will be available in libraries. It may be obtained by written request to, The Director, Australian National Parks and Wildlife Service, P.O. Box 636, Canberra City, A.C.T., 2601. As limited numbers were printed, it is suggested that people interested refer first to a library copy to confirm that it will be of value to them.

The Flora Of Mt. Arthur Reserve

This is the cover of an 82-page book that describes the flora of a recreation reserve three kilometres west of Wellington, N.S.W., available from the Editor for \$4.00 plus \$1.00 postage. Shown is the beautiful *Halimolobos preissiana* belonging to a genus of plants found mainly in Western Australia. Very few reports have been received on these and other shrubs in the family Boraginaceae, that also includes *Coldenia*, *Ehretia*, *Heliotropium*, *Myosotis*, *Omphalappula*, *Plagiobothrys*, *Tournefortia* and *Trichodesma*. Who can help the Editor with reports or slides?

Acrotriche halmaturina
Aizoon kochii
Atriplex eichleri
Atriplex kochiana
Atriplex macropterocarpa
Brachycome dimorphocarpa
Brachycome muelleri
Cheiranthra volubilis
Chionohebe parrkalliana
Conostephium halmaturinum
Corybas despectans
Cryptandra uncinata
Dodonaea tepperi
Frankenia flabellata
Frankenia granulata
Frankenia orthotricha
Frankenia plicata
Frankenia pseudo-flabellata
Frankenia speciosa
Gahnia hystrix
Garnotia stricta
Goodenia anfracta
Goodenia parallelinervis
Hydrocotyle comocarpa
Lasipetalum tepperi
Maireana melanocarpa
Malacocera biflora
Myoporum refractum
Nymphoides stygia
Olearia arida
Petrophila multisepta
Phabalium hillebrandii
Phlegmatospermum richardii
Prasophyllum validum
Ptilotus beckeranus
Ptilotus robynianus
Pultenaea trifida
Pultenaea viscidula
Sarcocolla bicarinata
Sclerolaena cristata
Sclerolaena caput-casuarii
Sclerolaena eichleri
Stackhousia annua
Stipa brachystephana
Stipa nodosa
Swainsona viridis
Tetraria halmaturina
Triglochin ovoideum
Zygophyllum hybridum
Zygophyllum kochii

VICTORIA
Acacia howittii
Acacia williamsonii
Asplenium hookerianum
Calochilus richae
Cryptostylis hunterana
Diuris punctata var. *alba-violaceae*
Eucalyptus yarraensis
Eucalyptus froggattii
Gnaphalium nitidulum
Gnephosis baracchiana
Leucopogon nueroophyllus
Monotoca rotundifolia
Pultenaea patellifolia
Rutidosia leptorhynchoidea
Swainsonia plagiotropis
Westringia crassifolia
Westringia cremnophila

QUEENSLAND
Choricarpia subargentea
Cryptanthemis slateri
Cryptocarya foetida
Diploglottis campbellii
Dodonaea rupicola
Eleocharis difformis
Euphorbia carissoides
Fimbristylis adjuncta
Garnotia stricta
Hernandia bivalvis
Lepturus geminatus
Liparis swenssonii
Macropteranthus montana
Nervilia pachystomoides
Planchonella eerwah
Polygala pycnophylla
Polystichum fragile
Thaumastochloa constricta
Xanthostemon oppositifolius

NEW SOUTH WALES
Acacia forsythii
Acacia pubescens
Apatophyllum constablei
Asplenium hookerianum
Caladenia holmesii
Cryptanthemis slateri
Cryptocarya foetida
Cryptostylis hunterana
Cynachum elegans
Diospyros macabaea
Diploglottis campbellii

Eucalyptus camfieldii
Eucalyptus parvifolia
Grevillea rivularis
Grevillea shirensii
Haloragadendron lucasii
Olearia flocktoniae
Olearia oligantha
Phabalium ralstonii
Phyllanthus microcladus
Phyllota humifusa
Prasophyllum laminatum
Prasophyllum obovatum
Prostanthera cryptandrae
Prostanthera densa
Prostanthera staurophylla
Prostanthera stricta
Prostanthera teretifolia
Pterostylis furcillata
Pterostylis longicurva
Pultenaea bauerlenii
Pultenaea stuartiana
Rutidosia leptorhynchoidea
Swainsonia plagiotropis
Syzgium moorei
Typhonium eliosurum

NORTHERN TERRITORY
Actinotus schwarzi
Amyema haematodes
Boronia affinis
Christia australasica
Eriacne bleeseri
Fimbristylis compacta
Helichrysum thomsonii
Hibbertia angustifolia
Hibbertia tasmanica
Huxleya linifolia
Macrozamia macdonnellii
Terminalia savannicola
Thryptomene parvifolia

TASMANIA
Anthocercis tasmanica
Epilobium perpusillum
Eucalyptus morrisbyi
Euphrasia phragmostoma
Ixodia achlaena
Milligania johnstonii
Oreomyrrhis gunnii

In Volume 10, No. 81 of Australian Plants the Editor drew attention to the Society's objective of preservation of the Australian flora, rightly pointing out that "lessons being learned in the propagation and cultivation of our wildflowers by home gardeners will make a significant contribution to the ultimate objective". We recognise that readers of Australian Plants, many of whom are members of the Society, are dispersed throughout the country and often in the best position to understand the local flora of their region. We are therefore seeking their assistance in providing information and illustrations of any of the species listed below or others which they believe meet the definition of endangered, i.e. species in serious risk of disappearing from the wild state within one or two decades if present land use and other causal factors continue to operate.

Any information on locations will be treated confidentially as unfortunately there have been examples of overharvesting of seeds and vegetative material of threatened species when their precise locations have been publicised.

If you are able to assist please contact either —

Dr. John Leigh,
 Division of Plant Industry,
 CSIRO,
 P.O. Box 1600,
 CANBERRA CITY, A.C.T., 2601.

Dr. Robert Boden,
 National Botanic Gardens,
 P.O. Box 158,
 CANBERRA CITY, A.C.T., 2601.

***Westringia*, Description of Species**

G. W. Althofer and P. McD. Althofer

The Species of *Westringia* may be simply described as follows:

***Westringia amabilis*: Boivin.**

The late C.T. White, then Queensland Government Botanist at Queensland Herbarium once said in a personal communication to the Authors when writing of this species, "Surely the most beautiful of all *Westringia* species". We agree wholeheartedly, for this species with a height of a little over one metre with flowers larger than any other of the genus is certainly a plant of infinite beauty. A fine compact bush with handsome foliage with flowers of soft pink to pale lavender. *W. amabilis* is a real joy. It grows at Ballandean in South Queensland and at various places on the granitic uplands near there and contiguous border areas of N.S.W. (Mt. Seaview). Leaves ovate-lanceolate with an acute point, 12-20mm. long, 4-8mm. broad on a long, slender petiole to 2mm. long. The flowers are large and handsome.

***Westringia angustifolia*: R. Br.**

A shrub of two metres or perhaps a little more at times. Branches slender though rigid. The leaves usually in whorls of three but sometimes four or two, on slender erect petioles, narrow linear rather broader and longer than *W. quaterna*. The revolute margins usually cover the backs of the leaves almost to the broad mid-rib. The apex mucronate. Flowers showy, solitary, axillary near the ends of the branches, rather large white to pale lilac are interspersed in the throat with spots of yellow, crimson or purple on lower side of the throat. Tube slightly longer than the calyx, lobes of the two lips spreading in one plane, upper lip twice as long as the tube, bilobed, each lobe with apex emarginate and the two margins irregularly toothed and often recurved. The lower lip shorter than the upper one and 3 lobed. The species is confined to Tasmania, where it is widespread and locally frequent on rocky hillsides from sea level to 1000 metres.

***Westringia blakeana*: Boivin.**

This handsome species is confined to the uplands of Southern Queensland and areas close to the border of northern N.S.W. It is a slender plant of two metres or sometimes a little more, growing under dense *Eucalyptus* forest cover. The leaves are handsome linear lanceolate. The flowers are also large and handsome, the corolla being purplish and the tube nearly white. We conclude that if this species is grown in the open in mild climates it will prove to be a more compact, lower growing shrub. Plants may be seen in Queensland in Lamington National Park (Davis Ck.), Mt. Maroon, Mt. Gillies Back Ck., Canungra. In N.S.W. Minyon via Mullumbimby.

***Westringia brevifolia*: Benth.**

The species is endemic to Tasmania. A much branched shrub to a little over a metre high. The leaves very shortly stalked in whorls of four, oblong or elliptical lanceolate, 4-10mm. long, 1.2 to 3mm. broad; margins shortly and closely revolute but *not* covering the silvery lower surface. In some forms the upper surface of leaves is a bright, shining green, in others greyish green. Flowers pale mauve solitary, very shortly pedicellate, in the axils of the leaves near the branch ends. Calyx 5-6mm. long, the lobes narrow triangular and tapering to a fine point, more than half as long as the tube. Corolla about twice as long as the calyx, sparsely hairy, the lobes narrow. Endemic to Tasmania. Sparsely represented on the west coast and north of the state. See page 345 for colour plate.

***Westringia brevifolia* var *raleighii*: (Boivin) W. Curtis.**

A shrub somewhat larger in all its parts than the type species. The leaves are about one third longer, the flowers are larger, varying in colour from white to mauve. Leaves 11-16mm. long. Calyx 6mm. long. Found at Sandy Bay, Hobart, Tasmania. Colour plate on page 345.

***Westringia cephalantha*: F. Muell.**

This species is endemic to West Australia. An erect bushy shrub (rarely diffuse) to 1 metre high. Leaves linear obtuse or sometimes acute, in whorls of three, four or rarely five, shining but black when dry; rarely exceeding 1-2cm. in length. Flowers sessile and solitary within each floral leaf, collected into dense, globular terminal heads. The bract-like floral leaves not exceeding the calyces and the real bracts usually wanting. Calyx 2 to 3mm. lines long, the teeth very obtuse, irregularly separating to below the middle. Corolla pubescent outside, the tube about as long as the calyx, the upper lobes erect and obovate, the lower ones spreading, all flat, obovate and entire, or the middle lower one emarginate. It is fairly close to *W. discolorum* but with even smaller flowers. An extra aid to identification is that leaves are shining on top but whitish on the visible surface where the margins are folded back. It is confined to the southern portions of Western Australia.

***Westringia cheelii*: Maide. & Betcher.**

A native to Queensland and N.S.W. In Qld., it may be found west of Pentland, in the Roma district, a Dawson R., Miles, Columboola, N. West of Chinchilla, Pelham, Barakula State Forest and the Moonie highway, west of Westmar. In the Northern border regions of N.S.W., it is widespread extending to Warialda and the Pilliga scrub. It is reported also from Goonoo Forest N.S.W. We know for instance that *W. cheelii* does come into the eastern portion of the forest and extends towards Gulgong and north through the wheat belt to the Pilliga. If however the species extends to the forest proper it must mingle with *W. rigida*. The status of this plant must remain questionable until a full range of specimens are assembled for the whole of the north west of N.S.W., and the central division. Our own interpretation of this species is that it is generally a taller shrub than *W. rigida* with longer leaves. The leaves of *W. rigida* being less than half the length of those of *W. cheelii* and linear acute with strongly revolute margins. The leaves of *W. cheelii* are more or less linear lanceolate with an acute point. The flowers usually white to pale yellowish but sometimes pale mauve show up well on the long branches. The average height runs to a little over a metre. The type collection of this species by J. L. Boorman was on the road from Goonoo (Forest?) to Mudgee and this bears out our earlier remarks that *W. cheelii* inhabits the isolated ridges east and north of Goonoo and Pilliga Forest.

***Westringia crassifolia*: N. A. Wakefield.**

The species is confined to Victoria. This is a very showy species with beautiful flowers of mauve to deep violet. An erect shrub. The height is from one to a little over two metres. This plant provides brilliant splashes of colour in the Whipstick scrub near Bendigo and along the fringes of the Little Desert. Leaves are in whorls of three. Shortly petiolate, narrow elliptical, 5-15mm, 1.5-2.5mm. wide, thick, upper surfaces concave underneath, becoming wrinkled, both surfaces minutely tuberculate and slightly pubescent, margins minutely denticulate, not recurved, apex obtuse but with a slight callose point, the midrib not apparent except as an indefinite thickening on the undersurface; flowers sub sessile, calyx 4-5mm. long, scaly pubescent, scarcely ribbed. The lobes triangular thick acute and 1.5-2mm. long.

***Westringia cremnophylla*: N. A. Wakefield.**

The Snowy River *Westringia*. A very rare species with a restricted range along the cliff faces of the Snowy River Gorge in East Gippsland, Victoria. A straggly, much branched shrub, growing in crevices of the rocky cliffs. Bark of the older and larger stems thick and corky, furrowed. Leaves in whorls of three (rarely four) 1-2cm. long, 1-2mm. wide, margins revolute, apex obtuse but $\pm$ mucronate. Flowers solitary in the axils, subsessile; calyx lobes acute, about half as long as the tube; Corolla mauve, about 1cm. long, densely hispid on the outside villous in the throat, all five lobes indented at the apex with the lowest one more so (quite

bilobed) and longer than the others, flowering branchlets 2-4cm. long, universally invested (on stems, leaves and calyces) with dense $\pm$ whitish tomentum. A straggling, dwarf shrub of 50-70cm. Dr. J. Willis has said "this is a rare shrub of the cliff faces of the Snowy River Gorge where it is endemic". W. Cane and Leo Hodge (the original discoverer) have both reported on the excellence of this seldom collected species.

***Westringia dampierii*: R. Br.**

This species is confined to southern West. Australia and adjacent areas in South Australia. Usually a small shrub, very dense and up to a metre high. The leaves and young shoots mostly hairy in whorls of four, rarely three. The flowers, rather small are axillary, white with purple markings. Originally this species was reported from Tasmania but later examination has transferred the Tasmanian collections to *W. angustifolia*. In West. Australia it is found mostly in the vicinity of Albany, back along the coast eastwards and contiguous areas to just over the Sth. Australian border. This small, rigid shrub has the young shoots and leaf undersides hoary though less so than *W. fruticosa*. The corolla is more hirsute than the above species, the calyx with a striate tube of about 4mm. and the teeth whether broad or narrow always very short and acute, usually not a $\frac{1}{4}$ the length of the tube.

***Westringia discolorum*: S. Moore.**

This is a rare species confined to the south-west portions of West. Australia. A small shrub with sub-terete leaves, usually in whorls of four and densely tomentose. Known locally as White Cotton bush from the crowded white flowers at ends of the branchlets. The flowers are small, white; the calyces exceeding the floral leaves. The leaves are shorter than in *W. cephalantha*, to which it is closely related, but the floral leaves are longer. The flower heads and flowers are a little larger than those of *W. cephalantha*. The height is about half a metre.

***Westringia eremicola*: A. Cunn. ex Benth.**

One of our most widespread species found inland in N.S.W., Queensland, Victoria and South Australia. A slender but sometimes a bushy shrub, it is very common over central areas of N.S.W., growing to a height of two metres, with leaves in whorls of three, narrow, linear acute. The flowers rather small vary in colour from the palest mauve to deep mauve or violet, can be very attractive when massed as in good years. A form growing on Mt. Arthur at Wellington, N.S.W., was formerly known as *W. linifolia* but recent research has relegated it to a synonym of *W. eremicola*. The chief difference from the type is that the Mt. Arthur plant has leaves even narrower, bright green and glabrous as opposed to the usually hoary or glaucous leaves of the typical *W. eremicola*. In Queensland *W. eremicola* may be found in Carnarvon Gorge, Toowoomba Range, Crow's Nest, Mt. Helidon, Goodna, Dinmore, Ipswich, Mt. Castle, south of Laidley, Belmont, Tingalpa, Broadwater, Mt. Cotton, Mt. Gravatt and St. George, Moonie Hwy.

In N.S.W., it occurs at Yamble, Burrendong, Cundubul Range, Mt. Arthur, Mt. Wellesley, Hervey Range and hills on Cookamidgera Road. In Victoria it occurs along Genoa and Towamba (?) Rivers, in the north east, far north and east of the state. In Sth. Aust., in the Mt. Lofty area and ranges in the central north. The leaves are usually a little more than a mm. broad with a mucronate margin and up to 24mm. long, but usually much shorter, usually scabrous. Calyx lobes narrow, often as long as the tube. Corolla pubescent outside, the upper lip shorter than the middle lobe of the lower lip and not deeply lobed, the lobes all rather narrow and emarginate.

***Westringia eremicola* var. *quaterna*:**

The variety is distinguished by having the leaves in whorls of four. Little is known of this plant. But it is recorded that it is a tall, slender shrub of 2 metres or more. The leaves are 10-30mm. long and 0.6-1.0mm. wide. A little narrower and longer than the normal *W. eremicola*. This may result from the position in which the variety grows — deep, shaded gullies on the Shoalhaven R., at Glenrock (?).

***Westringia fruticosa* (Willd) Druce. Syn. *W. rosmariniformis*.**

The first *Westringia* discovered and named has only comparatively recently undergone the name change as shown above. The common sea-coast *Westringia* of N.S.W. used quite often as a dwarf hedge. This is a dense bush to one metre or more in height and succeeds in a variety of soils and situations from the far inland to the most exposed areas on the sea coast.

The leaves crowded on the stems are in whorls of four, with the undersides hoary or silvery white; from oblong lanceolate to linear, 12-24mm long, coriaceous, glabrous and shining on the upper side, the margins more or less recurved or revolute. Flowers rather small, white, almost sessile, all axillary with very short linear bracts. Calyx about 6mm. long. The teeth acute, varying from half the length to nearly the length of the tube. Corolla pubescent outside, not twice as long as the calyx, the upper lip deeply 2 lobed, equal to or longer than the tube, the lower lip scarcely so long. Anthers of the staminedia with two linear, clavate parallel lobes. Commonly called native rosemary because of a fancied resemblance of the leaves to that plant.

***Westringia glabra*: R. Br. includes *W. violacea*: F. Muell.**

Westringia glabra is a hardy shrub, very variable as to leaf shape and size, sometimes being thick and fleshy, sometimes thin and attenuated. The leaves with a prominent mid-rib, scarcely recurved, shining above, dull below. Leaves sometimes up to 2cm. long at other times barely half that length. Leaves in whorls of three, shortly petiolate, from oblong elliptic to lanceolate, acute or obtuse, flat or the margins slightly recurved, smooth and often shining on the upper surface. The flowers are rather large and showy, very numerous, pale mauve to violet in colour, calyx teeth usually lanceolate, about as long, or a little longer than the tube. In Queensland it may be found at Shoalwater Bay, Mt. Cooroora, and in many secluded gullies from these places south to the N.S.W. border. In N.S.W. it is found in many New England areas, along the mountainous coastal fall to the Victorian border. We have noted it at Smith's and Myall Lakes. In Victoria it is doubtful if the typical form exists at all except at isolated patches in northern Gippsland and perhaps near Timbarra R., south of Mt. Elizabeth. Dr. Willis in "Plants in Victoria" states "Victorian populations are chiefly referable to var. *bacchi* and var. *williamsoni* = *W. williamsonii* — Willis & Boivin".

***Westringia glabra* var. *bacchi*: B. Boivin.**

This is a handsome small plant with smaller narrower and shorter leaves. Typical examples are found along the Lerderberg Gorge. This variety with quaternate leaves, very short floral bracteoles and narrower hairy calyx tubes that are mostly longer than their lobes is a feature of this area. This variety with large mauve to violet flowers grows to one metre and perhaps a little taller in sheltered places.

***Westringia glabra* var. *violacea* = *W. violacea*: F. Muell.**

The type of this plant was collected from near the mouth of the Goulburn R., by Mueller in March 1853. Another specimen collected 11/11/45 by J. H. Willis at Lerderberg Gorge agrees fairly well with the type. We have received specimens from the one area labelled just *W. violacea* which appear to match the above description. The only divergence is that the leaves are broader, quite glabrous and the flowers even larger than in *W. glabra* and the variety *bacchi*. The leaves in specimens we have examined range from narrow to broadly lanceolate.

***Westringia grandifolia*: F. Muell.**

A striking species confined to the Glass House Mts., in Queensland and contiguous areas. It is a tall shrub to 2 metres and one of the loveliest of the genus, the conspicuous leaves in whorls of three, oblong elliptical, 1-25cm. long, the margins slightly revolute, green above white beneath.

The large flowers are from white to pale or deep mauve. Flowers all axillary. Calyx very white about 8mm. long, the teeth nearly as long as the tube. Corolla pubescent not unlike that of *W. fruticosa* with the lobes

shorter and broader and the upper lip rather shorter than the lower. It may be found at Beerwah (Muellers Granite Mountain) Mt. Biboa, Mt. Tibrogargan in Queensland.

***Westringia grevillina*: F. Muell.**

This is a dry area shrub allied to *W. dampierii* and by some authorities considered synonymous. Pending further investigation we prefer at the moment to keep them separated. A small rigid shrub with leaves in whorls of three, shorter and more numerous than in *W. dampierii*. Flowers smaller than those of *W. eremicola* and differing only in having the calyx half as long as the tube and perhaps in having the leaves more crowded than in that species and *W. dampierii*. In South Australia it may be found at Port Lincoln and adjacent areas and in West. Australia just over the border near the coast. We have collected specimens from near and on Mt. Remarkable of a plant which appears to be this species. The leaflets in whorls of three or four, more rigid and pungent pointed than usual. Height to 1½ metres.

***Westringia linifolia* see *W. eremicola*.**

Formerly classified by Edwin Cheel as *W. linifolia* but name was not validly published. This plant is more slender with finer leaves, glabrous and of a deeper green than typical *W. eremicola*. Mt. Arthur, Mt. Wellesley and the Hervey Range near Obley in N.S.W.

***Westringia longifolia*: R. Br.**

A fairly tall, slender shrub with the leaves in whorls of three, glabrous, shining green above, duller below and very narrow. The flowers are rather small, axillary, white. Calyx to be 2-3mm. long, 5 ribbed, green and smooth, the teeth lanceolate-subulate, usually about as long as the tube and often ciliate. Corolla pubescent outside, the tube exerted and usually exceeding the calyx teeth, dilated upwards, the upper lip much shorter than the tube, broadly 2 lobed, the middle lobe of the lower lip much longer. Connective of the perfect anthers very prominent and (in some specimens at least) almost winged at the back. Growing to 2 metres and sometimes more, this long flowering shrub is hardy in most areas. Occasionally plants are seen with pale mauve flowers. Confined to N.S.W. this species is found in the Sydney area from the south coast to the Gosford area in the north, and west to Campbelltown and the Appin area.

***Westringia longipedunculata*: Boivin.**

This rare plant, confined to the Inglewood area in Southern Queensland and contiguous areas, will well repay introduction to garden culture. It is a beautiful species with fairly large deep mauve flowers. We feel that the range of this plant may be considerably extended by further investigation. Plants collected north and west of Inglewood appear to belong to this species. It grows to a height of one metre and more and is a stiff, upright shrub. Leaves 3-5mm. long, ovate-oblong, smooth, and thick in texture. Peduncles 2-2.5mm. long; calyx 5.5-6mm. long; tube 4.5-5mm. long.

***Westringia lucida*: Boivin.**

The alpine *Westringia* of N.S.W. found on most of the Alpine Mountains of southern N.S.W. Typical areas are Cabramurra, Kiandra and near Khankoban. The leaves are a bright, shining green above, smooth and in whorls of three, 8-12mm. long. The flowers are white and on good bushes are like newly fallen snow. This is a shrub to one metre high and very often wider spreading.

***Westringia parvifolia*: White and Francis.**

A small species endemic to the southern inland areas of Queensland and extending westward to the dry area ranges. A small rigid shrub from 30-70cm of a metre high with numerous small white to pale mauve flowers. The leaves very tiny — the smallest of the genus are crowded in whorls of three. Leaves 1.5-3mm. long, peduncles 0.5mm. long. It may be found at Yelarbon, Inglewood and Keetah near Goondiwindi. We have recently located plants on the west Queensland ranges.

***Westringia quaterna*: Boivin.**

This species is confined to Tasmania. A fine shrub of a little less than a metre to three metres. The leaves are in whorls of four occasionally three or two. The main recognisable difference from *W. eremicola*, with which it is often confused are as follows: Leaves longer with more acute terminal point (often pungent), leaves deep green above, grey beneath, rolled back to almost cover the undersurface. Calyx scarcely lobed, flowers axillary, pale to deep mauve, solitary, near ends of branches. Leaves on slender erect petioles 1-2mm. long.

There is some doubt in the minds of some botanists as to the validity of this species but we consider it is quite distinct from its relatives. It is widespread and located frequently on rocky hillsides from sea level to 1000m. Included in *W. angustifolia* by Curtis in student's flora.

***Westringia raleighii*: Boivin.**

Regarded as a variety of *W. brevifolia*. In the recent publication "Endemic Flora Of Tasmania", Dr. W. Curtis restored this to full specific range, a decision widely acclaimed. The species is larger in all its parts than *W. brevifolia*.

***Westringia rigida*: R. Br.**

From Queensland, N.S.W., Victoria, S. Australia, Tasmania and West. Australia, "Stiff *Westringia*". This is the species with the greatest range of any other in the genus. On critical examination it may be found that several species are covered by the above name, for not only has the species the greatest range but it has also the greatest variability in the genus. It is a rigid bushy shrub of one metre.

The leaves are mostly in whorls of three but occasionally four, and usually glabrous, linear obtuse, rigid. Colour plate on page 348.

The flowers are numerous, small, white, spotted with purple on the lower lip. The species seems to run into and merge with *W. cheelii* in some districts, but generally speaking the leaves are shorter, more rigid and less flexuose than in *W. cheelii*. The leaves vary in length from 1-10mm. long to 1mm. broad, rigid and almost pungent pointed, hoary beneath, rarely above, but the undersurface sometimes almost concealed by the revolute margins, the floral ones shorter than or as long as calyx; calyx 4-5mm. long, hoary with a minute pubescence, the deltoid teeth about 1/3 as long as tube; corolla not twice as long as calyx, pubescent inside and out, white spotted with purple inside the lower lip. In Queensland the species may be found at Grey Range, Quilpie — Thybunga Road. In N.S.W., in Goonoo and Pilliga Forests, the Hervey Range, sandy areas in north east and north west of the State, also north of Bourke. In Victoria in the Wimmera, Avoca and Murray areas, the little and Big Deserts. In South Australia in southern sandy areas to the far north, west to Birksgate Range, Ooldea, Murray lands, Yorke and Eyre Peninsulas. In West. Australia on Rottnest Is., Sharke Bay, Murchison River, and many localities between there and Birksgate Range.

***Westringia rigida* var. *brachyphylla*:**

Has leaves shorter and more spreading than the type. A dwarf variety from W. Australia of 0.7m.

***Westringia rigida*: var. *dolichophylla*:**

A dwarf variety from W. Australia height up to 0.7m. It has longer leaves than the variety *brachyphylla* up to 3cm. long.

***Westringia rollandii*: Boivin.**

A little known species confined to Queensland. Botanically it is close to *W. cheelii* differing only from that species in having all of the leaves hairy except the top surface. The leaves (unlike those of *W. cheelii*) are broadest towards the tip. The calyx teeth are short.

***Westringia rubiaefolia*: R. Br.**

Confined to Tasmania. This is a much branched dense shrub upwards of one metre high with leaves in whorls of four. Branches glabrous to

pubescent. Leaves sessile to subsessile, oblong — elliptical or lanceolate, apex blunt or mucronate; acute 4-12mm. long, leaf upper surface smooth, shining, glabrous, lower surface paler but glabrous, somewhat thick, flat or with margins slightly recurved. Flowers solitary, axillary, crowded in short clusters, near the ends of the branches. Calyx glabrous or puberulent 4-6mm. long, the lobes narrow — triangular, as long as the tube. Corolla pubescent, white or pale pinkish lilac with tube as long as the calyx and lobes shorter than the tube. Widespread and locally abundant from coast to mountain plateaux.

***Westringia rubiaefolia* var *subsericea*:**

Upper leaves and inflorescence silky pubescent. Leaves thick, not at all revolute. The corolla nearly glabrous, the lobes apparently narrower than the typical form. Head of Douglas River, Tasmania.

Westringia rosmariniformis: SM. now known as *W. fruticosa* (Willd) Druce.

See reference in the introduction to this paper.

***Westringia rupicola*: S. T. Blake.**

This rare species is confined to the mountains of southern Queensland. The plants form small green pendulous bushes growing in the crevices of the sheer rhyolite cliffs. The bluish-white flowers have a few pale brown spots at the base of the lower lip. The only other *Westringia* recorded from a similar habitat is *W. cremnophylla* from Victoria. *W. rupicola* is unique in having pendulous stems and opposite leaves. Ternate leaves were found at a few nodes of only two of the very many branchlets examined. There is a superficial resemblance to *W. blakeana* Boivin also found on Rhyolitic areas on the McPherson Range; this erect shrub sometimes has opposite leaves towards the base of the branchlets, but the plants are $\pm$ puberulous all over, the leaves are broader on longer petioles up to 1.5mm. long, the peduncles are shorter with longer broader bracts, and the calyx is larger with lobes slightly to prominently longer than the tube; also the ribs decurrent in pairs along the stems from each leaf base are acute and, especially on the younger twigs, almost winglike in *W. rupicola* but more or less obtuse and tuberculate in *W. blakeana*. The flowers axillary. Found on western and eastern slopes of Mt. Roberts, McPherson Range and Springbrook. Height is approximately $\frac{1}{2}$ a metre.

***Westringia senifolia*: F. Muell.**

This endemic Victorian species is confined to the alpine areas. A small rigid shrub up to 0.7m. The leaves are in close whorls of 5 or 6 rigid, scabrous, linear with margins so revolute as to conceal the under surface. The flowers are white, densely clustered in the uppermost axils. The species is an erect, robust shrub of 0.6-1.3m. more or less hirsute with white hairs, sometimes silky but looser and longer than in the other species, occasionally wearing off from the older leaves. The flowers axillary, sessile. Calyx tube 3-4mm. lines. The teeth subulate-acuminate nearly or quite as long as the tube. Corolla slightly pubescent outside, the lobes all nearly equal or the middle lower one rather longer, and not very much exceeding the calyx teeth. See photograph on page 349.

Confined to Victoria on Mt. Aberdeen, Buffalo Range and other high mountains in the southern Alps.

***Westringia senifolia* var. *canescens*:**

It is thought expedient to include this plant from the Phillips River area of West. Australia. We feel however that closer examination will place it as a distinct species. *W. senifolia* is entirely alpine whilst this plant grows on the low, stony jump ups of the near coastal Phillips River of West. Aust. A small plant up to 0.6m. with leaves in whorls of 5 or 6. The whole plant is hoary with white hairs and the flowers are small and white.

***Westringia sericea*: Boivin.**

This beautiful species, confined to southern Queensland whilst abundant in very localised areas can be considered rare. A tall species up to 2 metres, with silky, greyish leaves and conspicuous lavender flowers. Leaves

narrow lanceolate 2-3cm. long and 2-4mm. wide, petiolate. Calyx 7-8mm. long, tube 3.5-4.5mm. long. It is found on rocky ridges in Moreton district. Mt. Greville, Mt. Edwards. The flowers are similar to but a little smaller than those of *W. grandifolia*.

***Westringia tenuicaulis*: White and Francis.**

This species is unique in that its rigidly erect stems spring from a thickened root stock. The stems about 30cm. high, straight, virgate simple or sometimes slightly branched, leaves in 3's, rarely in 4's; narrow lanceolate, a little smaller than those of *W. glabra*. The flowers are small, purple at the leaf bases. It may be found at Burrum River, Double Island Point, Nikenbah, Tuen Ck., Lake Cootharaba, Elliot River and Coolumb in S.Qld.

Westringia violacea: F. Muell now known as *W. glabra* var. *violacea*.

See discussion in the introduction and description under *W. glabra*.

***Westringia williamsonii*: Willis and Boivin.**

We are very much aware that the inclusion of this plant in the list as a full species may cause surprise but we feel that the differences between this and *W. glabra* are too marked to be entirely ignored. It is of course an easy matter to pass over the matter of quaternate leaves but the other botanical differences are more constant and of greater significance. Many species are variable as to leaf and unless the differences are fixed, too much emphasis should not be placed on this feature. *W. williamsonii* as we see it is an upright, slender plant confined to Victoria. It is smaller in all its parts than *W. glabra*. The leaves besides being smaller are thinner and quaternate. The flowers have very short bracteoles and narrower, hairy calyx tubes that are mostly longer than their lobes (Willis). It may be found in parts of the Grampians (Victoria) Lake Tyers and W. Tree Creek Falls near Buchan. It grows to a height of two metres.

***Westringia* sp (Nov. 7)**

A small diffuse shrub of the Stony Ridges of the Ravensthorpe area of W. Australia. Height 30-50cm. Leaves in whorls of three, sometimes four, ovate, glabrous, shining bright green above, dull below, not recurved, 3-4mm. long, 2mm. broad. Flowers small, white, axillary. This strange little plant is compact with a very dense leaf cover.

Other new species?

There are still many unanswered questions relating to the genus. With regard to two species *W. eremicola* and more particularly in the case of *W. rigida* we feel there are good grounds for a thorough investigation of these two species. We feel that the separation of the extreme variants will lead to a much clearer picture of the genus as a whole. In addition to the possible new species in our specimens of *W. rigida* variants we have a specimen from Boatman Road, Charleville which cannot be matched. It seems to be midway between *W. longifolia* and *W. eremicola*.

***Westringia* Cultivars:**

Westringia 'Poorinda Pavane' — A cross of *W. glabra* and the NSW form of *W. fruticosa*. A plant almost midway between the parents in the shrub shape 2m. x 1.5m. with light mauve flowers, the petals not being so wide spreading as in *W. fruticosa*.

Westringia 'Poorinda Anne' — A cross between *W. glabra* and *W. crenophylla*, a small shrub with soft mauve flowers.

Readers, advise the Editor of other cultivars or good forms of species.

NEW BOOK ON WILDFLOWERS

National Parks of N.S.W. by Barbara Mullins, Margaret Martin and Douglas Baglin. Recommended Price \$12.95. Available from the Editor for \$12.00 post free for 1980.

All the national parks and historic sites in N.S.W. are described and intended as a traveller's guide. An extremely valuable and accurate guide. The book features, at much greater length, four areas every Australian should visit — Royal National Park just south of Sydney; Warrumbungle National Park on the edge of The Cradle Of Insects and featured in this issue on page 376; Kinchega To The Corner Country, the outback areas of the far north-west of the State; and the historic Hill End, scene of Australia's early gold rush. The presentation is excellent with some superb colour photographs and the personal experience and competence of the writers shows in the text. The book contains all the information a traveller will need to know. A superb Christmas present.

Grafting *Prostanthera* onto *Westringia*

Reprinted from the National Botanic Gardens Journal

"Growing Native Plants" — Volume 7.

Interest in grafting plants of the genus *Prostanthera* was initiated following high losses in both the Botanic Gardens nursery and the open garden. These observations, begun in 1969, soon linked the root-rotting fungus *Phytophthora cinnamomi* with these deaths. Chemical control in the field was not feasible.

Studies of the genus and related genera led to *Westringia fruticosa* or Coastal Rosemary being chosen as a likely rootstock. *W. fruticosa* grows vigorously in the Gardens, is easily propagated and shows excellent resistance to *P. cinnamomi*. The initial grafting trials showed that most species of *Prostanthera* were compatible with *W. fruticosa*. Several small-leaved species such as *P. aspalathoides* were incompatible and were successfully grafted using a nurse graft of *P. nivea*.

The *W. fruticosa* stock was struck from cuttings and grown-on in 10 cm pots. When 10-12 cm high these stocks were pruned to leave only one main stem. Any laterals were shortened to within 2 cm of the main stem in order to provide sustenance till the graft could produce its own food. They were then removed altogether. The wood was prepared like a cutting. The wood used was semi-hardened tip material about 5-7 cm long with two-thirds of the leaves removed. It was ideally the same diameter as the stock.

Using sterilised tools the top of the stock was removed and a 2 cm cut made vertically down the centre of the stem. The scion was prepared by paring off an equal length of wood (2 cm) from each side to make a vertical wedge. This wedge was fitted into the vertical slit, the cambium or bark layers aligned and the graft bound and sealed. The lower down the stock the graft is placed, the less chance there is of the *Westringia* stock shooting away. All the same, it is still necessary to check the stock for the first few years and cut back any shoots.

Once the graft is established the leaves on the stock can be completely removed; at this stage the graft can be unwrapped. All grafts at Canberra Botanic Gardens are done in a glasshouse with problem species covered by plastic bags to raise humidity.

The Gardens has most of the common *Prostanthera* spp. established as grafts and work now is concentrated on the less common species. Grafted specimens have been made with most species.

For many difficult-to-propagate species grafting may provide the only means of propagating and thus preserving them. The survival rate of the grafted plants is more than twice that of comparable non-grafted plants. However, there are difficulties with the work. The *Westringia* grows so vigorously that it can push off the scion or callous too quickly. This problem is alleviated to some degree if the stock and scion are both growing vigorously in the glasshouse before grafting. The follow-up to grafting can be time-consuming with weekly checks and weekly stock pruning essential.

The success with *Prostanthera* has led to the examination of other difficult-to-propagate genera. Some initial work has been done on Myrtaceae using *Kunzea ambigua* as a stock; Rutaceae using *Eriostemon* and citrus; Western Banksias on to Eastern Banksias and so on.

There is still much experimental work to be done with other genera but it appears that after five years of trials, the grafting of *Prostanthera* on to *Westringia fruticosa* is indeed successful. It is strongly recommended that both amateurs and nurserymen adopt this practice as standard when producing *Prostanthera* plants.

Eriostemon australasius

An Improvement of Seed Propagation by P. Nixon, Senior Lab. Technician,
The Dept. of Agronomy and Horticultural Science, The University of Sydney.

INTRODUCTION

Eriostemon australasius is an attractive Australian native shrub up to 2 metres high, found on the coast between central N.S.W. and Southern Queensland and some inland areas. The numerous attractive flowers may be seen from July to September. The pink flowers as cut flowers hold on well to their stems.

The horticultural exploitation of this plant is hindered by one major aspect and that is it is difficult to propagate. An article in *Australian Plants* (Vol 6 256-259) by McIntyre and Veitch (1972) has shown that seed germination can be increased to 25% by chipping the testa (seed coat) and by leaching. The chipping involved removing the testa around the radicle end of the seed with a scalpel, carefully exposing the endosperm and not damaging the radicle. This seed was then placed in muslin bags and washed in running water for 2 weeks. Presumably this removes a germination inhibitor before sowing. This method has given results in which all viable seeds, as determined by a 1% tetrazolium chloride stain, were germinated. However, only 29 out of 100 seeds were indicated as being viable according to this method and it is in this area of low viability that I made this study.

Some attempts have also been made to propagate the plant using tissue culture. It is understood that the work at the University of New England under de Fossard (Parry, personal communication) has proceeded to the point where some rootlets were developed on plantlets. Results of propagation by cuttings vary considerably and are not satisfactory.

I have moderate responses by cuttings to the hormone indol-butyric-acid (IBA) at high temperatures, and some parent plants gave more successful cuttings than others.

So far, however, no widely accepted method of successfully propagating the plant has been devised.

The aim of the study was to observe the effect on seed viability of maturing the seed on the plant.

To ensure that seed was properly matured on the plant, seed traps were placed around plants growing in the Gosford N.S.W. area in mid November 1978. Plants appeared to be shedding seed at this time of year. Traps of fibreglass fly-netting were put over plants and tied or stapled where necessary. These traps were collected in mid December when most seed had been shed (dehiscid) from the capsules.

When the dehiscid seed was separated from the trash, numbers varied from 30 to 100 seeds per plant with an average of 50 seeds per plant. Each plant was considered to be a replication and so seed collected from each plant was kept separate. Unfortunately, this seed could not be tested until November 1979. During this 12 months time it was kept at normal room temperature, Camden N.S.W. (lat. 34°S). After storage, seed collected in traps was visibly different from apparently matured seed which had been hand-picked from nearby plants at the time of putting out traps in mid November. A visual comparison of trapped seed and hand collected seed showed:-

(a) hand collected seed tended to be brown, wrinkled and have curled seed stalks (funicle). Trapped seed was shiny black with no wrinkles and the funicle remained straight.

(b) A very high proportion of hand collected seed floated in water, while nearly all the trapped seed sank. This would possibly provide an initial check on seed quality.

Seed Treatments

The following treatments were applied to seed from each plant.

Table 1 — Germination of Seed Obtained expressed in per cent

Seed collected from traps						Seed collected by hand			
Plants	A	B	C	D	E	H	I	J	K
Chipped Seed	80	60	40	50	70	0	0	0	0
Unchipped Seed	0	0	0	0	20	0	0	0	0

(1) Chipped seed. 1 mm of testa was carefully chipped from the larger radicle end with a scalpel, taking care not to damage the radicle. 10 seeds per plant were treated from plants which were bagged, and 5 seeds per plant from plants which were hand collected and not dehissed.

(2) Unchipped seed. Here, seeds were left entire. 5 seeds per plant were used in all cases. After seed treatment, seeds were put in a mist propagator in sand at 26°C to 30°C. Seed was dusted with Benlate and the duration of the trial was 28 days.

RESULTS AND DISCUSSION

It is clear that germination of both trapped and untrapped seed was extremely poor when the seed was left entire: chipping greatly increased the germination of trapped seed but did not increase the germination of hand collected seed.

These results confirm the finding that some seed treatment is necessary to improve germination — it also confirms that chipping is an effective (though laborious) method. However, it shows that a long period of leaching (2 weeks, as performed by McIntyre and Veitch, 1972), is not necessary to obtain removal of any inhibitor presumed to be present, with 12 month old seed misting alone is sufficient. More importantly, the results here show that increase in germination can be obtained if we allow the seed to mature and dehiscence on the parent plant. Seed which may be collected by hand by a collector who makes one or two visits to the plants may not have matured and may never mature to the point of dehiscence.

Further work needs to be done to establish if freshly trapped seed will perform as well without having the 12 months storage to overcome the effect of inhibitors.

It is probable that trapped seed will give a greater quantity of collected seed and seed which can germinate better because it has been allowed to mature fully to the point of dehiscence on the plant. This finding may also apply to other members of the *Rutaceae* family.

ACKNOWLEDGEMENTS

I am indebted to Mr and Mrs Parry from Florilands for their generous help and encouragement. To Professor M. Mullins and Dr P. G. E. Searle from the Department of Agronomy and Horticultural Science, the University of Sydney, for their encouragement. To D. McIntyre and G. Veitch from Canberra Botanic Gardens for the chip and leach system to build on, and to my wife for her help and tolerance.

Gardening on Coastal Limestone in exposed situations

By COLIN OFFICER, Seymour, Victoria

I was most interested in "Gardening in Limestone Areas" in the June, 1977, issue. You have asked for reports on experience in wildflower cultivation, so I am encouraged to give my own findings. This article will not be for the expert, but rather to encourage the non-expert to have a go on "Coastal Limestone, Exposed Areas".

This is, I believe, a challenge, and one which deserves publicity. Many people like to build in an open situation to achieve a view, and simply do not know how to restore the missing native vegetation. Yet a bush garden will enhance their home and is easily designed not to interfere with the views.

Only a mass movement of interested coastal home owners can hope to reverse a century or more of depredation of coastal scenery, a depredation

which is rapidly increasing with more and more houses by the sea. It is essential that the plant species chosen be simple, quick-growing ones which will encourage our gardeners and also their neighbours.

Over the past eight years we have been creating a native garden at Nelson in western Victoria. The block was a simple suburban-sized one, on a bare hillside covered in phalaris grass. There was indeed, on the lee side, a partial hedge of native vegetation, but there was no wind protection, and salt-laden gales of up to 100 mph occur in season. The limestone begins about 1 ft down, but is fairly easy to dig out. Building excavations produced some deeper soil in one corner of the garden.

A "park mixture" of grass was selected for general hardiness, and a continued weeding programme of all phalaris has gone on. This is now quite an easy task, with the growth of shrubs and trees. Native species of grass like kangaroo grass now occur in spots and are encouraged.

We soon realised that a native windbreak on all sides was essential and have used mainly the locally occurring species. Those used have been:

1. *Acacia longitolia* var. *sophorae* (Coast Acacia). This was found quite unsuitable; it would grow well, become yellow and die. *Acacia sophorae* is a very dominant species and it now needs some restriction, though the gates help to do some of the pruning! It flowers well in late September.
2. *Leptospermum laevigatum* (Coastal Tea Tree), which has established itself in a wild state on part of the Glenelg River bank, though I believe not indigenous to the area. Planted closely it forms a dense thicket flowering in October.
3. *Leucopogon parviflorus* (Coastal Beard Heath), which like coast acacia germinates from windblown seed in the ground as the result of watering and protection from rabbits by fencing.
4. *Acacia pycnantha* (Golden Wattle), grown readily from seed.
5. *Helichrysum parailium* (Coast Everlasting), which is cultivated for its silvery foliage contrast. Flowers in February.
6. *Westringia fruticosa*, which provides flowers for about 11 months of the year. It is not local, but has proved most successful.
7. *Melaleuca lanceolata* (Moonah), indigenous to our hill. It is summer flowering.
8. *Eucalyptus gomphocephala* (Tuart Gum), surely the best eucalypt for coastal limestone.
9. *Eucalyptus robusta* (Swamp Mahogany), doing very well with full exposure.
10. *Casuarina stricta*, the common local she-oak, which is very hardy, though rather slower growing than the previous species.

Whilst the above were growing, but in more cases after we had achieved some wind protection, we have found the following to be relatively successful to date.

11. *Melaleuca diosmitolia* flowers profusely, and even tolerated full exposure, though it appreciates the cover it now enjoys. Our most successful *Melaleuca* to date.
12. *Melaleuca densa*. This little-mentioned species has tolerated full exposure with equanimity and flowers profusely. The very similar *M. squarrosa* has not thrived in this situation.
13. *Melaleuca incana*. Fairly successful, but would have benefited by early wind protection. It flowers annually, but is small.
14. *Melaleuca nesophila*. This shrub also appreciates some wind protection. It is small, but flowers well, the blooms being suitable for cutting.
15. *Meiaieuca armillaris*. This shrub also appreciates protection from salt and wind. It is hardy enough to flower regularly, but has some yellowing of its leaves. Not a wind-break species under these conditions.
16. *Melaleuca styphelioides*. Successful behind a screen of tea-tree.

17. *Melaleuca elliptica*. The general success of the genus induced us to try this granite country species; it has had slow growth, but is managing to survive, though no flowers yet.
18. Western Australian *Melaleuca* species, currently unidentified, but related to *M. microphylla* and *M. minutifolia*. It is a low-growing, spreading shrub with terminal green flowers in late August, and very successful.
19. *Eucalyptus leucoxylon rosea*. This species appreciates wind protection, but certainly thrives if this is provided.
20. *Eucalyptus cornuta* (Yate). This is a successful species in Nelson, but here good soil and salt protection are needed.
21. *Acacia pravissima*. Grown with full protection, its performance to date is below expectations.
22. *Hakea laurina*. Our specimen stood up to full exposure, but took six years to flower. Protection is appreciated, and deep soil would be advantageous.
23. *Banksia integrifolia*. Early growth of small specimens was encouraging; flowering occurred in 4-5 years. Current growth is nearly static, with no further flowers, probably due to limestone intolerance.
24. *Banksia ericifolia*. Early growth was good, but no flowers yet and probably does not like these conditions.
25. *Banksia marginata*. This is the local species in the Lower Glenelg National Park. It looks healthy and is sprouting after two years.
26. *Banksia praemorsa*. Very satisfactory growth in two years. I am optimistic about this one.
27. *Albizia lophantha* flowers well at Nelson. It is straggly unless given wind protection.

Ground-storey Plants and Climbers

A number of these were planted; others were self-seeded.

28. *Pimelea ferruginea*, which is a great success.
29. *Correa reflexa*, highly successful.
30. *Calocephalus brownii* (Cushion Bush). Planted, but a local.
31. *Disphyma* sp. (Pigface), local to area.
32. *Senecio latus* (Variable Groundsel). Only tolerable as an annual, due to the untidy dead stalks produced.
33. *Anigozanthos flavidus* (Kangaroo Paw). Satisfactory.
34. *Tetragonia implexicoma* (Bower Spinach). A common and prolific local grown from cuttings. Tolerable if its growth and site are strictly controlled, it cascades over ugly brick walls, climbs over shrubbery and provides habitat.
35. *Clematis microphylla*. Self-seeded. Flowers under full exposure.
36. *Convolvulus erubescens*. Self-seeded.
37. *Kennedia prostrata*. Self-seeded and a great joy.
38. *Ajuga australis*. Self-seeded.
39. *Hibbertia australis*. Successful, a local plant.
40. *Helichrysum obtusifolium*. Successful, yellow flowered.
41. *Ptilotus macrocephalus*. Self-seeded.
42. *Bulbine bulbosa* (Bulbine Lily). Indigenous to the site.
43. *Viola sieberana*. Self-seeded. Comes up spontaneously in spots that catch water beneath other plants.

Bird Life Encouraged

The common species now attracted to the revegetation include blue wrens, silvereyes, yellow-tailed Thornbills, white-browed scrub wrens, grey fantails, grey thrush and New Holland honeyeaters, most of which are breeding there. We also have crimson rosellas, red-browed finches, owls, nankeen kestrels (interested in the bees), yellow-faced honeyeaters, eastern spinebills and spiny-cheeked honeyeaters, all as regular visitors, not forgetting the nearly tame magpies.

Acacia sophorae

Studies of *A. sophorae* and *A. longifolia* by David R. Murray
University of Melbourne Botany School, Parkville, Vic., 3052

Two Australian acacias which some consider to be varieties of a single species (e.g. Willis, 1972), have recently been distinguished by some of their biochemical characteristics and by the physical properties of their seedcoats. The two taxa are the well known Sydney Golden Wattle, *Acacia longifolia* (Andrews) Willd., and the Coast Wattle, *A. sophorae* (Labill.) R.Br.

Morphological features which may be used to differentiate between these two taxa include:

1. the generally shorter and broader phyllode of *A. sophorae*
2. the larger pod and seeds of *A. sophorae*
3. the greater degree of contortion shown by the mature, splitting pod of *A. sophorae*
4. the spreading habit often shown by seedlings of *A. sophorae*
5. the slower rate of germination and lower final percentage germination of *A. sophorae* seeds subjected to moist heat
6. the thicker and harder seedcoat of *A. sophorae*.

The properties of the seedcoats have been studied recently by Tran (1979). He found considerable differences in both deformation and crushing load, indicating that the thicker seedcoat of *A. sophorae* is also the stronger.

Obviously differences in the properties of the seedcoats (which constitute about 40% of the seed mass) may influence seed germination (see 5 above).

As a result of our recent studies of seed proteins and phyllode flavonoid composition (Murray, Ashcroft, Seppelt and Lennox, 1978), the following biochemical distinctions may be added to the above list of differences between the two taxa:

7. a more complex flavonoid pigment complement shown by phyllode extracts from *A. sophorae*
8. a greater number of albumin (water-soluble) storage proteins in seeds of *A. longifolia*
9. the presence of a distinctive globulin (salt-soluble) storage protein in seeds of *A. sophorae*
10. a lower average molecular size for the seed storage proteins (both albumins and globulins) of *A. sophorae*

While it might rightly be claimed that any individual characteristic such as phyllode shape is too variable to allow unequivocal identification, we have so far found that the flavonoid pigment composition of the phyllode is independent of variation in phyllode shape and so permits reliable identification. As a general rule, a ratio of length to maximum width of 6:1 or greater as suggested by Willis (1972) should indicate *A. longifolia*. In the past, the most compelling reason for regarding these taxa as distinct species has been their almost exclusive geographic distributions. *A. sophorae* is confined to the coastal sandy soils and dunes of S.A., Tasmania, Victoria, N.S.W. and Queensland. *A. longifolia* is not restricted to the coast; it is prominent in the tablelands of N.S.W. and occurs also in Victoria. The curators of Herbaria in S.A. (Eichler, 1965), Tasmania (Curtis, 1956) and Queensland (Pedley, 1978) have all held that *A. longifolia* is not native to their states, and that *A. sophorae* is a distinct species. There is abundant evidence to support that view in the studies reviewed here.

REFERENCES

- Curtis, W. M. (1956) — The Students Flora of Tasmania. Part 11. Government Printer; Tasmania.
- Eichler, H. J. (1965) — Supplement of J. M. Black's "Flora of South Australia".
- Murray, D. R., Ashcroft, W. J., Seppelt, R. D., and Lennox G. G. (1978) — Comparative Biochemical and Morphological Studies of *Acacia sophorae* (Labill), R. Br. and *A. longifolia* (Andrews) Willd. Aust. J. Botany 26, 755-771.
- Pedley, L. (1978) — A Revision of *Acacia* in Queensland. *Austrobaileya* 1, 75-234.
- Tran, V. N. (1979) — Comparative Study of the Effects of Microwave Energy on Strophilole, Seedcoat and Germination of *Acacia* seeds. Aust. J. Plant Physiology 6.
- Willis, J. H. (1972) — A Handbook of Plants in Victoria. Vol. II. Melb. Univ. Press.

Australian Plants for the Australian Country

Experiences in the N.S.W. Riverina by T. P. O'Rourke, Forester, Narrandera.

A wide variety of native plants ranging from the delicate Purple Mint Bush *Prostanthera ovalifolia*, to the leathery-leaved Four-wing Mallee *Eucalyptus tetraptera* can be grown throughout this area. The Forestry Commission at Narrandera has concentrated on raising seedlings of hardy native shrubs and trees, either indigenous to the area or from areas with a similar climate and rainfall. In fact, a look at the sowing list reveals about 20% of the species hail from Western Australia.



Eucalyptus ficifolia

Photography by W. Watkins

A beautiful tree growing in front of 98 Mitchelmore St., Wagga Wagga, the home of Mrs. D. J. McEwan. The tree was there when they moved in 16 years ago. It gets no fertilizer and only occasional watering. It has flowered regularly every year for 16 years, as regular as clockwork, one week before Christmas.

The Hardy Eucalypts

Natural timber cover of the Riverina is Grey Box (*Eucalyptus woollsiana*), Yellow Box (*E. melliodora*) and Cypress Pine associations and pure stands of River Red Gum (*E. camaldulensis*) (5:324) along the Murray and Murrumbidgee Rivers. Index references refer to previous issues of Australian Plants.

The climate is conducive to the growth of Western Australian eucalypts and a great range of this colourful flora has been introduced.

Strickland's Gum (*E. stricklandii* 5:118), Coral Gum (*E. torquata* 1:9), Brockway's Gum (*E. brockwayi*), Gungurru (*E. caesia* 1:8:25), Tall Sand Mallee (*E. eremophila* 6:192), Red Flowering Mallee (*E. erythronema*), Scarlet Flowering Gum (*E. ficifolia* 4:225), Kruse's Mallee (*E. kruseana*), Bushy Yate (*E. lehmannii*), Rose of the West (*E. macrocarpa* 4:300), and Four-wing Mallee (*E. tetraptera* 8:48), are only a small sample of the trees found.

Soil types are fairly critical for windbreak establishment. For light red sandy loams the following are suitable: Dwarf Sugar Gum (*E. cladocalyx* 'Dwarf'), Grey Box (*E. woolliana*), Yellow Box (*E. melliodora*), Green Mallee (*E. viridis*), Strickland's Gum (*E. stricklandii* 5:113) and Coral Gum (*E. torquata* 1:9).

For heavy soils a choice should be made from: Mugga Ironbark (*E. sideroxylon*), Yellow Gum (*E. leucoxydon* 6:196), River Red Gum (*E. camaldulensis* 5:324), Narrow-leaved Gimlet (*E. spathulata*), Salmon Gum (*E. salmonopholia*) and Black Box (*E. largiflorens*).

Top Twenty Species for the Riverina

The native species which have proved themselves for establishing woodlots and windbreaks include:

Dwarf Sugar Gum, Yellow Box, Mugga Ironbark, Strickland's Gum, Red Flowering Paper Bark (*Melaleuca hypericifolia*), Rosemary Grevillea (*Grevillea rosmarinifolia* 6:188), Lemon Scented Tea-tree, Queensland Wattle, Kurrajong (*Brachychiton populneum* 4:106), Narrow-leaved Gimlet, White Cypress Pine (*Callitris columellaris*), River Oak (*Casuarina cunninghamiana*), Belah (*Casuarina cristata*), Bracelet Honey Myrtle, Cootamundra Wattle, Coral Gum, Green Mallee, Brown Mallee (*Eucalyptus astringens*), Blue Mallee (*E. gardneri*) and River Red Gum.

The Acacias

The tried and trusted Cootamundra Wattle (*Acacia baileyana*) is the most popular of the Acacias. This fine leaf species is not only fast growing but seems to live in excess of twenty years. Many planters use it for windbreaks in a three row break, as well as for single specimen trees.

The Queensland Wattle (*Acacia podalyriifolia*) has broad silvery leaves and its profuse golden blossom is a picture in July, when most of the garden is rather drab.

Green Wattle (*Acacia decurrens* Vol. 5:148, 232), is probably the fastest growing wattle, and some trees have grown to twenty feet in two years.

Wallangarra Wattle (*Acacia adunca*) is one of the most attractive wattles with dense clusters of sweet-scented yellow flowers.

Other Acacias which thrive in the area are *Acacia buxifolia*, *A. decora*, *A. elata*, *A. pendula*, *A. spectabilis* (Vol. 8:153), *A. saligna* (Vol. 8:48) and *A. salicina* (Vol. 8:256). The latter (Cooba or Native Willow) is a particularly handsome tree for parks and large gardens. It is long-lived; I know trees which were large specimens some twenty-five years ago and are still thriving.

These species of *Acacia* are described and illustrated by sketches with some in colour in *Acacias of N.S.W.* by Inez Armitage available for \$7.50 plus 75c postage from the Editor.

The Bottlebrushes

The Bottlebrush or *Callistemon* family offers a wealth of floral beauty and many do well in the Riverina.

Red Bottlebrush (*Callistemon citrinus* Vol. 10:77), has dark green foliage and showy crimson flowers in Spring.

Scarlet Bottlebrush (*Callistemon macropunctatus*) also has short dark green leaves and showy scarlet blossoms.

Stiff-leaved Bottlebrush (*Callistemon rigidus*) is a very hardy, red flowering species, which thrives in the hotter areas.

The Pink Tip Bottlebrush (*Callistemon salignus*) is an introduced coastal shrub which has adapted well to the Riverina. The red flowering form is particularly attractive, as is the Drooping Bottlebrush (*Callistemon viminalis* Vol. 8:57), a small, pendulous tree with a glorious red blossom, and a favourite of mine.

(Pests, Diseases, Parasites and Predators) \$24.95 plus \$2.55 postage.

During 1980 this book is available by mail for \$23.00 post free from the Editor.

The Society has published this book in association with A. H. & A. W. Reed and it would be the finest book ever produced by the Society. This is what the Australian gardener has been waiting for. We do not want to kill off nature's mites willy-nilly, but learn to know them, how they fit into nature's plan and if they reach pest proportions, to control them. It is man who has upset the ecology of this planet and we must cease this senseless destruction of many forms of life and learn to live in harmony.

Full colour plates, hundreds of them, show these creatures, many with magnification, so that you can see what they look like. If you find tiny creatures on your plants, or if disease appears to have afflicted it, by comparing it with the illustrations in the book (a magnifying glass may be necessary) you can find out what they are, if in fact they are harmful, if any action is necessary, and if so, what you should do as a control. There will be more details in our next issue.

Frequent references will be made to this book in the future.

The 380 colour photographs of mites and diseased plants are presented in sections entitled (i) Pests associated with flowers, fruit, seed, leaves and shoots. (ii) Less harmful, harmless and beneficial small animals. (iii) Pests associated with twigs and small stems. (iv) Small animals associated with main branches and trunks. (v) Pests affecting collars and roots. (vi) Small animals associated with soil, compost and shelter. (vii) Free ranging small animals. (viii) Diseases affecting native plants.

Net Bushes

The *Calothamnus* group from W.A. are making quite an impact in the Riverina gardens. Four species grown at Narrandera all have their appeal and are drought hardy.

Giles Net Bush (*Calothamnus gilesii*) has sharp-pointed pine-like foliage and bright crimson flowers.

Crimson Cluster Net Bush (*Calothamnus quadrifidus* Vol. 2:269) has bundles of rich crimson stamens against deep green, pine-like foliage.

Blood-red Net Bush (*Calothamnus sanguineus* Vol. 2:269), has one-sided brushes of vivid tassel-like flowers. It enjoys sandy soils.

Woolly Net Bush (*Calothamnus villosus*) has soft, pine-like leaves and rich deep red flowers.

The Melaleucas

The many species of *Melaleuca* which thrive in the region include *Melaleuca bracteata*, *M. decussata* (7:33), *M. ericifolia*, *M. hueglinii*, *M. hypericifolia*, *M. incana* (5:293), *M. lateritia* (2:273), *M. linariifolia* (7:37), *M. nesophila*, *M. radula* (7:1), *M. wilsonii* (6:181), and even, on heavier soils in the Albury area, *M. styphelioides* (2:155).

The most widely planted *Melaleuca* species is the Bracelet Honey Myrtle (*Melaleuca armillaris* 7:32), also known locally as "Flax-leaf Paper-Bark". A beautiful, small tree with dense, dark foliage and masses of white flower in November, it has been grown extensively for screens in parks, for dense hedges which can be clipped short, and as single specimens.

Tea-Trees

Most gardens have a Tea-tree, usually the beautiful hybrids of *Leptospermum scoparium*. Other favourites are *Leptospermum flavescens* (8:60) and *Leptospermum petersonii*, the decorative Lemon-scented Tea-tree.

On sandy soils around Narrandera, the Coast Tea-tree *Leptospermum laevigatum* has thrived and spread. Two or three trees will make a good thicket.

The Warrumbungle National Park

The Flora as you will see it — by Rhonda Martin.

The Warrumbungle Ranges are situated about 520 km north-west of Sydney in central-west New South Wales and their spectacular scenery, wildflowers and animals make them a photographer's paradise.

What makes the vegetation of the Warrumbungle National Park so different is its diversity, caused by the volcanic ecology of the area. It has often been said that in the Warrumbungles east meets west, the meeting of the arid and humid climatic zones producing a wealth of plant life. To the west are the plains with their distinctive plants adapted to arid areas with those of the moist east coast overlapping in these Ranges.

Plants of the eastern sandstone, such as the Flannel Flower (*Actinotus hellianthi*) and Native Fuchsia (*Correa glabra*) have adapted well to the drier conditions. A boronia (*Boronia glabra*). Five Corners (*Styphelia triflora*) and Coast Whitebeard (*Leucopogon* sp.) have also made the transition.

Close to its eastern distribution limit, along Wambelong Creek upstream from Chalke's Mountain, Canyon Camp and Camp Blackman, is the Red River Gum (*Eucalyptus camaldulensis*). In the dry, thin sandstone soils the Wonga Vine (*Pandorea pandorana*) and the Native Indigo (*Indigofera australis*) have also adapted and thrive.

Found only in the Warrumbungle Ranges, and so newly discovered that they have not been given specific names, are a species of Black Eyed Susan (*Tetradlea*) and a Geebung (*Persoonia*). One wattle, *Acacia forsythii*, is found only on the protected side of Bluff Mountain. Common in the Warrumbungles, but regarded as uncommon elsewhere, is the green-flowered *Phebalium viridiflorum*. A hairy form of Mint Bush (*Prostanthera stricta*) has only been found in a gully on the track to Fan's Horizon.

In the deep cracks of hot, steep rock faces, in seepages and soaks, grow ferns and figs, while on the dry arid tops grows Triodia—Porcupine Grass—and the heath-like vegetation Whitebeard (*Leucopogon lanceolatus*) and the Fringed Heath Myrtle (*Micromyrtus ciliata*).

The mountains rise to 1,205 m above sea level, creating their own weather pattern. The average annual rainfall is about 950 mm (38") per year, measured in the middle of the park. On the eastern side, at Coonabarabran 37 km away, 700 mm (28") falls, while on the eastern side at Gummie they make do with approximately 550 mm (22") per year. All this makes for a great diversity in plant communities.

The steep, rocky upper slopes on which there is little soil produce a rapid run-off. Much of the benefit of this rainfall is lost at higher altitudes due to the high summer temperatures, often in the high thirties. A great deal is trapped in the narrow valleys, allowing species adapted to moister, cooler climates to survive and, indeed, to do well. In the winter, temperatures can drop well below freezing and it is not uncommon to see frost 5 m or more above ground level in the trees.

The underlying rock of the Warrumbungle Ranges is that of the Pilliga sandstone formed about 200 million years ago. The masses of jagged peaks are the remains of volcanic activity during the Miocene epoch, about 13.5-17 million years ago, in the middle of the Cretaceous era. In the early phases of activity lava overflowed on to the Pilliga sandstone. Trachytic flows were dominant in the west and north, while in other areas were basalt flows, and yet in others both.

Over millions of years the domes, dykes and plugs have eroded, giving this area its particular distinction of soaring peaks and rugged valleys. On many areas of the windswept tops the basic Pilliga sandstone is again showing through.



Prostanthera nivea

Photography by Peter Althofer

The Snowy Mint Bush is a shrub to 3m in the bush but can be kept lower in the garden. It is one of the many mint bushes with considerable horticultural potential that are recommended in our last issue and described in "The Cradle of Incense" available from the Editor for \$15.00 incl. postage.

For the purpose of this article we will leave the riverine community of Canyon Camp, with its River Oak (*Casuarina cunninghamiana*) association, and wander from Camp Pincham to the almost sub-alpine surface of Mount Wambelong, thereby going through most of the divers plant communities of the Warrumbungle Ranges, as illustrated in the Warrumbungle National Park.

On the alluvial flats of Camp Pincham, in soil washed from the steep hillsides surrounding it, can be seen the thick green foliage of the Rough Barked Apple (*Angophora floribunda*), its bark rough and furrowed, its branches twisted, and in season its flowers creamy and abundant. The tubular yellow-green flowers of the Native Fuchsia (*Correa glabra*) set off the bright yellow, five-petalled flowers of a small shrub, the Guinea Flower (*Hibbertia obtusifolia*) and the straw-coloured flowers of the Cough Bush (*Cassinia quinquefaria*).

For approximately the first 3 km the walk goes gently uphill against the flow of Spirey Creek, which for part of the year at least is dry. Many plants that grow in the Hawkesbury sandstone grow here, notably the green-tipped, cream-petalled Flannel Flower (*Actinotus helianthi*), Native Fuchsia (*Correa glabra*) and (*Correa reflexa*), etc. The slopes of the surrounding, protecting hills are moderate to steep, and due to erosion from the Tops the valley's soil is quite deep. Although protected from the sun and wind, the soil is generally quite dry.

In the spring carpetted between good stands of the Narrow-Leafed Ironbark (*Eucalyptus crebra*)—a tall tree with rough, deeply furrowed, brownish-black bark—and its associate the White Gum (*E. rossii*)—an attractive small tree with smooth, bluish-white bark, narrow lanceolate leaves and small white

flowers (the bark is sometimes marked with insect scribbles or flakey patches), the Flannel Flowers (*Actinotus helianthi*) run up the slopes in a white flame contrasting with the yellow flowers with red centres, borne on the branch ends, of the Eggs and Bacon bushes (Parrot Pea—*Dillwynia retorta* and Prickly Beauty—*Dillwynia juniperina*). Along Spirey Creek grows the somewhat straggly Blakely's Red Gum (*Eucalyptus blakelyi*) with its smooth, blotched bark, and the Red Stringybark (*E. macrorhyncha*), a medium-sized tree with reddish-brown rough, long-fibred stringy bark, the leaves being lanceolate and the flowers white.

The floor of this valley is a mass of subtle colour, but it has to be looked for. Crouched alongside the track can be seen the greenish tubular flowers of Five Corners (*Styphelia triflora*) on an upright shrub with pointed leaves; the delicate Spider Orchid (*Caladenia patersonii*) with its large, beautiful spider-like flowers, yellowish-green and red in colour, set on long, broad, hairy leaves; the Greenhoods (*Pterostylis curta*), a ground orchid with two joined petals and one sepal forming a hood; the yellow flowers in the distinctive shape of the Donkey Orchid (*Diuris platichia*) and the beautiful Sun Orchids (*Thelymitra pauciflora*). The numerous small white flowers on the shiny-leaved Sticky Daisy Bush (*Olearia elliptica*) and the straw-coloured flowers of the Cough Bush (*Cassinia quinquefaria*) are much in evidence. Towards Hurley's Campsite the deep red bell-shaped flowers of the Ruby Urn Heath (*Meibomius erubescens*) glow softly and the mauve and purple flowers of the Hovea (*Hovea lanceolata*) invite a photograph.

After passing the West Spirey Creek trail turnoff an excellent specimen of Banana Orchid (*Cymbidium canaliculatum*) is found growing in a tree. The leaves are rough, stiff, deeply channelled and sharply pointed. The flowers vary from greenish- to yellowish-brown, with deep reddish-brown spotting, and are the largest of the native species, being up to 1" across.

Further along the trail, between the Spirey View Lookout and Hurley's Campsite turnoff, Fivecorners (*Styphelia triflora*) is common. This plant's berries produce a drug which was alleged to have been used by the aborigines as a curative.

A number of ferns, including both Common and Rough Maiden Hair (*Adiantum aethiopicum* and *A. hispidulum*) and the soft tracery of the Necklace Fern (*Asplenium flabellifolium*) soften the contours of the rocks, clustering along the watercourse in nooks and crannies or in damp, rock-filled hollows.

Due to the steep slopes a much higher rainfall than the annual 950 mm precipitates in the valleys and gullies. This allows such plants as the Native Raspberry (*Rubus parvifolius*) and the Rusty Fig (*Ficus rubiginosa*), an olive-leaved, grey-barked tree, to grow. A good example of this fig can be seen in the spring above Hurley's camp. It is said that these plants are the remnants of a time when the area was almost a sub-tropical rainforest. The soil along Upper Spirey Creek has been enriched by the tufts and volcanic debris washed down from the surrounding slopes.

From this dry Eucalypt wood community the trail climbs steeply to the Dagda Shortcut and the plant communities change rapidly. The soil is thin, the steep slopes giving rainfall little purchase, but even though the soil is very dry there is a good covering of both Black and White Cypress Pine (*Callitris endlicheri* and *C. columellaris* respectively). These are upright, symmetrical pines, the Black having small, dark-green leaves keeled on the dorsal surface, while the foliage of the White is bluish-green and has no keel on the dorsal surface. The smooth, blotched bark of Blakely's Red Gum (*Eucalyptus blakelyi*) is once again in evidence and making an appearance is Dwyer's Mallee Gum (*E. dwyeri*), a crooked-trunked tree with white bark, blotched with greenish-blue patches and leaves up to 13 cm long. The Iron-bark and Cypress Pine Association has taken over from the white gum community of the valley floor.

Clinging to the sparse soil beneath the trees are the hardy acacias—Spearwood (*Acacia doratoxylon*), with its long, narrow leaves (up to 10 cm long by 3-5 mm wide), a tall shrub with golden-yellow flower spikes to 2 cm; Mountain Hickory (*A. penninervis*), a tall, erect tree or shrub with long, greyish-green phyllodes and globular yellow flowers; Sword Wattle (*A. gladiiformis*), with its slightly sickle-shaped leaves; Knife-leaved Wattle (*A. cultriformis*), with large golden flower heads and leaves triangular in shape. Also found are the greenish pendulous flowers of *Phebalium viridiflorum*, along with the toothbrush flowers of *Grevillea triternata*.

On from the Dagda shortcut turnoff is the Breadknife. This was a dyke that was formed through a crack in the wall of Crater Bluff. This can still be seen from the Grand High Tops.

On reaching Lugh's Hut, shaded by Cypress (*Callitris columellaris*), Mallee (*Eucalyptus dwyeri*), and with the appearance of the Scaly Phebalium (*Phebalium squamulosum*), an upright shrub with a scaly appearance, its leaves dull green above, silver below and brilliant yellow flowers, the distinct difference between this plant community and that of the valley along the creek is very obvious, in particular the stunting of tree growth and the thinning out of the understorey due to the altitude, exposure to wind and sun, and lack of soil depth. Whitebeard (*Leucopogon*), and the creamy-green bell-shaped flowers with pointed leaves of the Urn Heath (*Melichrus urceolatus*) are in evidence. From here, on to the Tops proper, Knife-leaved Wattle (*Acacia cultriformis*), Scaly Phebalium (*Phebalium squamulosum*), Fringed Heath Myrtle (*Micromyrtus ciliata*) and Tick Bush (*Kunzea ambigua*), a shrub or small spreading tree with furrowed fibrous bark and numerous small leaves and white flowers, provide what cover there is, with some stunted Cypress Pines (*Callitris columellaris*) and the white to mauve flowers of the *Westringia*. The view is magnificent and the visitor is sharing the heights with the Wedge-tail Eagle as he soars out over the jutting spires, the narrow dykes and ponderous plugs.

On the Grand High Tops the visitor is standing on the rim of the old volcano, of which Crater Bluff was the central vent. From here can be seen the river of rock coming towards the Breadknife from Crater Bluff, the dyke which formed the Breadknife. Belougery and Tooraweenah Spires are parasitic cones to Crater Bluff.

From here the track goes steeply downhill past Anna and Fiona Pinnacles to the basalt soils at Dagda Gap, where there is a great variety of eucalypts and many wildflowers such as the Guinea Flower (*Hibbertia obtusifolia*), Cough Bush (*Cassinia quinquefolia*), the violet flowers of the False sarsaparilla (*Hardenbergia violacea*), the Broad-leaved Pea (*Daviesia latifolia*) and the small abundant flowers of the Western Golden Wattle (*Acacia decora*).

The trail then continues towards Dow's Hut, in several places crossing over rock screes. Due to the water which collects beneath these screes there are a number of Rusty Figs (*Ficus rubiginosa*) and the bright green leaves of the Kurrajong (*Brachychiton populneum*) attract the eye.

A visit to Bluff Mountain from Dow's Hut is a must. The trail is steep and rocky. From halfway there is an excellent view of Crater Bluff showing the Hawaiian shield formation (i.e., the left side is much higher than the right, due to prevailing winds).

A large number of Grass Trees or Blackboys (*Xanthorrhoea*) grow on the cooler stretches of this track. Towards the top you may find Forsyth's Wattle (*Acacia forsythii*) in flower. This is a small shrub with its distribution restricted to this side of Bluff Mountain. Its branches are angular and often appear reddish; its leaves are narrow and upright. Attention should be given to the very sparse vegetative cover coming down to almost heath, although, almost surprisingly, Tick Bush (*Kunzea ambigua*), Fringed Heath Myrtle (*Micromyrtus ciliata*), Knife-leaved Wattle (*Acacia cultriformis*) and *Phebalium* are common. Descent is by the same route.

The trail from Dow's Hut to Ogma Hut is down a steep, volcanic ridge, very exposed. The soil is shallow and dry except for pockets caught against

dykes and plugs. As the trail descends towards Point Wilderness the north-west face of Bluff Mountain shows clearly the prismatic cooling of the lava. There are more scree slopes with their cover of Kurrajong (*Brachychiton populneum*), Rough Barked Apple (*Angophora floribunda*) and Rusty Fig (*Ficus rubiginosa*).

This ridge is mostly of the Ironbark/Cypress Pine association, with an understorey of Spearwood (*Acacia doratoxylon*), its long leaves and golden-flower spikes in contrast to the sickle-shaped leaves of the Sword Wattle (*A. gladiiformis*), the triangular leaves and large golden flower heads of the Knife-leaved Wattle (*A. cultriformis*). The spreading shrub, narrow leaves and small flowers of the Western Golden Wattle (*A. decora*) soften the often stark contours of the hills among the Stringybarks (*Eucalyptus macrorhyncha*) with their tattered bark and Dwyer's Mallee Gum (*E. dwyeri*).

Ogma Hut is on a narrow saddle with the base sandstone showing through. The soil is shallow with the Ironbark/Cypress Pine association, but the Cough Bush (*Cassinia quinquefaria*), Sticky Daisy Bush (*Olearia elliptica*) and Pinkwood (*Beyeria viscosa*), a small erect shrub with small yellow flowers and round, prominent fruit on long stalks, have adapted well to the thin sandstone soil.

The West Spirey Creek trail down to Camp Pincham is similar to the Upper Spirey Creek area, described earlier, and is a common koala sighting area.

The walk to Mt. Wambelong is a story of contrasts. It begins at Camp Burbie. This is a reasonably level area, the soil brown, mixed with stone debris. It cracks deeply when dry. White Box (*Eucalyptus albens*)—a medium to large tree with greyish-black, short-fibred bark and thick silver-grey leaves and white flowers—and the easily recognised Rough Barked Apple (*Angophora floribunda*), and the soft, white bark and long leaves (up to 25 cm) of the Butt Butt or Apple Box (*Eucalyptus bridgesiana*) are common. The Red Stringybark (*E. macrorhyncha*) and the Native Cherry (*Exocarpos cupressiformis*) are also abundant. The Native Cherry is an attractive small tree with fine, pendulous, yellowish-green to dark-green foliage, cream flowers and fruit, with an attractive red fleshy stalk.

Although the area from Camp Burbie to Danu Hut has the above trees, the actual floor cover is sparse, but Cough Bush (*Cassinia quinquefaria*), Sticky Daisy Bush (*Olearia elliptica*) and the tall shrub with long, narrow to broad, oblanceolate, sticky shiny leaves and three-winged red or purple fruits of the Giant Hop-Bush (*Dodonaea viscosa*) predominate.

Walking along what is commonly referred to as the Boulevard, good stands of Sticky Daisy Bush (*Olearia elliptica*) and the Hop-Bush are present. Once again, during the short, steep climb to Danu Hut, scree slopes are crossed with their attendant Kurrajongs (*Brachychiton populneum*). Koalas are often sighted around Danu Hut and on Lucas Terrace above the hut. The trail zig-zags its way up one of the scree slopes, where a number of ferns grow. After crossing Lucas Terrace, where the Hop-Bush (*Dodonaea viscosa*), Spearwood (*Acacia doratoxylon*) and the Knife-leaved Wattle (*A. cultriformis*) grow along with the alpine grass *Triodia*, the trail ascends the south-western side of the mountain.

The soil here is a mixture of tufts, breccias and flow materials. It is cooler on this side and the soil water is more or less constant, except in severe drought. The vegetation is relatively lush, with the Apple Box

Acacia decora

Photography by Phillip Moore

One of the many *Acacias* found in the Warrumbungle Mountains. The shrub as it grows in the scrub and the flowers are shown. You may learn more about many beautiful wattles by purchasing either "Acacias of N.S.W." for \$7.50 plus 75c postage, or "Acacias of South Australia" for \$8.00 plus 80c postage from the Editor.



Acacia decora

(*Eucalyptus bridgesiana*), Red Stringybark (*E. macrorhyncha*) and White Box (*E. albens*) interspersed with Grass Trees (*Xanthorrhoea australis*)—clumps of grass-like leaves on sturdy, blackened trunk with their flower spikes rising straight into the air; the smooth, soft Smooth Darling Pea, with its pinnate leaves and mauve pea-like flowers (*Swainsona galegifolia*); the Native Indigo (*Indigofera australis*), and the twining, attractive creeper False Sarsaparilla (*Hardenbergia violacea*). There are Tree Ferns (*Cyathea australis*), ferns and grasses, *Poa sieberana* being one.

The trees on the scree slopes are far from vertical and in some instances are almost horizontal, as these slopes are constantly on the move, approximately 1/100" per day under normal circumstances.

Many lichens and liverwort cover the rocks on this damp, southern side.

On reaching the flat top of Mt. Wambelong, the highest peak in the park, the change in vegetation from that of the side just traversed is startling. It is here, where both the Nandewar Ranges near Narrabri, and Mount Canobolas near Orange can be seen on a clear day, that the Grass Tree (*Xanthorrhoea australis*) and the Snow Gum (*Eucalyptus pauciflora*) grow side by side in the almost sub-alpine/dry heath surface. Whitebeard (*Leucopogon*) and the Fringed Heath Myrtle (*Micromyrtus ciliata*) are once again in evidence, with lichens, some stunted gums, Pinkwood (*Beyeria viscosa*) and Knife-leaved Wattle (*Acacia cultriformis*).

What is surprising is the number of daisy-type herbs—the Yellow Flowered Variable Groundsel (*Senecio laetus*) and the Rough Fireweed (*Senecio hispidulus*); the white flower heads and small leaves growing up the flower stem belong to the Camomile Sunray (*Helipterum anthemoides*); the white-flowered, woolly-leaved Sunray (*H. albicans*); the small, round yellow flower on a long stem of the distinctive Billy Buttons (*Craspedia uniflora*) and the small mauve-coloured herb which likes moist or shady spots, *Brachycome angustifolia*.

It will be seen by anyone who knows these mountains and their marvellous wealth of flora that the surface has not even been scratched. It will be pointed out that just driving down the main road in August and early spring will assault the eye with colour—the pink of the Boronia (*Boronia glabra*), the small whitish flowers and hairy stems of the small shrub Zieria (*Zieria aspalathoides*), the delicate mauve flowers of the Mint Bush (*Prostanthera nivea*), the rusty red of the Hop-Bush (*Dodonaea viscosa*) and over all, pulling all eyes, the incomparable Bluebush (*Acacia caesiella*), its narrow, pointed leaves and massed blooms of yellow all make a superb picture against a cloudless blue sky and the rugged peaks.

A prowl over old lava flows reveals brightly coloured lichens of orange, green and yellow, and the softer-hued heaths, Donkey and Spider orchids, the delicate Flax Lily (*Dianella*), the Fringed Heath Myrtle (*Micromyrtus ciliata*) with its minute flowers, the white-petalled member of the Lily family, Early Nancy (*Anguilaria dioica*), the Scaly Phebalium's brilliant yellow flowers and silver-bottomed dull green leaves (*Phebalium squamulosum*), the Knife-leaved Wattle (*Acacia cultriformis*), and in the nitrogen-deficient soils the insect-eating Sundews (*Drosera*).

A walk anywhere near the camping areas will reveal Daisies (*Brachycome*), the Yellow Paper Daisies (*Helichrysum braoteatum*) and the little Ground Orchids, Pinkies (*Caladenia carnea*), to name just a few.

Leaving by the western gate the bluish-grey, sickle-shaped leaves and golden-yellow flower spikes of Motherumbah (*Acacia cheelii*) and the feathery leaves and lemon-coloured blossoms of the Western Green Wattle (*A. deanei*) bid you a memorable farewell.

In conclusion I would like to suggest that you make a visit, armed with a reference book. It is well worth it.

FURTHER READING:

Warrumbungle National Park Plant List—provisional only, compiled by Gwen Harden—available to visitors.

"A Complete Guide to Warrumbungle National Park"—Alan Fairley, published by Murray Child.

"Warrumbungle National Park Handbook"—Alan Fox.

Mackinlaya macrosciadia

By DAVID HANGER

The genus *Mackinlaya* is endemic to Australia and consists of two species, *M. confusa* and *M. macrosciadia*. Both occur in Queensland, the former being restricted to the districts of Cook and North Kennedy, and the latter occurring in the districts of South Kennedy, Port Curtis and Wide Bay, as well as the two more northerly districts. Both species are found in the Rockingham Bay area of North Queensland.

I have seen very few plants of *M. macrosciadia* in cultivation in Brisbane, so the following notes are derived from very narrow experience.

In cultivation *Mackinlaya* are large herbaceous plants seldom growing more than 2 m and often only 1-1.5 m tall. The leaves are digitately compound and very similar to those of the Queensland Umbrella Tree (*Schefflera actinophylla*). At a glance, seedlings of *Mackinlaya macrosciadia* could be readily mistaken for Umbrella Tree seedlings. However, the leaflets on a mature plant of *M. macrosciadia* vary between 10 and 20 cm in length. Individual flowers are small and, from an ornamental viewpoint, rather insignificant. The inflorescence is interesting, as it consists of a compound umbel. Each flower is often followed by a small, rather flat blue berry 5-8 mm diameter containing usually one seed. In Brisbane the fruit matures about May-June. Seed viability is high and germination occurs after about 6-7 months if the seed is sown immediately the fruit matures.

In summer time, growth is steady but not prolific. The first flowering of plants occurred in the second year. Up to date, it has not been visibly affected by pests or diseases. My oldest plant — 4 years — while only about 1.2 m tall, has always been rather open in habit. It is growing in filtered sunlight underneath *Eucalyptus*, *Casuarina* and *Acacia* spp. in an acidic, loamy sand. It has tolerated quite dry conditions on several occasions without undue damage. Growth in full sunlight may reduce internode length and lead to a more compact shape. However, its tolerance to midsummer sun in Brisbane is suspect. Tip pruning could be tried, although I suspect this may not be very successful as some other species in the family ARALIACEAE do not always respond favourably to tip pruning. The use of a growth regulator such as Alar to reduce internode length and, possibly, to promote lateral branching, may improve the appearance of this plant.

Mackinlaya macrosciadia appears suitable as an understorey plant in cultivation. It may have potential as an indoor foliage plant.

Encyclopaedia Of Australian Plants

Rodger Elliot and David Jones.

The first in a series of volumes is now available at \$37.50 plus \$2.50 for postage and packing. For orders received before the end of 1980, this first volume will be sent post free to anywhere in Australia. It will make a magnificent present. Rodger Elliot has produced the series of articles on description, propagation and cultivation of Australia's wildflowers in "Your Garden". He established the Australflora Nursery and has since supplied the nursery trade with plants on a wholesale basis. He has produced other books. Rodger is, without a doubt, the most experienced and knowledgeable man actively engaged in the trade, on the horticultural use of our Australian Flora. He has a keen intellect to observe and translate his findings into practical, precise directions.

Why have I, the Editor of Australian Plants, directed this book review at the authors and not what is in the book? There are books and books and books on our Australian Flora, all with recommendations, all presenting the same subjects in various ways, some relying principally on glossy, often trick photography, to sell the product. The real value in this book is the basic advice on cultivation of our wildflowers by two of Australia's leading writers and practical gardeners. All well illustrated in fine colour printing.

What of David Jones? Those who have a copy of "Australian Ferns and Fern Allies" will know just how David researches his subject, adds practical know how, and then presents the subject in such a clear, precise, practical way. We are all indebted to two such gifted horticulturalists for this series of volumes.

But what does Volume 1 cover? Volume one is the introductory volume with all "the good guts". Volumes 2, 3 and 4 will follow at yearly intervals describing the plants from A to Z with specific advice on cultivation and propagation. — Editor.

BOOKS ON WILDFLOWERS

We have reorganised our procedures for the sale of books, any books currently in print by most publishers, to give better service. The aim is to provide a mail order service of books, postage free, with, in some cases, a discount. You may be able to buy the following books a little cheaper and some groups in the society are offering certain books at a bigger discount so if you want to shop around after reading my reviews, then do so. However the service we offer will be convenient and any small profit made is reinvested in the production of Australian Plants. You may pay a little more through this service but the donation, if you wish to look at it that way, will be well used.

The prices below are the recommended price you will pay at a book sellers unless a special price is noted. With the price of postage these days the discount offered is in fact quite significant. The books listed are recommended for the best value and treatment of the subject. Further books are to be added.

Order for Christmas presents now:

Books On The Flora (Some including fauna) Of Discreet Areas

For N.S.W.

"National Parks of N.S.W. — Mullins, Martin, Baglin	\$12.95 (\$12.00 for 1980)
"Flowers and Plants of N.S.W. and Southern Qld."	\$19.95
"The Cradle Of Incense", The Wellington Dubbo Area	\$15.00

For Queensland

"A Horticultural Guide to Australian Plants", Sets 3-6	\$12.00
--	---------

For Victoria

"Handbook to Plants in Victoria", Vol. 1, Willis	\$18.80
"Handbook to Plants in Victoria", Part 2, Willis	\$30.00
"Flowers and Plants of Victoria and Tasmania". To be reprinted shortly.	

For South Australia

"Flora of South Australia" — Part 1, Black	\$16.90
"Flora of South Australia" — Parts 2 & 3, Black	\$ 6.50
"Flora of South Australia" — Part 4, Black	\$ 3.00

For Northern Territory

"North Australian Plants," Harmer	\$ 8.00
---	---------

For Western Australia

"Flowers and Plants of Western Australia"	\$23.95
"West Australian Plants" — Beard	\$ 8.00
"West Australian Plants For Horticulture" — Part 1	\$ 8.00
"West Australian Plants For Horticulture" — Part 2	\$ 8.00

About Specific Groups of Plants

Orchids — "Australian Indigenous Orchids" — Dockrill	\$32.00
"Australian Native Orchids In Colour" — Cady	\$ 6.95
Ferns — "Australian Ferns and Fern Allies"	
— Jones & Clemesha	\$15.95
Eucalypts — "Eucalypts", Vol. 1, by Stan Kelly	\$22.50
"Eucalypts", Vol. 2, by Stan Kelly	\$22.50
Mint Bush — "Prostanthera" — "The Cradle Of Incense"	\$15.00
Wattles — "Acacias Of N.S.W." — Armitage	\$ 8.00
"Acacias Of South Australia" — Whibley	\$ 8.00
"Aquatic Plants Of Australia" — H. Aston	\$24.00
"Lichens Of South Australia" — Filson, Rogers	\$10.50

On The Cultivation Of Australian Plants For All States

"A Horticultural Guide To Australian Plants" — Sets 3-6	\$12.00
"Encyclopaedia of Australian Plants" — Volume 1	\$37.50 (\$33.00 for 1980)
Volumes 2-3 & 4 will follow in 1981, 1982, 1983.	

The Best Book On Pest and Disease Control In The Garden

"Friends and Foes In Your Australian Garden", F. D. Hockings	\$24.95 (\$24.00 for 1980)
---	----------------------------

On The Australian Fauna

"Butterflies Of South Australia" — Fisher	\$ 9.50 plus \$1.50 postage
"Crustaceans Of South Australia" — Hak	\$ 5.50 plus \$0.50 postage
"Fishes, Marine & Freshwater Of S.A." — Scott	\$ 9.20 plus \$1.40 postage
"Freshwater Fishes Of South-eastern Australia"	\$19.95 plus \$1.05 postage
"Australian Shells"	\$25.00 plus \$1.60 postage
"Birds Of Australia"	\$19.95 plus \$1.65 postage
"Birds For Beginners"	\$12.95 plus \$1.25 postage
"Field Guide To Australian Shells"	\$14.95 plus \$1.25 postage
"Gemstones In Australia"	\$14.95 plus \$1.25 postage
"Reptiles And Amphibians of Australia"	\$29.95 plus \$2.05 postage
"Waterfowl In Australia"	\$18.95 plus \$1.85 postage

Ornamental Flowering Shrubs In Australia

by Ramond J. Rowell.

Available by mail from the Editor for \$19.95, post free for orders received in 1980.

The author, Head of the Division of Horticulture of the Ryde School of Horticulture for many years, is experienced in practical ways, in the need for adequate information on those flowering shrubs that will grow in the gardens of Australia. He has divided Australia into Climatic Zones and for each plant he has listed 9 categories that he gives advice upon: common and botanic names, family and genus, propagation methods, soil aspect and climate, pruning and description. As the book describes all shrubs suitable for Australian Gardens, there is limited space for Australian plants but, for instance, it describes 18 species of *Acacia* and 7 species of *Prostanthera*.



Austraflora

THE NURSERY WITH
'NATIVE KNOW HOW'

BELFAST ROAD, MONTROSE, VICTORIA

PHONE: 728-1353

Mon.-Sat. 9-5.30 p.m.

Sun. 10-5.30 p.m.

NEWCASTLE
REGION

NORTHRIDGE COTTAGE

NATIVE PLANT NURSERY (049) 87-2397

RANGERS ROAD RAYMOND TERRACE, N.S.W. 2324
on the Western Shore of the Grahamstown Dam.
Turn East off The Pacific Hwy., 4 km North of the Town



WIRREANDA Wholesale Nursery

QUALITY—VARIETY—VALUE

Over 20,000 Native and Exotic

Trees, Shrubs & Indoor Plants

Public and Trade Welcome

Open 7 days — Send S.A.E. For List

169 Wirreanda Rd, Ingleside, NSW 2101. Ph: 450-1400

DEANES ORCHID NURSERY

Specialising in Australian Native Orchids

Please send for descriptive list. Plants sent anywhere.

Nursery closed Friday — Phone (02) 651-1798

29 HEMERS ROAD, DURAL, N.S.W. 2119



FOREST NATIVE NURSERY

CATALOGUE AUSTRALIAN
NATIVE PLANTS FOR
N.S.W. GARDENS

\$3.50 posted

9 Namba Rd, Duffy's Forest, NSW 2084
(beside Waratah Park), (02) 450-1785

LAKKARI NATIVE PLANT NURSERY

(Lakkari means Banksia
Integrifolia)

RUSSELL and SHARON COSTIN. *Retail & Wholesale
Growers of Native Trees, Shrubs, Ground Covers and
Creepers — Also Ferns, Palms, Cycads, Indoor Plants
Specialists in Honey Flora*

*Many selected Natives unique to Queensland as well
as new cultivars and hybrids.*

477 REDLAND BAY ROAD, CAPALABA, QLD. 4157
Open 6 days (closed Sat. only) — Ph: Bris. 206-4119

TASMANIAN FOREST SEEDS T. WALDUCK

'Summerleas Farm' Kingston, Tas 7150

All Tasmanian Tree Species and
Ornamental Shrubs.

Send S.A.E. for free list.

Sales by packet or in bulk

BUNDARA NATIVE NURSERY

37 Carters Rd., Dural, Sydney, 2158

Specialising in grevilleas

Open Weekends

Weekdays please ring first.

Telephone Sydney 651-1962

PRESERVATION BY CULTIVATION

Closed Tuesdays

FLORALANDS

KARIONG, via GOSFORD, N.S.W. 2250

A large variety of the most popular native plants at nursery

PHONE: Gosford 40-1142

Send \$1.50 for descriptive catalogue.

UTINGU NATIVE PLANT NURSERY

WHOLESALE AND RETAIL

Suppliers of: TREES, SHRUBS,
GROUNDCOVERS, FERNS AND
HANGING BASKETS.

37 Sorbiston St, Wellers Hill, Qld 4121

Open 7 days—Phone: (07) 397-5706

BELBRA NURSERY

In the heart of the Grampians

LARGE RANGE OF AUSTRALIAN
NATIVES

Closed Wednesday only

BOX 12, HALL'S GAP, VIC. 3381

MICHIE'S KENTLYN NATIVE PLANT NURSERY

Specialising in Australian Plants

Beth & Bob Mische invite you to call
on 96c George's River Road, Kentlyn,
N.S.W. 2560. Phone (046) 25-1583.

Closed Tuesday and Wednesday only

LANDSCAPING WITH AUSTRALIAN NATIVE PLANTS

by

BANKSIA NURSERIES P/L

Waratah Highway, Elliott,
Tasmania, 7325Grower of rare and more common
Australian Native Plants. Available in
most sizes at certain times of year,
advanced and tube lines a specialty.

Send 28c stamp for list

Open 7 days a week, 9-5

Phone (004) 36-3128

Cranebrook Native Nursery

R23 Cranebrook Rd., Cranebrook, NSW

4 miles north of Penrith, between
Tadmire and Taylor Roads.

Open 10 a.m.-6 p.m. Closed Sundays

(047) 77-4256 — No Mail Orders



NINDETHANA SEED SERVICE

LARGEST SELECTION OF NATIVE SEED IN AUSTRALIA

SEND 20c STAMP FOR FREE CATALOGUE

AVAILABLE IN 50c pkts, gram lots or kgs.

ADDRESS: NINDETHANA, NARRIKUP, W.A. 6326

DAVID & MARGARET'S NATIVE FLORA

We have thousands of plants for your
selection. Set amidst acres of landscaped
garden areas. Located two
miles past Woorti Yallock at Braeside
Drive Launching Place, Vic.

(059) 64-7631, THURS. to SUN.

(Established 1974)

WIRRIMBIRRA

Hume Highway, between Tahmoor and
Bargo, N.S.W. 2574

AUSTRALIAN PLANTS

Wide Range—Phone (046) 84-1112

OPEN SEVEN DAYS A WEEK



COLLECTORS' NURSERIES NATIVE PLANT SPECIALIST

Cnr BELLEVUE CRES and SEAFORD RD SEAFORD

Vic. 3198

Huge selection from ground
cover to trees, rare and the
common, sizes large or
small.

Open Saturday and Sunday

(Closed Mon. and Tues.)

NANGANA NATIVE PLANT NURSERY

COCKATOO-WOORI YALLOCK ROAD

6.4 km from Cockatoo, Vic.

Large range, including over 100 Grevilleas
(5 cm to bucket size)

PHONE: (059) 68-8337

Open every day except Tues. and Wed.

(also closed June and July)

GRASSTREE

NATIVE PLANT NURSERY

Brown's Rd., Rosebud S. Vic., 3939

(Opposite Hyslops Rd.)

10 a.m. to 5 p.m.—Wed. to Sun. Inc.

Over 1000 Species in Propagation.

Nursery in Natural Bushland Setting.



FAIRHILL NURSERIES

Growers of
Australian Native Plants

FAIRHILL ROAD, YANDINA, QLD., 4561

Phone (071) 46-7193 — P.O. Box 100

Trees, shrubs, ground covers, climbers, ferns, palms and orchids for
the sub-tropical and tropical east coast. Most species offered for
sale are growing in our extensive display gardens. You are welcome
to browse through at any time between 8.30 a.m. and 5 p.m. any
day but Christmas day. Catalogue \$1.50 posted. Wholesale & Retail.

Past Issues of "Australian Plants" Available

Because of the vast wealth of our flora there is very little repetition, each volume becoming a valuable reference book in itself. Each volume has a separate abridged index, but a composite index of volumes 1-8 incl. is available for \$2.00 plus 50c postage.

It is intended to maintain all volumes in print in bound hard-cover form, beautifully presented with gold-lettered green vinyl covering. Each volume has bound with it another Society book as indicated below and is available for \$15 plus 50c per vol.

- VOLUME No. 1. Issues 1-12 — to be reprinted in 1980. Watch for announcements.
- VOLUME No. 2. Issues 13-20, no longer available — to be reprinted in 1981.
- VOLUME No. 3. Issues 21-28, bound with "Catalogue of Cultivated Australian Plants".
- VOLUME No. 4. Issues 29-36, unavailable for 6 months until more copies are bound.
- VOLUME No. 5. Issues 37-44, bound with "The Language of Botany".
- VOLUME No. 6. Issues 45-52, with "West. Aust. Plants for Horticulture—Part II".
- VOLUME No. 7. Issues 53-60, bound with "North Australian Plants".
- VOLUME No. 8. Issues 61-68, bound with "The Cradle of Incense".
- VOLUME No. 9. Issues 69-76, bound with Aust. Plant Names in March, 1980.
- VOLUME No. 10. Issues 77-84. Each issue to date available at \$1.00 post free.

Other Books Published by the Society:

- "AUSTRALIAN INDIGENOUS ORCHIDS" by A. W. Dockrill, \$30.00 including postage. The only complete reference to Australian epiphytic orchids and tropical terrestrials.
- "WEST AUSTRALIAN PLANTS", 'A descriptive catalogue' by Dr. J. S. Beard, \$7.50 plus 60c postage. The only complete reference to the flora of Western Australia.
- "WEST AUSTRALIAN PLANTS FOR HORTICULTURE", Parts 1 & 2, by K. Newby, each \$7.50 plus 60c postage. A valuable guide to the plants with horticultural potential.
- "NORTH AUSTRALIAN PLANTS", by Jenny Harmer, \$7.50 plus 60c postage. The most comprehensive reference to plants of the Darwin area available.
- "CRADLE OF INCENSE", 'The Genus *Prostanthera*' by G. W. Althofer, \$15.00 plus 60c postage. The only reference to our Mint Bushes.
- "THE LANGUAGE OF BOTANY", by C. N. Debenham, \$6.00 plus 60c postage. An outstanding reference to botanical terms with examples from Australian flora.
- "AUSTRALIAN PLANTS INDEX"—Vols. 1-8", A comprehensive index to all species, authors, etc., \$2.00 including postage.
- "A HORTICULTURAL GUIDE TO AUSTRALIAN PLANTS" — Large colour plates of species with information on the rear, for filling in a ring Binder. Sets 3-6 (32 sheets each set) @ \$3 per Set. (Sets 1 & 2 out of stock). Special Binders (hold approx. 160 sheets) @ \$3 each. All prices include postage.
- "ACACIAS OF NEW SOUTH WALES", by I. Armitage. All N.S.W. wattles described and illustrated by sketches and colour, \$7.50 plus 75c postage.

The Society for Growing Australian Plants

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

The Society offers many services in all States, such as meetings, instruction, shows, field outings, seed, propagating aids and friendship, much on a mail basis for those who cannot or do not wish to attend meetings.

Enquiries for membership should be directed to:

SOCIETY FOR GROWING AUSTRALIAN PLANTS—N.S.W. REGION:

President: Mr. Hugh Stacy, 16 Boovong Avenue, Lugarno, N.S.W., 2210.
Secretary: Mr. Ray Page, P.O. Box 298, Riverwood, 2210.

SOCIETY FOR GROWING AUSTRALIAN PLANTS—QUEENSLAND REGION:

President: Mrs. N. Chopping, 5 Luss Street, Moggill, 4070.
Secretary: Mrs. R. Reid, P.O. Box 809, Fortitude Valley, Qld., 4006.

SOCIETY FOR GROWING AUSTRALIAN PLANTS—SOUTH AUSTRALIAN REGION (Inc.):

President: Mr. P. McEntree, 12 Grafton Street, Belair, 5052.
Secretary: Wynn M. Spier, Box 305, Unley, S.A., 5061.

SOCIETY FOR GROWING AUSTRALIAN PLANTS—TASMANIAN REGION:

President: Mr. H. L. Dodson, 28 Balaka St., Rosny Pt., Tas., 7018.
Secretary: Mrs. Chris Howells, "Gwastadnant", Sandfly, Tas. 7104.

SOCIETY FOR GROWING AUSTRALIAN PLANTS—VICTORIAN REGION:

President: Mr. R. G. McDonald, P.O. Box 9, Upper Ferntree Gully, Vic., 3156.
Secretary: (Sister) E. R. Bowman, 4 Homebush Crescent, Hawthorn East, Victoria, 3123. Please do not call at private home—enquiries by telephone or mail only.

SOCIETY FOR GROWING AUSTRALIAN PLANTS—CANBERRA REGION:

President: David McKenzie, 13 Lincoln Close, Chapman, ACT., 2611.
Secretary: Mrs. E. V. Stanford, P.O. Box 207, Civic Square, ACT., 2608.

WEST AUSTRALIAN WILDFLOWER SOC. (Inc.):

President: Mr. John Colwell, P.O. Box 64, Nedlands, W.A., 6009.
Secretary: Miss R. Sainsbury, P.O. Box 64, Nedlands, W.A., 6009.

"AUSTRALIAN PLANTS" IS AUSTRALIA'S NATIONAL PRESERVATION JOURNAL (A non-profit making venture, produced quarterly, dedicated to preservation by cultivation)

PUBLISHING SECTION FOR SOCIETIES—Produced as a non-profit venture.

Managing Editor: W. H. Payne, assisted by P. D. Leak, N. Page, B. Kennedy, N. Smith and H. Jones. Do not telephone or call at private home—enquiries by mail only.

NON-MEMBERS: You may receive the next 4 issues direct to your home by forwarding an annual subscription of \$3.00. Overseas subscription \$4.20 Aust., £2.80 in English currency or \$6.50 U.S. Send to The Editor, "Australian Plants", 860 Henry Lawson Drive, Picnic Point, N.S.W., 2213.

COPYRIGHT — All material copyright as directed by authors.



Banksia collina

A shrub to 2 metres with attractive flowers in a spike length to 14 cm. The flower colour varies from yellow to deep red. There is some confusion over the correct name and readers are referred to the Banksia Study Group Report 5 below.

STUDY GROUPS

Study Groups comprise people who are interested in carrying out simple studies in their garden of certain species of plants. No special experience is needed. Members advise each other, exchange seed and plants, etc., under the guidance of a leader. The next issue, being the first of a volume, will list these groups for your advice.

Banksia Study Group — Trevor Blake, 12 Little John Ct., Vermont, 3133, Victoria.

Unlike other study groups this group has no membership subscription or lists, but the leader corresponds with any one who can help in the study of this fine group of plants. It operates entirely on the proceeds of its reports. Report 5 (48 pages) is now available at \$3.00 per copy plus 50c postage. The report clarifies the *B. spinulosa*, *B. collina* and the *B. marginata*, *B. canei* groups; provides detailed descriptions of 16 undescribed forms including 7 of the *B. sphaerocarpa* complex; and provides reports on trials at various localities, watering over summer and seed sources. Reports 1 and 2 are out of print, reports 3 and 4 are \$1.50 each. Any information on the cultivation and propagation of unusual forms of *Banksia* is welcome.