

Australian Plants

Registered at G.P.O., Sydney, for transmission
by post as a periodical.

DECEMBER, 1965

Volume 3, No. 25

Volume 3 will comprise issues No. 21-28.
Price 3/-



Photography by H. A. Morrison

EPACRIS IMPRESSA

The State floral emblem of Victoria where it grows in abundance with a colour range from white through the pink shades to bright red.

BEAUTIFUL NATIVE BIRDS FOR YOUR GARDEN—Page 203
WILDFLOWERS FOR PLANTING IN GARDENS NEAR THE SEA—Page 205

CONTENTS OF THIS ISSUE

EPACRIS—the theme. The plant family *Epacridaceae* is introduced and the more closely allied plants (genera) to *Epacris* in the tribe *Epacrideae*, are illustrated. The 30 species in the genus *Epacris* are then described, illustrated with sketches and colour plates and compared in a key.

For the layman impatient with descriptions of many species, an article on their propagation and cultivation is interposed on page 197.

CASUARINA—The Australian Oaks. These beautiful trees are introduced on pp. 228 where all Australian species are listed with an index to their references. A feature of these articles is the key to the Eastern species in which the author uses features discernible to the layman, with excellent sketches.

ORCHIDS—*Dendrobium ruppianum*, its cultivation and a review of nomenclature, pp. 223. *Corymborkis veratifolia*. The only Australian species is described, pp. 227.

HIBISCUS TILIACEUS—The Cottonwood as a shade and street tree—Page 219.

EUCALYPTUS—On Clay Soil near Newcastle by D. D. Morris—Page 209.

BIRDS AND A WILDFLOWER GARDEN—How to attract those beautiful wild birds—Page 203.

WILDFLOWERS OF CENTRAL AUSTRALIA—Plants of the Saltbush family, *Chenopodiaceae*—page 222.

GROWING WILDFLOWERS

Not the last or least important subject but the objective of the whole publication. Each article is presented to enable the reader to understand our wildflowers and assist in their cultivation in the home garden. Each issue also deals with a different aspect and in this issue special mention is made of:—

GROWING WILDFLOWERS—Their propagation and cultivation and with special reference to *Epacris*—page 197.

WILDFLOWERS FOR THE SEASIDE—The problem is defined, page 205 and suitable plants listed, page 207.

FROST HARDY NATIVES—The results of research are given on page 207.

ROCKERY PLANTS—Suitable plants from Kangaroo Is. are described, page 218.

Have you purchased your copy of "WEST AUSTRALIAN PLANTS"

This is the first comprehensive book on the amazing flora of Western Australia ever to be published. Special mention must be made that the thousands of plants listed are presented in as concise a form as possible with prominence to the features that those who wish to grow them will want to know. Available in a limited number at the low price of 12/- plus 1/6 postage, send to the Editor for your copy without delay.

OUR PUBLICATIONS . . . AVAILABLE FROM EDITOR BY MAIL ONLY

360 Henry Lawson Drive, Picnic Point, N.S.W. — Please be patient for a reply.

AUSTRALIAN PLANTS

The annual subscription of 12/- includes postage of the next 4 issues to your home. Past issues 1-8 & 18-21 are available as individual copies at 4/- plus 5d. postage. Some issues 9-17 are out of print and are available only in the bound volume.

AUSTRALIAN PLANTS—Volumes 1 & 2. Price £3/- each plus 2/- postage.

Volume No. 1 comprises issues 1-12. It will shortly be a rare out of print book. 350 pages, 75 sketches and 45 full colour plates. Out of print until February when a limited number will be available for the last time.

Volume 2 comprises issues 13-20. Bound in the same volume is the publication *Descriptive Catalogue of West Australian Plants*, see below, giving this volume its exceptional value.

These volumes are beautifully presented in gold lettered, hard covers and include *The Language of Botany*, see below.

DESCRIPTIVE CATALOGUE OF WEST AUSTRALIAN PLANTS. Price 12/- plus 1/6 post & pack.

This book lists all the wildflowers indigenous to Western Australia, giving for each species, kind of plant, general size, flower colour, flowering months, localities of occurrence and type of soil and/or vegetative type. Illustrated with many full colour photographs and supplemented by articles such as "Planning, Making and Growing A Native Garden", "Notes on Growing W.A. Plants", "Recommended Subjects for the Beginner", "Propagation", etc., it is fantastic value. Available in October, 1965.

BINDERS

For filing issues of *Australian Plants*—plastic covered stiff cover—gold lettered. Price 12/- plus 1/- postage.

EPACRIDACEAE

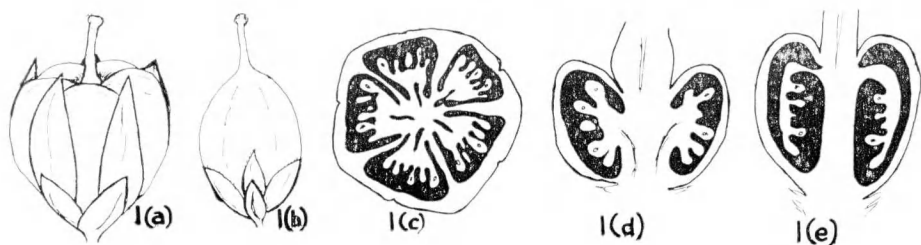
A SERIES ON THE FAMILY by BETSY R. JACKES

The *Epacridaceae* is an interesting family, its members being commonly referred to as Australian Heaths, because of the similarity to the European heaths and heathers. Probably the best known species is *Epacris impressa*, the floral emblem of Victoria.

Although the family has no economic importance except for garden plants, it is interesting to note a report by Sleumer (1964) concerning *Styphelia malayana*: "a decoction of leaves and roots is drunk for stomach ache and pain all over the body. In Banka the fibre (i.e. the inner bark) is used to make canoes waterproof."

It was on Captain Cook's second voyage that several members of the family were first collected by J. R. Forster and his son. These species were described and placed in the genus *Epacris*, a word derived from the Greek meaning "on the hilltop", referring to the habitat of several species. Unfortunately the Forsters did not record the precise locality.

It was Robert Brown in 1810 who first described the family *Epacridaceae*. He divided it into two tribes based on characteristics of the fruit; the *Epacrideae* and the *Styphelieae*. The fruit of the *Epacrideae* is a capsule in which the ovules are normally attached to placentas arising from the middle of the central column. However in two genera, (*Richea* and *Dracophyllum*) the placentas are attached at the summit. This has been the main character used for placing these two genera in a separate tribe. In the *Styphelieae* the fruit is a drupe, but it sometimes separates into nutlets as in *Trochocarpa*.



The family bears a close resemblance to the *Ericaceae*, the European heath family, but the characteristically simple often rigid leaves with palmate venation usually serve to distinguish it. In appearance this venation pattern is very similar to the open parallel venation of the Monocotyledons. This forms a basis for the popular method of identification, that is, to look for a dicotyledon with parallel venation. It is wise to handle most plants with care as the leaves have a habit of possessing pungent tips!

The flowers are regular with the five petals fused for a variable distance. Alternating with the corolla lobes are five stamens, which in most species are epipetalous. The anthers vary from those of the *Ericaceae* in that they contain two pollen sacs as against four in the latter. With the exception of *Sprengelia* all species possess small nectaries at the base of the ovary, which produce variable quantities of nectar, two of the most prolific species being *Melichrus procumbens* and *Acrotriche serrulata*. The chief flowering season covers the period July to January, but quite a number seem to flower almost continuously.



Photography by M. Baldwin

EPACRIS PULCHELLA

The *Epacridaceae* are predominantly Australasian although a few genera occur as far north as southern Thailand and Hawaii, with an atypical genus in S.W. South America. In Australia the richest development is in the south-eastern states, Tasmania, and the south-western corner of Western Australia. Only a few genera are found in the Tropics.

Most species prefer acid soils, particularly those of sandstone or granite extraction. Moisture conditions may vary considerably, some species occur in swamps, whilst others are growing on rocky, well-drained hillsides. A wide range of temperature and light intensity is covered. Some are found in hot dry open areas of the tropics, e.g. *Melichrus adpressus* around Herberton, N.Q., some in rainforests such as *Trochocarpa laurina*, whilst others occur in cold montane areas, such as species of *Archeria* and *Richea*. Except for those in or on the fringe of rainforests the majority prefer open areas, probably indicating a fairly high light requirement. Mycorrhiza are essential to most species, if not all. How dependent the plants are on this mycorrhizal association

(Continued on page 198)

GROWING WILDFLOWERS

WITH SPECIAL REFERENCE TO THE PROPAGATION AND CULTIVATION OF EPACRIS

An Introduction by the Editor—

The cultivation of *Epacris* is easy for a beginner. A wide range of normal garden conditions and soil is suitable as long as it is remembered that most species are lovers of moist heathland conditions, often hot and dry above, but cool and moist below ground level. Hence that damp or moist spot in the garden should be ideal. To achieve cool ground shade, plant in association with other plants and you will be rewarded with bright free flowering spikes in winter while the rest of the garden is only just stirring in preparation for spring.

The very long flowering period and the variety of flower and spike form make *Epacris* a valuable acquisition to the discerning gardener seeking a relief in form in amongst other small shrubs. The spikes of *Epacris impressa* heavy with their red, pink or white bells may be the queen of the heaths, but the sprays of pendulous flowers of *Epacris longiflora* will reach higher providing the setting and the lances of white *Epacris microphylla* are not to be outdone in form, often bent, as though from a violent fray, but defiantly erect.

Two large plants of *Epacris longiflora* have flourished for many years in a section of my garden that is rarely watered and is very well drained. Their survival has been possible because of giant boulders nearby. *Epacris* love to grow in rock crevices. Other species in my poor bush sand garden survive only when they receive adequate water. More vigorous bushes can be obtained in heavier soil, with cool root runs.

The principal obstacle to good healthy free flowering bushes is the gardener who is too timid to prune heavily. On reflection, most native plants require the garden conditions described, good soil (for best results, but almost any soil that is not limed and is drained, not water logged, deepdown), a cool root run, moisture on the ground and not on the plant (unless watered after sundown), water that has penetrated deep down encouraging deep roots and not just surface roots, and heavy pruning after flowering.

Propagation by Cuttings

Select pieces 2-2½" long, less than one year old and from just below the soft tips, during May or while the plants are in bloom. Foliage is cleanly stripped from the lower half and any flower or large buds removed. Cut anywhere on the stem as nodes are quite numerous. Plant in a pot prepared for cuttings with or without rooting hormone and keep the pot moist in a well shaded cold frame. I use an open fruit case sitting on two bricks in the filtered shade of a *Casuarina*.

Other issues fully describe simple but effective cutting boxes and methods of propagation for beginners, but the above guide is adequate using the following cutting pot mixture:— Coarse crock 4-5 inch pot. Cover with a layer of milled sphagnum moss, 1 inch deep, then fill to within ½" inch of the top with a 1:4 mixture of peat moss and sharp granite gravel (1/8in. to ¼ in.). Top this with fine sharp sand.

Propagation by Seed

Seed must be after-ripened (by storing) for 12-16 weeks in a cool dry room. Prepare a container (plastic or metal) with very poor drainage and

filled with coarse washed sand. The seed is sown on the surface and must be kept moist by frequent watering.

Self Grown Seeds by H. Brackpool

If you know a spot in the bush where many of our shorter native shrubs are growing thickly in bush sand, and if you know the owner, you may be able to acquire a little of the top soil underneath where the flowering is, or has been most abundant. This can be treasure trove.

If you use this top three inches in your pots to strike your cuttings, which are watered more or less daily, all sorts of native shrubs will come up, from time to time, alongside them. Personally, I never destroy any such seedlings until I find out what they are, but, when they are about an inch high, I plant them all over the garden in odd spots to await developments.

When transplanting young self sown seedlings of native shrubs from your pots it pays to do so in the cooler months, and to take them early with a flat trowel so that you make sure that you get down deep enough to have all the root without any interference. A lot of the deaths from damping off seem to me to be due to root disturbance when moving plants. This is why it should be better when planting seeds in pots, for the private grower, to put only one or two into each pot, and eventually to transplant just as they are to let the stronger survive.

Growing Epacris

Epacris pulchella: I have found that this shrub will grow and flower both in sand or in heavier clay based soil. The seedlings will propagate themselves using the above method.

Epacris purpurascens will also come up itself, but preferably if a little of the bush sand, from its home spot, is thrown onto the top of the sand already in your rockeries or beds. It makes a most attractive shrub, and is worth having despite its prickly nature. It does not seem to grow in clay based soil and has larger tubular blooms than *E. pulchella*.

E. microphylla is harder to succeed with but, like *E. purpurascens* it seems only to grow in bush sand for me and is not as successful as the two previously mentioned.

E. longiflora will grow in ordinary soil but gets very tall and straggly in that medium.

EPACRIDACEAE—continued from Page 196

has not been established, but where difficulty is experienced in growing members of this family, it may to some extent be due to absence of the mycorrhizal association. Very little is known about the fungal species involved, which can be transported by the soil.

TRIBE EPACRIDEAE

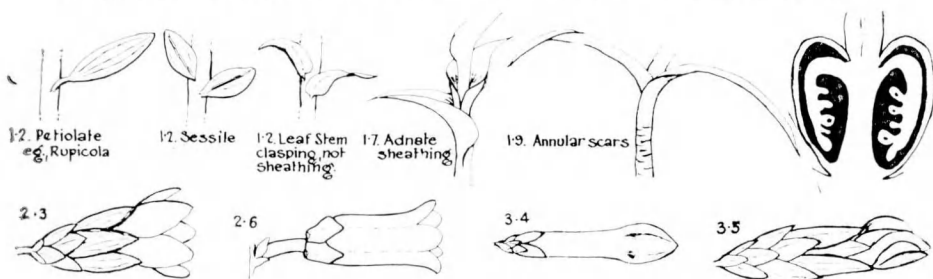
The characteristic features of this tribe are: style inserted in a depression at the top of the ovary; several ovules in each loculus of the ovary; a capsular fruit.

Germination of seeds is relatively easy as described by W. Quick (*Australian Plants* 2:15). I suspect a dormancy period for the seed but have not confirmed this. Fruits are collected when ripe. The shape of these fruits is shown in a sketch with the fruit of other genera in the family. They are collected when ripe. When are they ripe? This depends on when the flowering period is finished and as this is extended over a long period it is almost impossible to give an answer.

Members of this tribe are commonly grown as ornamentals, for several species have relatively large attractive flowers that make a pleasing display. The most widely known species is *Epacris impressa*, exhibiting a wide range of colour from white through to dark red.

KEY TO THE GENERA OF THE TRIBE EPACRIDEAE

- | | |
|--|---|
| 1. Leaves petiolate, sessile or stem clasping but not sheathing; placentas sessile or nearly so | 2 |
| Leaves with an adnate sheathing base which falls off with the leaf, leaving the branches smooth or scarless | 7 |
| Leaves with an adnate sheathing base, which falls off with the leaf leaving annular scars on the denuded branches; placentas suspended from an ascending recurved column | 9 |
| 2. Bracts imbricate on the calyx, passing into the sepals | 3 |
| Bracts or bracteoles at a distance from or scarcely reaching the calyx and distinct from the sepals | 6 |
| 3. Corolla-lobes imbricate, not contorted in bud | 4 |
| Corolla-lobes imbricate, contorted in bud | 5 |



- | | |
|--|---------------------|
| 4. Stamens inserted at the throat of the corolla-tube except in some young buds; filaments short; anthers attached above the middle | <i>Epacris</i> |
| Stamens inserted at the base of the corolla-tube; anthers adnate, connivent around the style but not cohering | <i>Rupicola</i> |
| 5. Leaves spreading acuminate with pungent points, (Eastern) | <i>Woolisia</i> |
| Leaves small, erect and acuminate, or spreading and obtuse, (Western) | <i>Lysinema</i> |
| 6. Stamens adnate to the corolla-tube; leaf margins serrated | <i>Archeria</i> |
| Stamens free; leaf margins with blunt teeth | <i>Prionotes</i> |
| 7. Stamens adnate to corolla-tube | <i>Cosmelia</i> |
| Stamens free | 8 |
| 8. Corolla-tube very short; spreading lobes more or less imbricate; anthers usually connivent or cohering in a ring around the style, the filaments markedly incurved (Eastern) | <i>Sprengelia</i> |
| Corolla-tube cylindrical; lobes erect, recurved or revolute, bearded inside, valvate in bud; anthers not connivent or cohering around the style, the filaments not markedly incurved (Western) | <i>Andersonia</i> |
| 9. Corolla circumsciss near the base, calyptriform, the lobes not opening | <i>Richea</i> |
| Corolla not circumsciss, the lobes spreading | <i>Dracophyllum</i> |
| 10. Ovary inferior (Ovary is superior in other genera) | <i>Wittsteinia</i> |
- A thirteenth genus *Sphenotoma* is at times listed. This is not universally accepted as a separate genus and the species have been left under the genus *Dracophyllum* where it forms a sub-genus.

EPACRIS Cav.

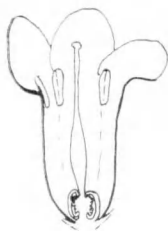
THE GENUS by B. R. JACKES

One of the most widely known genera of Eastern Australia with a particularly strong development in New South Wales and Tasmania. They are heath-life shrubs with sessile or petiolate leaves, although sometimes adpressed to the stem, they do not sheath it. The tubular, glabrous flowers may be pedunculate or sessile in the leaf axil. Floral colours range from white through to red, sometimes all shades may be present in the one species. Double flowers have been observed in some species, but they are usually sterile and quite rare; they possess neither stamens nor ovary or at most only abortive organs. These abnormal flowers are most attractive and if vegetatively grown make good garden plants.

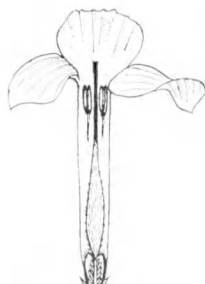
Considerable hybridisation appears to have occurred between the species, as well as ecological variations within the species, so that many intergrading forms exist.

KEY TO THE SPECIES OF EPACRIS
(Several rare species have been omitted)

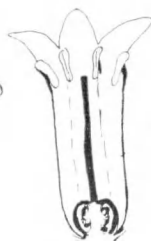
A.	Corolla-tube much longer than the calyx	B
	Corolla-tube shorter than or slightly longer than the calyx	G
B.	Corolla-tube marked with five impressions immediately above the ovary 1. <i>E. impressa</i>	C
	Corolla-tube without impressions	D
C.	Leaves obtuse	E
	Leaves acute	
D.	Stems erect; leaves oblong-elliptical to linear-lanceolate	2. <i>E. obtusifolia</i>
	Stems trailing or weakly ascending; leaves obovate to oblanceolate	3. <i>E. crassifolia</i>
E.	Corolla-tube 12-20 mm. long, red, though the lobes and sometimes part of the tube white	4. <i>E. longiflora</i>
	Corolla-tube 8-12 mm. long, usually uniform in colour	F
F.	Corolla-tube red or pink (small weak shrub)	5. <i>E. reclinata</i>
	Corolla-tube yellowish or white (erect shrub)	6. <i>E. calvertiana</i>
G.	Leaves very obtuse	H
	Leaves rather obtuse or almost acute, distinctly petiolate	M
	Leaves mucronate acute	Q
	Leaves broad and cordate or very concave at the base, acuminate or acute with spreading points	Y
H.	Corolla-tube cylindrical, sometimes slightly campanulate; style long	I
	Corolla-tube campanulate; style short	J
I.	Stems erect	2. <i>E. obtusifolia</i>
	Stems trailing or weakly ascending	3. <i>E. crassifolia</i>
J.	Leaves distinctly but very shortly petiolate, obovate to broadly ovate, 4-8 mm. long	7. <i>E. coriacea</i>
	Leaves sessile or almost sessile, 1.5 - 4 mm. long, ovate or elliptical to lanceolate	K
K.	Corolla-tube shorter than the calyx. Leaves usually 1.5-2.5 mm. long	8. <i>E. petrophila</i>
	Corolla-tube as long as the calyx; leaves 2-4 mm. long	L



EPACRIS



LYSINEMA



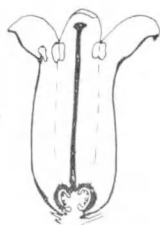
COSMELIA



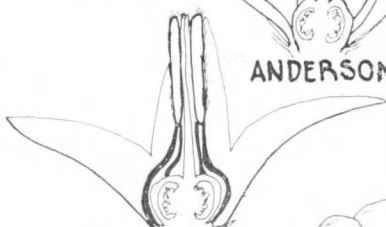
ANDERSONIA



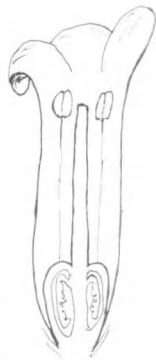
RUPICOLA



ARCHERIA



SPRENGELIA



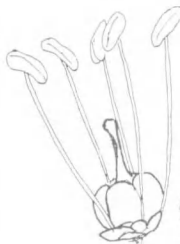
DRACOPHYLLUM



WOOLLSIA



PRIONOTES



RICHEA

L.	Peduncles not usually exceeding 2 mm. long; leaves with a prominent thick keel (flowers spring)	9. <i>E. rigida</i>	N
	Peduncles 2-5 mm. long; thick keel on leaves rarely prominent (flowers summer)	10. <i>E. muelleri</i>	O
M.	Leaves broadly elliptical or ovate; stigma not exerted		
	Leaves narrow-elliptical, lanceolate or oblanceolate; stigma exerted		
N.	Leaves usually more than 5 mm. long, ribbed on lower surface	11. <i>E. myrtifolia</i>	
	Leaves usually less than 5 mm. long, lower surface flat	12. <i>E. corymbiflora</i>	
O.	Leaves narrow-elliptical, margins minutely serrated	13. <i>E. mucronulata</i>	P
	Leaves elliptical-lanceolate or oblanceolate, margins entire		
P.	Much branched shrub; sepals blunt with tip somewhat rounded and ciliate; flowers usually clustered	14. <i>E. exserta</i>	
	Sparsely branched shrub; sepals acute, entire; flowers usually scattered	15. <i>E. virgata</i>	
Q.	Leaves shortly petiolate, linear-lanceolate to lanceolate, if broadly lanceolate then sparingly hairy		R
	Leaves mostly ovate, flat or concave, sometimes recurved		U
R.	Bracts and sepals ciliate, style hairy	16. <i>E. lanuginosa</i>	S
	Bracts and sepals not ciliate, style glabrous		
S.	Leaves sparingly hairy	17. <i>E. hamiltonii</i>	T
	Leaves glabrous		
T.	Corolla-tube narrow 1-2 mm. diameter, lobes obtuse; style about as long as the corolla-tube	18. <i>E. paludosa</i>	
	Corolla-tube 2-4 mm. diameter, lobes narrow and acute; style much longer than corolla-tube	6. <i>E. calvertiana</i>	
U.	Leaves usually less than 4 mm. long; leaf apex mucronate but not pungent	19. <i>E. serpyllifolia</i>	V
	Leaves usually exceeding 4 mm. long; leaf apex mucronate and pungent-pointed	20. <i>E. marginata</i>	W
V.	Leaves with whitish-hyaline margins, lobed at base		
	Leaves not as above	21. <i>E. barbata</i>	X
W.	Sepals covered with conspicuous reddish hairs		
	Sepals ciliate or glabrous	22. <i>E. heteronema</i>	
X.	Style about half as long as the corolla-tube	23. <i>E. squarrosa</i>	Z
	Style about as long as corolla-tube; stigma exerted		
Y.	Bracts and sepals obtuse or acuminate with blunt callous points		AD
	Bracts and sepals finely pointed		AA
Z.	Anthers included in the corolla-tube or at the throat		AC
	Anthers exerted		
AA.	Leaves under 6 mm. long; anthers inserted at mouth of corolla-tube	24. <i>E. gunnii</i>	AB
	Leaves above 6 mm. long; anthers enclosed in corolla-tube		
AB.	Leaves broadly cordate-ovate; flowers scattered along the branches	25. <i>E. apiculata</i>	
	Leaves elliptical-ovate; flowers crowded into branched subspicate heads at the apex	26. <i>E. breviflora</i>	
AC.	Leaves 3-4 mm. long; Corolla-tube shorter than the calyx, style inserted	27. <i>E. microphylla</i>	
	Leaves usually 5-10 mm. long; corolla-tube about as long as the calyx; style exerted	28. <i>E. acuminata</i>	
AD.	Leaves 8-12 mm. long; rigid shrubs 1-2 mm. high; corolla-lobes 4-5 mm. long	29. <i>E. purpurascens</i>	
	Leaves mostly 4-6 mm. long; diffuse bush 1-2 m. high with thin wiry branches; corolla-lobes 2-3 mm. long	30. <i>E. pulchella</i>	

NOTES ON SOME OF THE SPECIES

1. *Epacris impressa* Labill.

Common Heath

A very variable species with several varieties, it occurs in southern N.S.W., Vic., Tas., and S.A. It is the state flower of Victoria where it grows abundantly in many areas, particularly in wetter foothill country, the coastal heathlands and Little Desert scrub. Young plants may be transplanted quite easily if the roots are undisturbed and the soil of the new locality is free from lime or strong manures.

An erect, loosely branched shrub, which often attains a height of several feet, the last foot or so of each branch may be densely covered with numerous flowers, each solitary in a leaf axil. The corolla-tube varies in length from 8-18 mm. and it may be white, red or any intermediate shade. Although there is no definite ecological preference, white-flowered plants occur mainly in swampy areas, whilst reds are predominant in well-drained situations.

2. *Epacris obtusifolia* Sm.

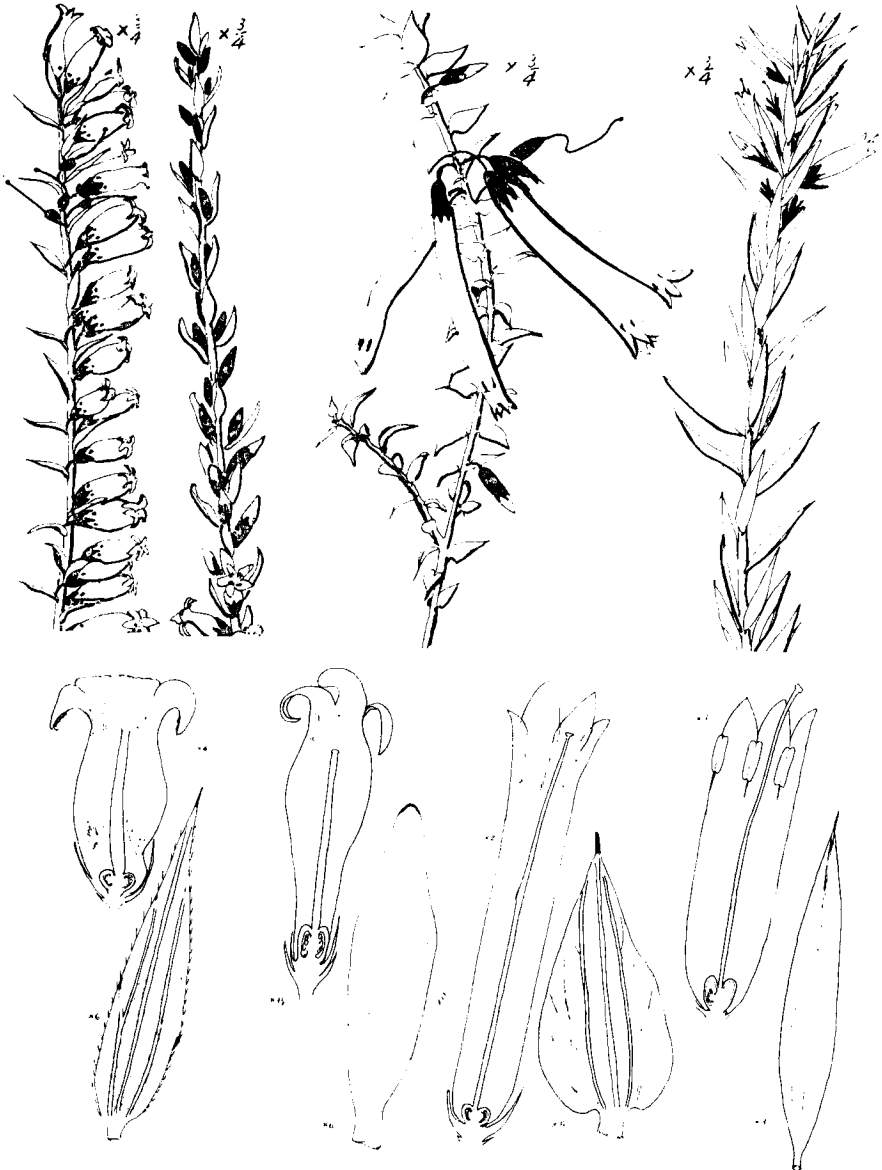
Blunt-leaf Heath

Found chiefly in marshy areas along the coast and nearby ranges of the eastern states and Tasmania. An erect plant (30-100 cm.) it bears fragrant creamy-white flowers in spikes or one-sided leafy racemes. The oblong-elliptical to linear-lanceolate leaves have thick obtuse tips.

3. *Epacris crassifolia* R.Br.

A trailing or weakly ascending plant found around Sydney and the Blue Mountains district of N.S.W. The leaves are obovate to oblanceolate with blunt apices. The whitish flowers are scattered along the branches. A related species *E. robusta* is erect in habit, and the more clustered, waxy cream flowers give out a delightful, spicy, stock-like perfume; it extends southward to the Kydra Peaks in the Monaro district on damp sandstone ledges of the Dividing Range.

(Continued on page 211)



E. impressa

E. obtusiflora

E. longiflora

E. calvertiana

BIRDS AND A NATIVE GARDEN

by Mrs. A. J. SALTER—PEST CONTROL SERIES, 1.

At our home in Black Rock, a suburb 14 miles from the heart of the city of Melbourne, the all-native garden, in area just under $\frac{1}{4}$ acre, is designed solely to attract the birds. During our 11 years' residence, 117 species of native bird have been recorded, and during the "busy" time of year, the colder months, the actual daily population of the garden exceeds 200 birds.

In order to attract native birds to a garden, it is necessary not only to grow native plants, but to grow the right sort of natives. Fortunately, these plants are also among the most beautiful. Many species, particularly those which have open flowers (i.e. *Boronia*, *Eriostemon*, *Thryptomene*) are of no use at all. The birds most easily attracted are those of the Honeyeater family, who feed on nectar provided by the honey flora; in addition, many other species of bird will frequent these plants, feeding on the insects which are in the foliage and which are attracted to the blossoms.

The three main requirements of native birds are shelter, food, and water. Shelter is provided by grouping the trees and shrubs so that thickets are formed; small shrubs planted beneath tall shrubs increase the density of foliage, making the birds feel more at home and safe from predators. It is easy to select plants which have different flowering seasons, so that food-providing blossoms are available from a percentage at any time during the year. Many natives have long flowering periods, particularly the *Melaleucas* and *Grevilleas*, and others, such as *Epacris*, blossom twice annually (*E. longiflora* flowers continuously throughout the year). As for water, a pond is an asset to any garden, and will attract many species other than those which come to the plants, i.e. Magpie-lark and Willie Wagtail. In our garden there is a pond sufficiently large and deep for the Honeyeaters to dive into, and in addition there are a number of small pools in hollowed-out rock slabs.

A total of 120 species of bird-attracting trees and shrubs is grown:

Eucalypt—19 species, 32 trees, of which the most useful is *E. leucoxylon rosea* which carries flowers from March to September. Eucalypts are of prime importance, and will attract birds even if no other native shrubs are grown.

Melaleuca—18 species, 34 plants, the best being *M. hypericifolia* which flowers throughout the year, and *M. armillaris* which thrives in the sandy soil. Of the shrubs which produce bottlebrush-type flowers, the *Melaleucas* are the most useful, having a great variety of sizes and shapes of flowers and foliage, and the longest flowering periods.

Callistemon—6 species, 12 plants. Although they make a brilliant show when out, they are less useful than *Melaleucas* in that the flowering season is short and the foliage does not attract many insects.

Banksia—14 species, 46 plants. The flowers of these shrubs will produce such a copious flow of nectar that at times it drips to the ground.

Hakea—8 species, 10 plants. Hardy, and require little attention.

Editor's Note: There have been many enquiries on the best method of pest and disease control of native plants. I have avoided the question as in my opinion, with a few notable exceptions the problem does not exist. If the plants are robust and healthy they can usually overcome disease but could be a prey to insects only where, by our blundering towards "civilisation" we have upset the balance of nature. This article is the first in a series on "PEST CONTROL" and describes the most pleasant and effective methods. Comments from readers are invited.

Grevillea—37 species, 85 plants. Most suitable shrubs for any garden, the variety in size, leaf shape, and flower colour being infinite.

Correa—6 species, 50 plants.

Epacris—2 species, 50 plants.

Acacia—14 species, 25 plants. The most important is *Acacia pycnantha*, which during the wetter months produces a heavy flow of nectar from a gland in the leaves.

Other nectar-producing shrubs grown are *Lambertia formosa*, *Beaufortia sparsa*, *Calothamnus villosus* and *C. pinifolius*, *Eremophila maculata*, *Regelia ciliata*, *Kunzea ambigua*, *Brachysema latifolium*, *Astroloma conostephioides*, and *Anigozanthos flavida* (3 colours) and *A. manglesii*. A flourishing patch of *Pterostylis nutans* (Nodding Greenhood Orchids) is not overlooked, the flowers being split open by the birds in order to obtain the drop of nectar. Local natives—*Hibbertia*, *Bossiaea*, *Goodenia*, *Pultenaea*, *Leucopogon*, *Burchardia*, *Dianella*, and a thicket of *Leptospermum laevigatum* (Coastal Tea Tree), have also been retained.

In addition to having the garden filled with all these natives, so that it looks like a small but delightful patch of bush, a supply of home-made food is offered, in order that the greatest possible number of birds may be induced to remain in this district, which has been so rapidly denuded of its bush. As a result, we have actually succeeded in increasing the numbers, and species, of the birds in this area. Nectar is provided, made of honey, brown sugar, and water, and in the colder months the birds consume more than 4 gallons a day; when the weather is mild, and insects are plentiful, they eat proportionately less. The food is put out in bottles, which are suspended from stands located beneath the shelter of the vegetation, a small plastic pot with holes in the sides being the actual drinking receptacle. The long brush tongues of the Honeyeaters lick up the food with surprising efficiency and speed, and the Sparrows, formerly great pests, are unable to obtain any. To date, 12 species of Honeyeater have frequented the garden; some live here permanently, others come only for the six colder months. They make a more than adequate return by taking great toll of the insect pests—we no longer see such things as Green Vegetable Bug or Harlequin Bug, and Aphids are a most favoured food. Scale is dealt with not only by Honeyeaters, but by a number of other native birds as well. In the vegetable garden, the only pesticide used is a little Pyrethrum Dust. We do not ever have trouble with insect pests.

Unfortunately, however, as the birds move about the countryside they do come in contact with the modern poisonous pesticide sprays, and in recent years approximately 10% of them have died each winter in the garden; analysis of the bodies has shown that in all cases the birds carried a very high concentration of Dieldrin in the body fat. Thus these creatures, who are wholly good, useful, and delightful, are killed indiscriminately along with not only the insect pests, but also the many useful insect species. By using these pesticides, man is gaining a temporary and immediate benefit, but storing up a compound of troubles and disasters for the years ahead.

Some persons may be concerned about the possibility of birds attracted to a native garden becoming in some way damaging or harmful, but this cannot be so. Native birds are insectivorous, and can do only good. The Honeyeaters are even of use in cross-pollination as they move from flower to flower. The birds which do harm are the introduced species—Sparrows, Mynahs, Blackbirds, Starlings. These cause damage to fruit crops and to

seedling plants, and spread noxious weeds such as Blackberries, Ink-weed, Bone-seed; in addition, they are aggressive by nature, and drive the native birds away from their normal habitat. Those misguided people who put out food scraps for the "birds" are simply keeping alive the introduced and harmful species, at the expense of the useful native species.

The presence of a large number of birds in a garden tends to attract the attention of feline predators. We do have a very effective means of discouraging them, permanently, but here all I can say is that cats should be discouraged by every possible means (i.e. thrown half-bricks). Fortunately, the birds are keen-sighted and usually receive warning in good time of the presence of predatory hawks or cats.

In conclusion, I would say that to live in a native garden, full of native birds, gives one a life full of such happiness, interest, and entertainment that no day is long enough to exhaust its pleasures. And, as well, one has the intense satisfaction of knowing that the good Australian birds are being helped to survive at this time, when so much of their natural habitat is being destroyed.

Wildflowers for the Seaside

PART 2 OF A SERIES WITH NOTES COMPILED BY THE EDITOR

A previous issue gave the first article of this series and an article entitled "A Garden Near the Sea." This important aspect of gardening with wildflowers will be pursued, and it is hoped that readers living near the sea will report their experiences. To more adequately record results we could not do better than to follow the lead given by Dr. E. A. Menninger in his book *Seaside Plants of the World*.

"The island continents of Australia and New Zealand play an important part in the drama of Salt vs. Plants, first because they have more shoreline exposed to the sea than any other habitable countries of the world and therefore a wider experience in meeting the problems involved.

Secondly, those two countries are the home of more salt-resistant plants than any other areas, and many of these are utilized throughout the world by craftsmen whose job it is to maintain beautiful gardens in the face of salt, wind and blasting sand. A million show gardens could not exist today without *Casuarina*, *Pittosporum*, *Araucaria*, *Callistemon*, *Myoporum* and *Olearia*—to name just a few of the toughest genera that are almost exclusively produced from down under.

Third, Australia and New Zealand are unique in their geographical experience from near the equator to snow covered mountains that feel the heavy breath of the Antarctic . . . whatever the problem is Australia or New Zealand had its first!"

1. The Problem

The various aspects are carefully analysed to arrive at the following conclusions: . . . "the landscaping first of all must give cover from wind, salt and sand. Secondly it must prevent erosion. It must provide shade

Editor's Note: It is essential that our native plants be observed and their value for seaside planting recorded. These notes are intended to assist in this project and members are invited to submit their comments under these headings. The first report is on the following page. Will readers with gardens on the exposed sea coast please contact me and I will advise how they can assist us. An example of what can be done by inexperienced home gardeners is illustrated by later articles on "Frost Hardy Natives."

because this plays a part in lowering the ground temperature, important in tropical areas. It must provide windbreaks for the benefit of both people and the lesser plantings. And above all the landscaping must be designed to protect the skin, the eyes, and the temperament of those who dwell on the property . . . A fundamental principle in such landscaping is to 'respect the view'."

Classifying the Plants

It is convenient to classify the plants for a garden near the sea into three functional groups which are clearly described as:

BELT I

This is the front line of defence . . . a plant must stand up under the most vigorous conditions. It must tolerate salt in the soil. It must be uninjured by salt spray, even if coated white with crystals or washed by the sea water itself. It must be able to withstand sand blasting, at least for a time. And in intercepting these furies, it must retain its pose, beauty and composure. This is a great deal to expect of a plant, and yet surprisingly enough there are a good many that can endure such violence and come up smiling.

BELT II

This is the location for plants that will tolerate only small amounts like a sand bank or a few boulders, or by artificial barriers . . . Plants in this belt will tolerate a good deal of salt in the soil and even in the air if no wind forces are mixed with it. They require barriers between them and the whip lash of storm . . .

BELT III

This is the locaiton for plants that will tolerate only small amounts of salt in the soil, but none of the rougher treatment of Belts I and II. In Belt III one will find the refinement and beauty and colour that make gardens luxuriant for here conditions are more normal, the soil is kept light so that any trace of salt will get washed away by the next rain, and where mulching, watering and fertilizing get results."

The following chapter headings in the book speak for themselves and our study and adaption of natives for seaside planting must give due regard to these headings.

2. *The Constant Enemies—Salt, Sand and Wind*—How some plants withstand them.

3. *Good Soil a Prerequisite*—To many gardeners overlook this especially for natives. You must have a good garden soil.

4. *Breaking the Force of the Wind*—Methods are described after an analysis (based on scientific investigation) reveals "that an obstacle with holes in it will slow down the wind to leeward very considerably. The optimum effect occurs when there are 60 per cent solids and 40 per cent of holes which can reduce wind speed by up to 80 per cent. A solid wall is of little or no protection as the wind swirls back on the leeward side and causes such turbulence that plants are often worse off than without any shelter at all.

5. *Plant the Garden.*

6. *Eroding Hills and Reclaimed Marshland*—The use of plants.

Plants suitable for each of the three belts are then classified under the form of the plant: 7. Ground Covers; 8. Vines; 9. Grass and Lily-like Plants; 10. Herbs and Sub-shrubs; 11. Shrubs; 12. Trees.

PLANTS FOR THE SEASIDE — 3

by T. R. N. LOTHIAN, Director Botanic Garden, Adelaide, S.A.

The following list gives species suitable for belt 1 and belt 2. Belt 3 is a totally protected site, where salt is absent from the soil and most species of garden interest will grow. Hence a list of belt 3 plants is unnecessary.

Ground Cover

BELT 1.

Carpobrotus
Helichrysum apiculatum
Ipomaea pes-caprea (tropics)
Muehlenbeckia adpressa
Pelargonium australe

BELT 2.

Chorizema cordata
Dichondra repens
Myoporum humile
Myoporum parvifolium

Herbs and Sub-Shrubs

Tetragonia implexicoma
Scaevola nitida
Atriplex cinerea
Leucophyton (*Calocephalus*) browni

Olearia teretifolia

Shrubs

Acacia cyclops
Acacia sophorae
Alyxia buxifolia
Alyxia ruscifolia
Anthocercis viscosa
Banksia marginata
Correa alba
Correa pulchella
Dryandra formosa
Hakea suaveolens
Leptospermum laevigatum
Leucopogon parviflorus
Melaleuca lanceolata (pubescens)
Myoporum insulare
Myoporum serratum
Nitraria schoberi
Olearia axillaris
Olearia ramulosa
Scaevola crassifolia

Acacia cultriformis
Acacia podalyritifolia
Acacia pycnantha
Acacia verticillata
Agonis flexuosa
Albizia lophantha
Callitris robusta
Correa reflexa
Eucalyptus globulata
Eucalyptus forrestiana
Eucalyptus leucorylon
Hakea elliptica
Hakea laurina
Melaleuca decussata
Melaleuca nesophila
Scaevola
Templetonia retusa

Trees

Acacia longifolia
Banksia integrifolia
Casuarina equisetifolia (tropics)
Casuarina stricta
Cupaniopsis anacardioides (sub-tropics)
Eucalyptus cornuta
Eucalyptus gomphocephala
Hakea suaveolens
Leptospermum laevigatum
Melaleuca halmaturorum

Banksia serrata
Callistemon citrinus
Callistemon macropunctatus
Callistemon salignus
Callitris spp.
Casuarina cunninghamiana
Eucalyptus camaldulensis
Eucalyptus botryoides
Eucalyptus ficifolia
Eucalyptus lehmannii
Eucalyptus maculata
E. megacornuta
E. steedmanii
Ficus macrophylla
Ficus rubiginosa
Hymenosporum flavum

Editor's Note: Who will add to this list?

FROST HARDY NATIVES

PART 1 OF A SERIES by TOSS FRAZIER, Armidale, N.S.W.

A large range of native plants have been tested by the writer and others members during the winter of 1965. These tests have been carried out in several localities with a varying range of winter conditions and in some cases careful recordings of ground temperatures have been taken, these recordings being the true readings of degrees of frost experienced. Due to

Editor's Note: It is not my policy to present lists of plants by their botanical name, that often mean very little to the home gardener. However I must refer the reader to the volume indexes and other articles of various issues for adequate descriptions of the plants as recording of so many plants in this way is essential for a concise reference. Readers are invited to submit results of their observations under the sub-headings of "Ground Cover", "Herbs and Sub-Shrubs". Shrubs and trees either as Belt 1 or 2 for "Seaside Planting" or Group 1 or 2 for "Frost Hardy Natives."

many factors temperatures may vary somewhat even in a garden but ground temperatures may generally be regarded as being in the range of 6° to 7° lower than normal screen readings. Readers may therefore assess frost severity in their own localities by adding say 7°F. to the figures given by the various writers where they are expressed as ground temperatures (e.g. 18°F. ground temp. approximates 25° screen).

The past winter has been the severest for many years, the lowest temperature recorded being 10°F. in late May following on two light frosts (25°) and at a time when drought conditions prevailed and plants were still in a very tender growth stage. Most damage was sustained at this particular time and no further severe frosts occurred till early July and from then till mid-August a series of heavy frosts occurred with recordings of 10° (twice) and several ranging from 12 to 18°.

Plant species which have been found frost-hardy in the writer's area could reasonably be expected to survive in other areas of less frost severity but the reverse would not necessarily be true.

In this report the plants listed are grouped under two headings . . . GROUP I: Plants which are completely frost-resistant; GROUP II: Plants which sustained damage to buds, tip growth or foliage burn but which have recovered to grow on in the spring. The number after the name of plant is the age of plant in May, and where no number is given it may be assumed that the plant was not more than one year old. For the purpose of the test no artificial overhead cover was given but natural protection was used where possible.

GROUP I:

Grevillea acanthifolia var. *stenomera* (2 yrs.), *G. sphacelata*, *G. juniperina*, *G. juniperina* var. *trinervis*, *G. "Poorinda Queen"*, *G. nematophylla*.
Hakea microcarpa, *H. gibbosa*, *H. ruscifolia*.
Banksia ericifolia, *B. collina*, *B. integrifolia* var. *paludosa*.
Petrophila canescens.
Persoonia tenuifolia.
Boronia denticulata, *B. algida*, *B. microphylla*, *B. crenulata*.
Eriostemon crowei var. *exalata* (2 forms), *E. myoporoides*, *E. gracilis*.
Phebalium glandulosum.
Callistemon citrinus (8 yrs.), *C. pachyphyllus*, *C. sieberi* (3 yrs.), *C. pinifolius*.
Melaleuca decussata, *M. thymifolia*, *M. pulchella*.
Leptospermum flavescens, *Lept.* sp. (unnamed).
Calytrix sullivani.
Kunzea parvifolia, *K. ericifolia*.
Pimelea involucreta (linifolia) 3 forms.
Eremophila maculata, *E. longifolia*, *E. gibbifolia*.
Prostanthera lasianthus (8 yrs.), *P. cuneata*, *P. aspalathoides*, *P. philicoides*. 2 Pros. sp. (identity uncertain).
Hovea heterophylla, *H. lanceolata*, *H. acutifolia*.
Aotus sp.
Epacris obtusifolia, *E. heterophylla*.
Dampiera lanceolatus.
 2 *Olearia* sp. (identity uncertain).
Acacia rubida, *A. lanigera*, *A. neriifolia* (3 yrs.), *A. triptera*.

GROUP II.

Grevillea dallachiana and *G. "Coral"* (buds only), *G. sericea* and *G. biternata* (tip damage only).
Hakea bucculenta (tips only).
Lambertia formosa (foliage burn).
Eriostemon lanceolatus (tips).
Correa reflexa (buds).
Kunzea capitata (tips).
Darwinia rhadinophylla (tips).
Leptospermum rotundifolium (foliage and stems).
Pimelea ligustrina (foliage).
Chieranthera linearis (tips).
Eremophila polyclada (tips).
Verticordia densiflora (bad foliage burn).
Dampiera stricta.
Acacia cultriformis (tips).

In addition to the above list several plants, notably *Calytrix tetragona*, *Homoranthus flavescens*, *Lept. rotundifolium*, *Cal. speciosus*, *Prostanthera nivea*, *Isopogon formosus* and *Eremophila glabra* and *E. alternifolia* and others suffered no foliage damage but were badly damaged or killed by stem burst and bark split or both near ground level. The danger point for this phenomenon appears to be at about 15 degrees F. and below. These plants will be tried again using older plants and with some form of stem protection next winter.

Comments—

Two points quickly apparent, the most forcible being the value of natural overhead shelter of trailer shrubs and trees and plantings in rockeries and against walls. Secondly, protection of small plants by placing large rocks on two sides. It would appear that the first essential to growing natives in heavy frost areas such as the New England Tablelands is to establish good shelter shrubs using known hardy species. This should suffice for successful growing (in mild to medium frost areas) a fairly wide range of plants, however, in the writer's area, additional means of protection against stem burst or bark split in young plants will need to be found.

Readers wishing to try plants other than listed, would find that the best prospects for success will probably be found in Grevilleas and Hakeas, particularly inland forms and those which have rather stiff needle leaves. Also Banksias, Eremophilas, Boronias, Eriostemons, Phebaliums, Zieria and Pimeleas. Winter flowering species would be a decided risk in areas of heavy frost as even hardy species are subject to bud damage unless covered. Spring flowering plants would be less risk as there appears to be a tendency for bud development to be delayed by continued cold conditions.

EUCALYPTS

ON CLAY SOIL NEAR NEWCASTLE by D. D. MORRIS

South of the Hunter River delta and east of Lake Macquarie the land rises in a series of narrow ridges reaching altitudes of 300 ft. to 500 ft. and separated by broad valleys. The surface rocks consist mainly of shales and conglomerations of the Newcastle Coal Measures which weather to clay soils of poor quality, deficient in humus and mineral plant foods. As a result little cultivation has been carried out and the area remains largely covered with sclerophyll forest, though it receives about 40" rainfall annually.

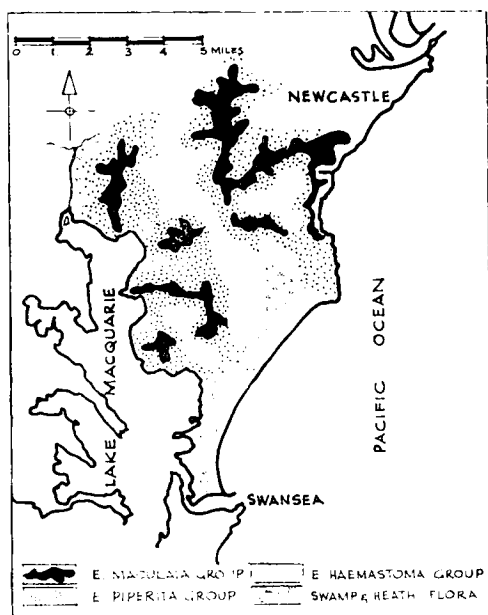
In the early days of settlement brushwoods and the better hardwoods were exploited and since then timber getting has been limited to cutting of pit props for use in the local coal mines. Frequent bush fires have also taken their toll. The resulting forest cover therefore, probably differs greatly from that existing before white settlement, particularly in the reduction of brush forest areas. The outer suburbs of Newcastle are now expanding rapidly into this area, and it is therefore opportune to consider the present distribution of Eucalypt species as a guide to suitable trees for garden planting.

When surveyed in 1963 it was found that three main groups of species were fairly clearly defined by features of soils and topography. The ridge tops usually consist of conglomerate which weathers to produce a red gravelly clay and together with the steep adjacent slopes support a variety of good timber species, particularly *Eucalyptus maculata*. The trees in this group are generally 50' to 80' high and less than 18" diameter with straight trunks and a fairly dense canopy of foliage. Few old trees remain and regeneration and coppice growth are common as a result of frequent cutting for small diameter poles.

The broad valley floors usually contain leached grey clays of fine texture, poorly drained and probably derived mainly from shales. In a few localities shales outcrop at higher elevations and produce similar soils which in both cases carry a much poorer forest characterised by *Eucalyptus*

haemostoma. These trees are generally less than 50' high, often gnarled and twisted and with a much sparser canopy. Many old over-mature trees exist, particularly *Eucalyptus haemostoma* and *Angophora costata*, which remain, no doubt, because of their small timber value.

On the gentler slopes between these two zones there exists an intermediate group which contains many of the species found in the others. Neither *E. haemostoma* and *E. maculata* occur in this buffer zone, while the most common species is *E. piperita*. The tree species most commonly found in each area are given below in their appropriate order of occurrence.



RIDGE GROUP—*E. maculata*, *E. paniculata*, *E. eugenoides*, *E. punctata*, *E. triantha*.

INTERMEDIATE GROUP—*E. piperita*, *E. punctata*, *E. intermedia* or* *E. gummifera*, *E. eugenoides*.

VALLEY GROUP—*E. haemostoma*, *E. intermedia* or* *E. gummifera*, *E. umbra*, *E. piperita*.

Other species of *Eucalyptus* which occur in the area but in lesser numbers are *E. saligna*, *E. siderophloia*, *E. capitella*, *E. resinifera*, *E. pilularis*, *E. microcorys*, while *E. tereticornis*, *E. robusta*, *E. botryoides* have a restricted distribution in low lying or swampy areas.

The author's residence occurs in the intermediate zone where the soil consists of a shallow grey top soil changing quickly to yellow clay. The four typical *Eucalypts* occurred on the site together with *Angophora costata* and *A. intermedia*, while the following *Eucalypt* species have been introduced with varying degrees of success.

TREES GROWING SATISFACTORILY—*E. maculata*, *E. citriodora*, *E. haemostoma*, *E. robusta*, *E. paniculata*, *E. cladocalyx*.

SEEDLINGS GROWING SATISFACTORILY—*E. eximia*, *E. obtusiflora*, *E. cinerea*, *E. triantha*.

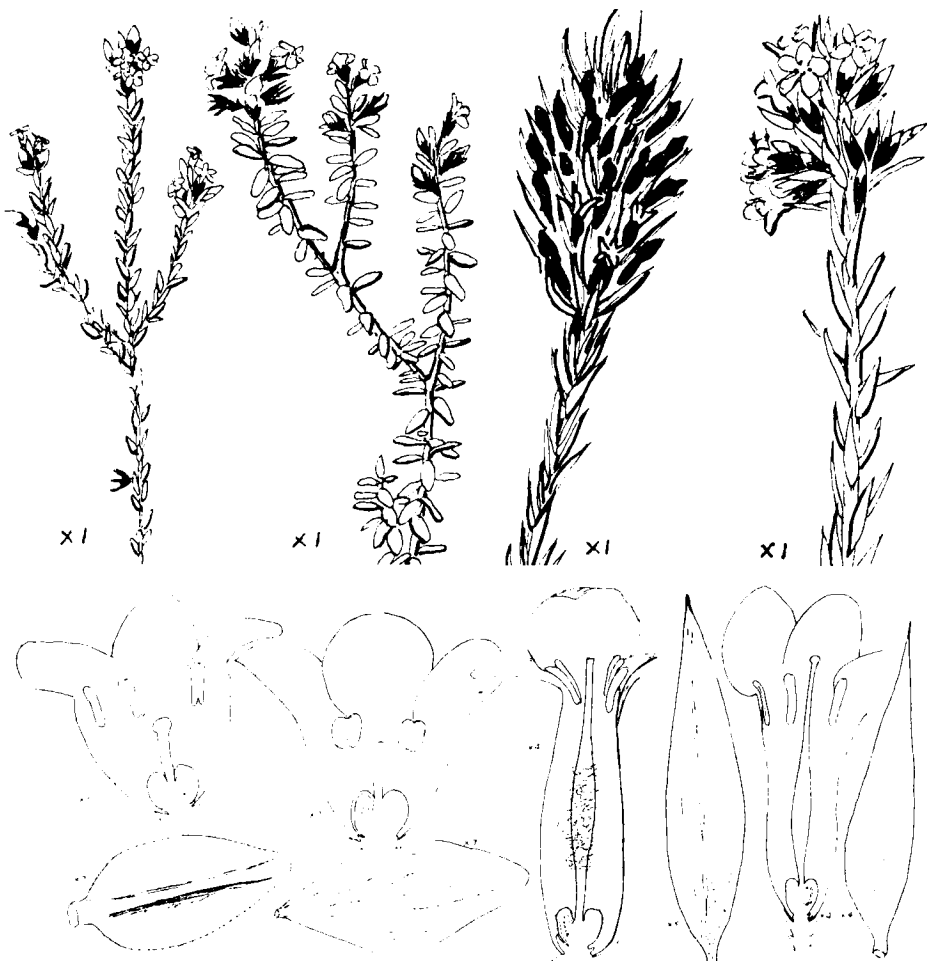
UNSATISFACTORY RESULTS—*E. Blakelyi*, *E. caesia*, *E. macrocarpa*, *E. spathulata*, *E. ficifolia*.

*Difficulty was experienced separating these species in the field, however bloodwood growing in the author's garden would seem to be *E. intermedia*.

EPACRIS—Continued from page 202

4. *Epacris longiflora* Cav. See page 240.**5. *Epacris reclinata* A. Cunn. ex Benth.**

This species normally grows in sheltered rocky areas of the southern and Central Tablelands of N.S.W. It is a low, straggling, much branched shrub with long pink or red flowers.

*E. rigida**E. muelleri**E. lanuginosa**E. paludosa***6. *Epacris calvertiana* F. Muell.**

An erect shrub restricted to N.S.W., particularly in the Blue Mountains and neighbouring areas (Conjola & Cyde Mts. to Mulgoa, Bullio, Tallong and the Comboyne). The lanceolate leaves are 1-2 cm. long. The corolla is yellowish or white with a much exserted style.

7. *Epacris coriacea* A. Cunn. ex DC.

A tall shrub from N.S.W. (Helensburgh-Macquarie Pass), frequently growing on sandstone cliffs, it has obovate or broadly ovate leaves 4-8 mm. long. The corolla-tube corolla-lobes and sepals are all approximately equal in length.

8. *Epacris petrophila* Hook. f.

This small shrub is confined to high elevations principally in Tasmania and Victoria, its extremely short style being distinctive. The flowering season extends from October to February.

9 & 10—*Epacris rigida* Sieb. ex Spreng. and *E. muelleri* Sond. See page 213.

11. *Epacris myrtifolia* Labill.

Endemic on the south-eastern coast of Tasmania. The white flowers are solitary, axillary, forming crowded areas along the stem or at the ends of branches.

12. *Epacris corymbiflora* Hook. f.

This Tasmanian species prefers wet peaty heathlands near the west and south-west coasts particularly. The white axillary flowers are arranged in small terminal heads.

13. *Epacris mucronulata* R.Br.

An erect shrub growing along river banks of the west Tasmanian coast.

14 & 15. *Epacris exserta* R.Br. and *E. virgata* Hook. f.

These two closely related species are found in northern Tasmania where they are endemic.

16. *Epacris lanuginosa* R.Br.**Woolly-style Heath**

Attaining heights up to 1 m. in swampy areas of Victoria and Tasmania, where not uncommon in hilly districts; it possibly extends into South Australia. The branches are usually pubescent, as are the ovary and style. The bracts and sepals may be completely ciliate or only have a marginal fringe. The white flowers, which are arranged in dense spikes, appear throughout the spring and summer months.

17. *Epacris hamiltonii* Maiden et Betche

A bushy much branched shrub covered by soft hairs, it is found in the Blue Mountains of N.S.W.

18. *Epacris paludosa* R.Br.**Swamp Heath**

Usually found in marshy situations in mountainous areas of N.S.W., Victoria and Tasmania. *E. bawbawiensis* Stapf is now usually included in this species. The flowers are congested about the branch apices forming a dense terminal inflorescence. Flowering season extends from September to January.

19. *Epacris serpyllifolia* R.Br.**Thyme Heath**

A low bushy shrub, with small ovate to lanceolate leaves, growing in mountainous areas of Victoria (5000-6000 ft.) and Tasmania (above 3000 ft.). Flowering is in the spring and early summer.

See colour plate No. 24 issue.

20. *Epacris marginata* Melville

Characterised by the whitish-hyaline leaf margins, and the glabrous bracts, sepals and style which is about half as long as the ovary. A small handsome bush restricted to eastern Tasmania where it is found on parts of the Tasman Peninsula, as well as on Maria Island.

21. *Epacris barbata* Melville

Related to the preceding species, *E. barbata* also occurs on the east coast of Tasmania. Distinguished from *E. marginata* and *E. heteronema* by the thick rounded margins of the mature leaves and the pubescence of the sepals.

22. *Epacris heteronema* Labill.

Bracts and sepals usually glabrous, but occasionally they may be minutely ciliate. Leaves are broadly ovate to lanceolate without either thick or whitish margins. Swampy often mountainous areas of Tasmania.



Colour photography by M. Baldwin, from her collection "Wildflowers of the Blue Mts., N.S.W."

EPACRIS RIGIDA**9 & 10. *Epacris rigida* Sieb. ex Spreng., and *E. muelleri* Sond.**

These two species, found in N.S.W., are very similar and the distinction between them is often not very clear. In the latter, the prominent keel found on the leaf of *E. rigida* is inconspicuous or absent, and the leaves are usually more spreading. *E. rigida* is always an erect bushy shrub, whilst *E. muelleri* may be weak or straggly. The former prefers open dry areas whereas the latter likes damp sheltered situations.



E. sephyllifolia *E. barbata* *E. microphylla* *E. pulchella* *E. purpurascens*
(flower spray across top) These details are for sprays directly above. var. *onosmitifolia*

23. *Epacris squarrosa* Hook. f.

A variable species, widespread in southern and eastern Tasmania. The pungent lanceolate leaves are all recurved and spreading. Inflorescence is usually spike-like but sometimes appears as short heads.

24. *Epacris gunnii* Hook. f.

This rigid sparingly branched shrub is frequent in wet heath areas of Tasmania and Victoria. The broadly ovate-cordate leaves are 3-6 mm. long, with spreading and recurved tips.

25. *Epacris apiculata* A. Cunn.

Occurs on rocky ledges in the Blue Mountains district of N.S.W. The broadly ovate-cordate leaves, 6-8 mm. long, are crowded so as to almost conceal the branches. The white flowers are shorter than the leaves.

26. *Epacris breviflora* Stapf

This species appears to be confined to mountainous areas of N.S.W., and Victoria. The leathery leaves, 6-9 mm. long, have minutely serrate margins. Flowers are white, the spreading corolla-lobes twice as long as the corolla-tube.

27. *Epacris microphylla* R.Br. See page 216.**28. *Epacris acuminata* Benth.**

This Tasmanian species is a bushy shrub with a few white flowers in the axils of the uppermost leaves.

29. *Epacris purpurascens* R.Br.

Found in damp areas of N.S.W. Rigid shrubs 1-2 m. high. The ovate leaves may be rounded or cordate at the base, tapering into a pungent point at the apex.

Two varieties are recognised: var *purpurascens* which has a pink corolla-tube about as long as the sepals; and R.Br. var. *onosmiflora* Maiden et Betcher, which has a white corolla-tube slightly longer than the sepals.

30. *Epacris pulchella* Cav.

Common in heath and dry sclerophyll communities of N.S.W., and southern Queensland. Erect shrubs 1-2 m. high, the thin wiry branches are minutely pubescent.

BOOK REVIEW (Books not available from the Editor)

NATIVE ORCHIDS OF TASMANIA by M. J. Firth

"A simple popular textbook on orchids native to Tasmania" is the way the author describes this exceptional little book. Stiff covered with 90 pages, it is certainly much more than that to orchid lovers and particularly those in Tasmania who know nothing of botany, but love to roam the fields and the bush. It is the only complete reference to the orchids of Tasmania since 1903 and includes many new species found on our southern island. All species are adequately described with identification sketches and many line drawings.

Available for 32/6 posted from M. J. Firth, c/- Dept. of Agriculture, Devonport, Tasmania ONLY.

KING'S PARK, PERTH, W.A.

A booklet available only from the Director, King's Park.

This 24 page booklet describes King's Park, its locality, its function, its history, its native flora and its birds. For those who wish to visit the park it will be a valuable guide and memento of an exciting visit. Others will find the 20 full colour plates of West Australian Wildflowers of interest. 6/6 including postage.



Colour photography by H. A. Morrison

EPACRIS MICROPHYLLA

This heath is well-known for its long spikes of thousands of small white flowers that will grace any garden. As it was so well-known I hoped to introduce to you a beautiful double flowered form but unfortunately the blocks did a very poor job in this case.

27. *Epacris microphylla* R.Br.

Coral Heath

A widely variable species, some of the extremes have been accorded specific status. The erect wiry plants have ovate-cordate leaves 3-4 mm. long. Flowers, which are as long as the leaves, are studded along the ends of the branches. A swamp loving heath found in all the eastern states.

BOTTLEBRUSH FLOWERS ARE EAGERLY SOUGHT

The Australian bottle brush type flower is a beautiful decoration for your garden or vase. If you love them as much as the tiny possum below then they are easily grown. Our No. 20 issue describes many plants of different mature heights for a spot in your garden.

Birds love them also. See the article on page 203.



Photography by M. K. Morcombe

Reprinted from *Wild Australia*

Pygmy Possum on a flower of *Melaleuca steedmanii* seeks nectar and insects with great agility after dusk. So small that it is able to curl up in the nest of a honeyeater—this possum was discovered in the two-inch-wide nest of a Spinebill—these tiny marsupials are slow and sleepy by day, but as darkness falls they become very active, running through the foliage to catch insects, and probing for nectar in bushland wildflowers.

WILD AUSTRALIA

The above colour plate is reprinted from a new publication entitled "Wild Australia" with photography and publication by Michael K. Morcombe. At a price of 17/9 including postage and packing, this is great value for those interested in large colour plates of the wild life of Australia. Is it a book or is it a calendar? Many of the colour plates are large 14½" x 9½", published with a fold down date pad for 1966 and bound to hang on the wall as a calendar if desired. To me it is so beautifully produced on art paper as to be too good to nonchalantly hang as a calendar but at the low price of 17/9 the problem is easily solved by purchasing two copies.

Its lasting value is a large colour illustrated book on Australia's wild life. In 15 large pages it goes on to describe the habits of the birds (it is mainly about colourful bird life) that are illustrated in full colour. Of interest to some will be a section on the techniques employed in getting such "candid" shots.

"Wild Australia" is to be a yearly series. Each issue will be different, this year birds being mainly featured. An important point is that Mr. Morcombe is marketing this on a non-profit making basis and the more copies of "Wild Australia" sold the larger and better will be "Wild Australia—2". Let us encourage such a fine venture by all purchasing a copy.

Send only 17/9 (includes postage) to M. K. Morcombe, P.O. Box 54, Armadale, West Australia.

ROCKERY PLANTS

NATIVES FROM KANGAROO ISLAND by G. JACKSON

Several plants here offer good prospects as rockery plants.

Astroloma humifusum—Only a few inches high with pretty foliage at all seasons and bright red tubular flowers in autumn and early winter.

Scaevola aemula—A blue fan flower which forms a mat on the ground and is covered in bloom from early spring till autumn.

Goodenia primulacea—A native primrose, a few inches high with bright yellow flowers in spring.

Correa pulchella—Some forms here appear to be lower growing than others and more suited to a rockery. The red bells on the dark green foliage are attractive.

Prostanthera aspalathoides—A mint bush 1-2 feet with scented foliage and bright red or yellow flowers. Flowers in spring and early summer.

*Lasiopetalum*s—All species. The pink flowered form of *L. schultzenii* is very attractive. *L. discolor* is very hardy. My favourite would be *L. behrii* and *L. tepperi* though both are a bit tall the latter up to 4-5 ft. Some forms of *L. baueri* are quite attractive. Some forms of the plants only have flowers of a dirty greenish colour but others are deep pink with darker stamens.

Tetradlea halmaturina & *T. ericifolia* to 12 ins. high. Spring flowering with ruby coloured bell shaped flowers.

Boronia edwardsii and *B. filifolia*—Up to 2 ft. high with masses of pink flowers.

Calytrix tetragona—Up to 3 ft. with pink star flowers. See colour plate page 169, No. 24 issue.

Lhotzkia glaberrima—Up to 3 ft. with pink flowers.

Kennedyia prostrata—Scarlet runner with bright red pea shaped flowers flat on the ground, August-November.

Thysanotus patersonii—A fringed violet flowering in late spring.

Pileanthus filifolius in Melbourne by J. Seaton—

I planted a seedling in September, 1948, in my garden at Caulfield. It was in sandy soil and on the west side where it is warm and sheltered. The plant grew and flowered every year, December and January, until 1963. The flowers must be seen to be believed for they were about 1 inch across with a delicate texture, and a bright red colour. The edge of the petals is frilled which enhances the beauty of the flower. The colour plate in issue No. 23 does not do it justice.

The bush had a fairly sparse habit and a tendency to sprout up from the base. It has the added advantage of flowering in the summer. It should be grown successfully in a warm, sheltered position in light soil.

The seed, which is similar to the Geraldton Wax, is cone shaped. The root grows through the point of the seed. All attempts to germinate seed from my plant failed.

Platytheca verticillata in Melbourne by J. Seaton—

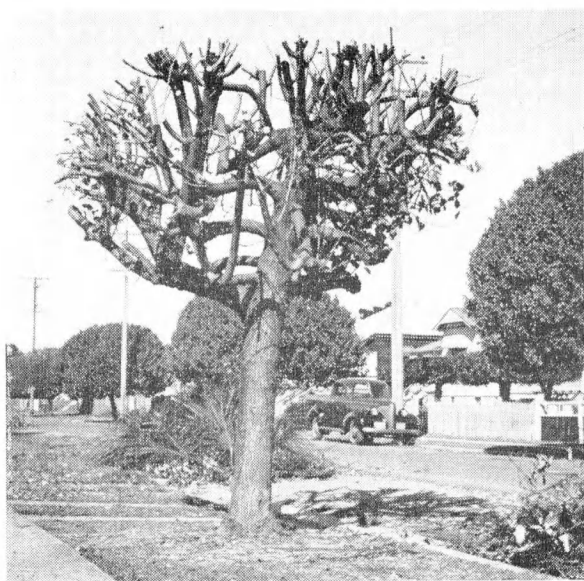
My plant is growing in a large pot and is in full flower at present (July). In the garden the plant does not appear to be very long lived but is easily grown in a container. Propagation by cuttings is very easy.

HIBISCUS AS STREET TREE

HIBISCUS TILIACEUS—COMMONLY REFERRED TO AS COTTONWOOD

by H. O. OAKMAN

Hibiscus tiliaceus has, during the past two decades, become increasingly popular for street and park planting. It is one of the malvaceae and is a fairly decorative free flowering tree with typical hibiscus blooms that are produced in successive flushes for nearly seven months of the year. The specific name is derived from the *Tilia*-like leaves which are held on long petioles and are invariably dense, except after an extended period of drought. The leaves are heart shaped, dull mid-green in colour with a smooth surface and are often white or hoary underneath. The flowers are bright yellow with a deep crimson throat, 3" across; they are most abundant in January but from November to May there are always some blooms to be seen. The individual flowers last for one day or, at the most, two days and are followed by small seed capsules which invariably provide a ready source of seeds for propagation.



Hibiscus tiliaceus

as a street tree. Heavy pruning is necessary but does not harm the tree. In fact it produces the well shaped street tree shown in the background.

There is surprisingly little seedling variation in the cottonwood so that for street planting there is no need for asexual propagation. New stocks can, however, be very easily obtained from large hardwood cuttings which save time when larger plants are urgently required. Young plants are inclined to grow bushy and need regular pruning of side shoots to induce the formation of a bole. Staking is essential as the root system is fibrous and close to the surface. This, in association with thick foliage and dense branching, makes it most vulnerable to strong winds.

The cottonwood is found along the east coast of Australia from the Gulf of Carpentaria to the New South Wales border but its habitat extends



Photography by Frank Hurley

Blocks by courtesy of John Sands Pty. Ltd.

HIBISCUS TILIACEUS—THE COTTONWOOD

The bright yellow flowers deepen when dying as shown by the flower in the rear. As in the past I feature a colour plate of a flower that will appear in the next issue. The next issue will be on *Hibiscus* and comments from readers are invited.

to the coastal areas of the Pacific Islands. It is amazingly adaptable to varying site conditions. In its natural habitat it is usually found close to watercourses or near tidal swamps but it grows well in sand and has a remarkable capacity for vigorous growth in clay. One of the most difficult situations for tree growth is in clay that is periodically subjected to times of drought with alternating swamp conditions. Few trees would survive this situation but the cottonwood can actually flourish. This is evident in many street plantings in some of the outer suburbs of Brisbane where cottonwoods are growing under conditions that would be quite intolerable for other trees. Many of the coastal areas have also been planted with the cottonwoods as it is one of the few trees that will flourish when exposed to moderately strong salt-laden breezes. Its tendency to blow over must however be provided for.

From the maintenance point of view, the cottonwood requires more attention than most other street trees because of its rapid growth and a tendency to produce strong canes. Fairly regular pruning is required initially not only to develop a trunk but also to produce a good framework. Once the latter has been established, root pruning once a year is essential if the tree is to be prevented from growing straggly. Heavy pruning does not appear to reduce its vigour so the regular cutting back to just above the previous year's cuts automatically produces a well-shaped tree. During the cooler months of the year there is a tendency towards dormancy which is often preceded by a darkness in leaf colour, usually with a few bright red leaves standing out from the rest to produce a quite pleasing effect. Leaf fall is seldom a nuisance but occasionally in wet weather the fallen flowers tend to become greasy and slippery.

The timber of the cottonwood takes on a high polish but has no commercial value. Wild coast-grown trees sometimes develop a gnarled structure which produces forks which are ideal for making boat knees. The fibre from the bark has been used for string and cordage as one of its virtues is that it is non-water absorbent. The Australian aborigines used it for making fishing nets and also used its roots for food as well as the mucilaginous bark for relieving thirst.

From the point of view of its suitability as a street tree, the cottonwood has several advantages—easy to propagate by seeds or cuttings; rapid growth adaption to extreme conditions of varying kinds and a life expectancy of 60 years throughout which it can be relied on to produce dense branching and foliage. The main disadvantages are its shallow rooting and the need for regular pruning. Spraying is usually unnecessary as it is not subject to serious insect pests or fungal disorders. Its relatively short life can be turned to advantage by using it for inter-planting with slower growing permanent trees and in this respect it is an excellent substitute for wattles which are shorter lived and not so adaptable.

THE DESERT ROSE

Although it looks like another *Hibiscus*, the Desert Rose of Australia belongs in the genus *Gossypium* L. Dr. Paul A. Fryxell, Soil and Crop Sciences Dept., Texas A. & M. University, College Station, Texas, U.S.A., has undertaken a program of research on this genus and one of the products of this project will be an illustrated article in your "Australian Plants." Dr. Fryxell requests the assistance of anyone who can send flowering specimens, dried or pressed leaves and specimens, notes, or any comments on plants of the genus *Gossypium* or of any related *Hibiscus* type plants from the dry inland areas of Australia that may belong to the tribe *Hibisceae*.

WILDFLOWERS OF CENTRAL AUSTRALIA

PART 3 by D. J. NELSON

The Saltbush family, CHENOPODIACEAE, is often thought of as a "Cinderella" family of the plant world as it does not have brilliant flowers. However many species in the family are well worth cultivating for their attractive foliage, rapid growth and extreme hardiness. The following species have been, with one exception, successfully cultivated in Alice Springs gardens and have proven their worth in our water short areas. I will deal with perennial species.

Atriplex nummularia, "Old Man Saltbush." This excellent plant is the king of Saltbushes, some fine specimens in the bush have attained 10 feet and more in height with a diameter of twenty feet. It has grey green leaves with a scaly tomentum. "Old Man Saltbush" makes a fine hedge or individual specimen shrub, it is easily trimmed to good shape. Extremely palatable to stock, many communities of this species have been destroyed, rendering its propagation even more desirable for the sake of preservation. Native to dry, saline, low-lying areas, it will grow almost anywhere. I have raised fine specimens by transplanting small plants and by cuttings, growth rate, 6 feet in 15 months.

Atriplex holocarpa, **A. lindleyi** & **A. spongiosa** are three ornamental annual "Saltbushes" with spongy fruits. They provide attractive border plants with grey-green foliage. The fruit of *A. lindleyi* becomes pink on maturity.

Chenopodium auricomum, "Northern Bluebush", a hardy blue-green shrub with soft, oblong, usually hastate leaves, bearing spikes of dense golden mealy fruit. An interesting specimen of low lying swampy clayey soils it is easily raised from seed and attains a height up to 4 feet. It too, is extremely palatable to stock. Drought and frost hardy.

Chenopodium nitariaceum, a straggly shrub ascending to 7 feet or more, this is a perennial which could be useful as a specimen in a native garden. Although not common, it grows in any soil and bears slender spikes of mealy fruit. It closely resembles *Rhagodia nutans*, described later in this article, and is another species which is avidly grazed by stock.

Chenopodium rhadinostachyum. A fragrant light green herb with unusual crumbly seed spikes to 6 inches long. It grows in the barest areas as an annual.

Enchylaena tomentosa, "Ruby Saltbush", a semi-prostrate shrub to 2 ft. high and to 4 ft. diameter, leaves small, linear, blue green, succulent. The fruit of Ruby Saltbush is succulent, ¼ inch diameter, usually bright red, sometimes yellow. Native in saline low lying areas, Ruby Saltbush is easily seed propagated, is drought and frost hardy and is very attractive when bearing its masses of small coloured fruit. A useful specimen for poor soil. This is the only species in this genus.

Kochia georaei. A small shrub to 15 inches, its chief attraction is in the masses of golden winged fruit it bears. Found in open sandy loam flats this plant is very hardy and may find use in rockeries. Has been raised from seed in sandy soil in Alice Springs.

(Continued on page 227)

Dendrobium Ruppianum

THE CULTIVATION by R. DEANE

Dendrobium ruppianum (fusiforme) comes from the coastal and tableland forests of Northern Queensland. Coming from both the coastal areas as well as the higher regions it is much more tolerant to cold than those orchids found only in the coastal areas. I have found that it is quite adaptable to Sydney conditions for bush-house growing and that is where I grow my plants of this species. It will grow quite well in a pot using chopped up fibre pieces as the compost and will even grow in the modern type peat-moss mixtures. However, I like to grow it on a block of tree fern fibre hanging in the bush-house in about 60% of available light. The main growing requirement is plenty of water during the growing season which under my conditions is from mid November till late March. During the winter months it can dry right out without harmful effects but our normal rainfall usually keeps the plant moist enough. Growing on the fibre block it does not require much attention but 2 or 3 applications of a liquid fertiliser during the growing period are beneficial but beware of too much fertiliser as this can build up in the block and become toxic. The normal flowering time in Sydney is October when the sprays of flowers will last 2 to 3 weeks.

A REVIEW OF THE SPECIES *DENDROBIUM RUPPIANUM* A. D. HAWKES (ORCHIDACEAE) by A. W. DOCKRILL

In this review, new combinations are given for *Dendrobium fusiforme* (F. M. Bail.) F. M. Bail. var. *blackburnii* W. H. Nich. and *D. fusiforme* (F. M. Bail.) F. M. Bail. var. *fusiforme forma magnifica* Dockr. by transferring them, without change of status, to the species *Dendrobium ruppianum* A. D. Hawkes.

A. D. Hawkes, in the *Orchid Weekly* (America) 2:129 (1960) and in the *Australian Orchid Review* 29, no. 1:40 (March, 1964), pointed out that the species name "fusiforme" for a species of *Dendrobium* had been employed by Thouar in 1822 and consequently the name was not tenable for the Australian plant which was first known under that name, but as a variety, in 1878, and renamed the species *Dendrobium ruppianum*. However, he did not rename the varieties, etc., and the present paper is an endeavour to overcome that omission, and this renaming of the varieties etc. will be embodied in a description of the species.

Dendrobium ruppianum A. D. Hawkes, *Orchid Weekly* 2: 129 (1960) and *Aust. Orch. Rev.* 29, no. 1:40 (March, 1964).

A species of 2 varieties, one of which has 2 forms.

1. *Dendrobium ruppianum* A. D. Hawkes var. *ruppianum*.

(a) *Dendrobium ruppianum* A. D. Hawkes var. *ruppianum forma ruppianum*.

Synonymy:- *Dendrobium speciosum* Sm. var. *fusiforme* F. M. Bail. *Proc. Linn. Soc. N.S.W.* 2:277 (1878) — misquoted in *Qld. Flor.* 5: 1527 (1902).

Dendrobium fusiforme (F. M. Bail.) F. M. Bail., *Qld. Flor.* 5:1527 (1902); *Aust. Orch. Rev.* 4:114 (Dec., 1939) et *ibid* 10:40 (June, 1945)—Not of Thouar 1822.

A robust plant either epiphytic or lithophytic, growing into large clumps, with no rhizomes, each branch of the sympodium commences directly from the base or near the base of the preceding branch. Branches of the sympodium

consist of a stem which is swollen at the base then fusiform, with 2-7 leaves near the apex. Stems 15-45 x 1.5-4.0 cm., usually sulcate, dark-coloured. Leaves 5-15 x 2.5-6.0 cm., usually ovate, thin-coriaceous. Inflorescences 1-4 from between the leaves or almost terminal, 15-35 cm. long, many flowered; peduncle usually much shorter than the rachis. Flowers 15-20 mm. long, with a short, broad and exceptionally thick mentum about 3 x 3 x 6 mm., fragrant; segments usually not widely spreading, white or cream turning pale primrose yellow with age, or occasionally the latter colour is present when the flower opens. Dorsal sepal 16-22 x 3-4 mm., $\pm$ linear, acute. Lateral sepals about as long as the dorsal one, the free portions beyond the mentum about as broad as the dorsal one but narrow falcate. Petals about as long as the sepals but not much more than one half their width, narrow-linear, acute, usually decurved. Labellum about 8 x 7 mm. when flattened, gently curved throughout its length, marked on the inside with numerous irregular transverse purple stripes; lateral lobes erect, about 2 x 6 mm., $\pm$ oblique crescentic, the free apical portions deltoid; mid-lobe about 2 x 5-6 mm., transverse oblong, truncate, mucronate; disc with a single orange-coloured keel which does not extend on to the mid-lobe. Column about 3-4 mm. long with a much curved foot 4-5 mm. long; apical teeth one on each side, short and blunt. Stigma obovate. Rostellum emarginate. Anther with only the mere rudiments of a deflexed rostrum. Members of each pair of pollinia equal, narrow obovate when viewed from the side. Flowering period July to November.

From the Burdekin River to the tip of Cape York Peninsula, extending to New Guinea, it is essentially a plant of the ranges and highlands but occasionally extends to the lowlands. Although it is often found in rain forests, it reaches its best development in open forest bordering rain forest, showing a preference for a species of *Casuarina* as a host.

(b) *Dendrobium ruppianum* A. D. Hawkes var. *ruppianum forma magnificum* (Dockr.) Dockr. comb. nov.

Synonymy:- *Dendrobium fusiforme* (F. M. Bail.) F. M. Bail. var. *fusiforme forma magnifica* Dockr., Nth. Qld. Nat. 24, no. 114: 24 (Feb., 1956).

Plant similar to that of (a) but usually robust for the species. Flowers, however, are 30-50 mm. long and usually wholly white but age to yellow—Fl:- August to October.

On the ranges between the Burdekin River and the Annan River of North East Queensland, seldom found at elevations much below 3,000 feet.

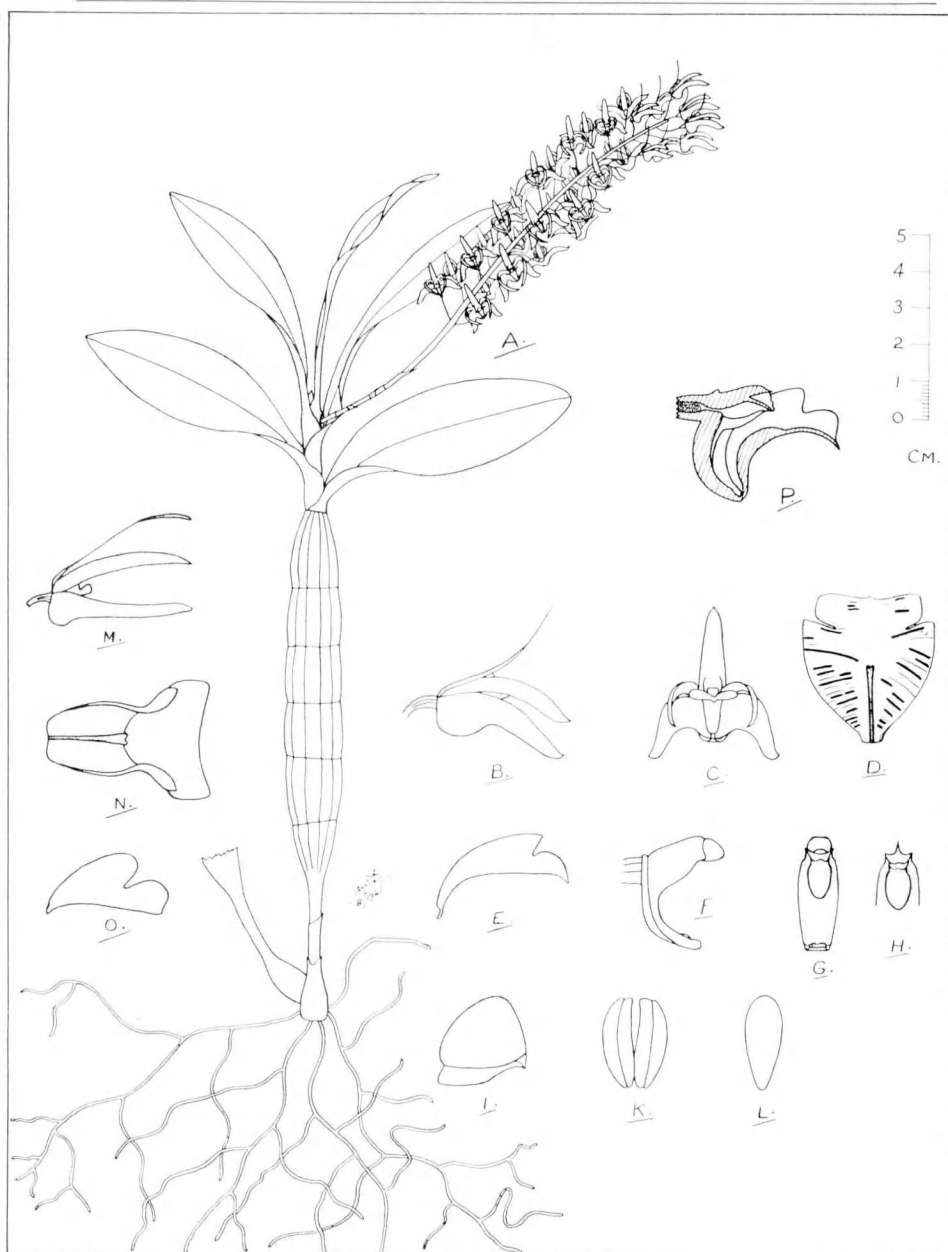
2. *Dendrobium ruppianum* A. D. Hawkes var. *blackburnii* (W. H. Nich.) Dockr. comb. nov.

Synonymy:- *Dendrobium fusiforme* (F. M. Bail.) F. M. Bail. var. *blackburnii* W. H. Nich. Vict. Nat. 66:225 (April, 1950).

The following is quoted from Nicholls, l.c.:—"This compact variety differs from the typical form chiefly in its much more robust pseudobulbs which are 12-22 cm. long x 2.5-3.0 cm. diam. The pendulous racemes have shortly segmented pale primrose-yellow flowers, whereas in the typical form the creamy-white flowers are born erect with somewhat filiform "spidery" segments. Fragrance of the flowers persists for some time."

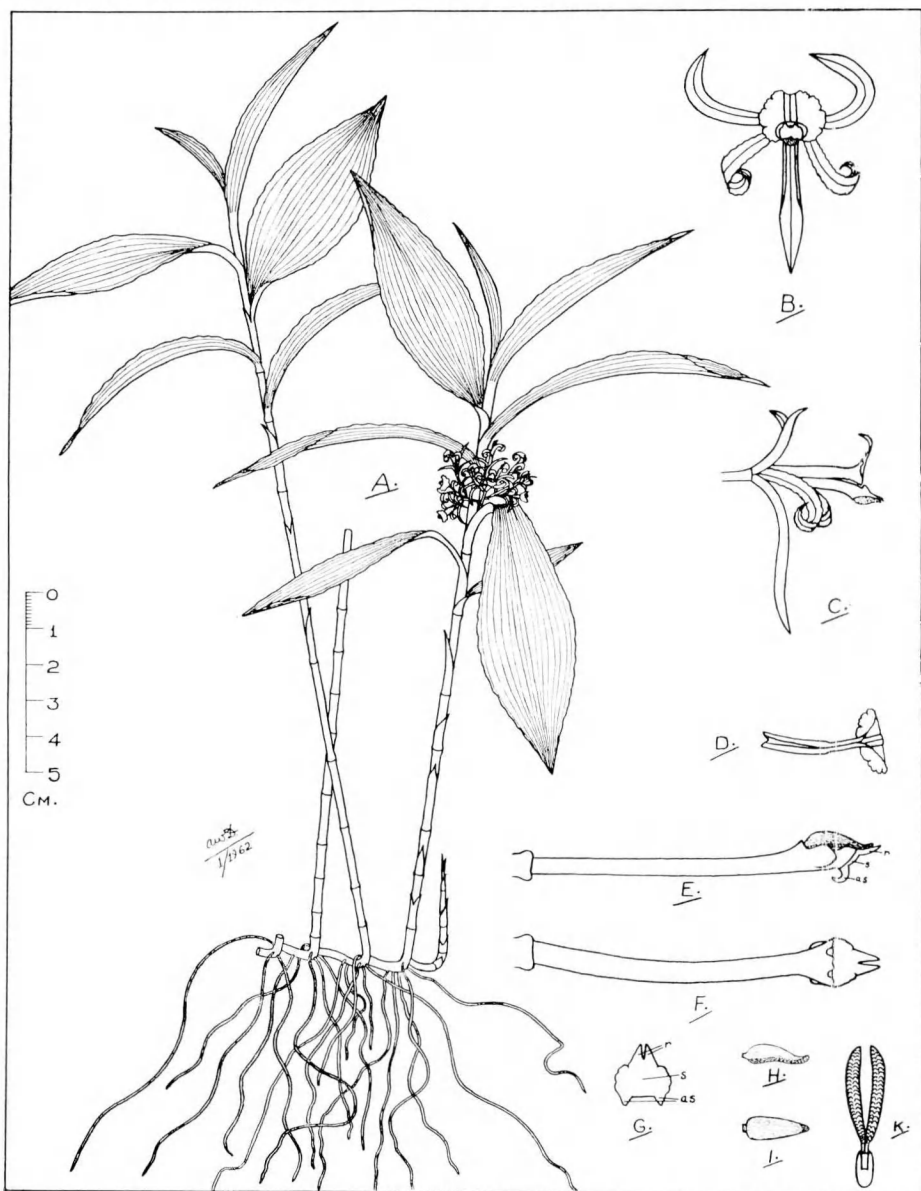
The distribution given was Font Hill Station, west of Port Douglas.

From the measurements and illustration given by Nicholls, l.c., this plant hardly seems to be a very significant variety.



DENDROBIUM RUPPIANUM A. D. HAWKES VAR. *RUPPIANUM* FORMA *RUPPIANUM*

- A. Portion of plant . . . to $\frac{1}{2}$ indic. scale. D. Labellum, flattened out . . . to scale x 5.
 B. Flower, from the side . . . to scale x 2. E. Labellum from the side . . . to scale x 5.
 C. Flower from the front . . . to scale x 2. F. Column from the side . . . to scale x 5.
 G. Column from the front . . . to scale x 5.
 H. Top of column, anther removed . . . to scale x 5.
 I. Anther from the side . . . to scale x 20.
 K. Pollinia from the front . . . to scale x 20.
 L. Pollinium from the side . . . to scale x 20.
 M. Flower of *forma magnificentum* Dockr. from the side . . . to indic. scale.
 N. Labellum of *forma magnificentum* Dockr. from above . . . to scale x 4.
 O. Labellum of *forma magnificentum* Dockr. from side . . . to scale x 3.
 P. Median longitudinal section of column and labellum of *forma ruppianum* . . . to scale x 5.

*CORYMBORKIS VERATIFOLIA* Thou Ex Blume

- A. Plant . . . to $\frac{1}{4}$ indicated scale.
 B. Flower from the front . . . to scale x 2.
 C. Flower from the side . . . to scale x 2.
 D. Labellum from below . . . to scale x 2.
 E. Column from the side . . . to scale x 5.
 F. Column from below . . . to scale x 5.
 G. Stigma and Rostellum . . . to scale x 5.
 H. Anther from the side . . . to scale x 5.
 I. Anther from above . . . to scale x 5.
 K. Pollinia . . . to scale x 10.
 L. Median longitudinal section of column and labellum . . . to scale x 3.
 r. rostellum
 s. stigma
 as. arms of stigma

THE GENUS *CORYMBORKIS* THOU. EX BL. IN AUSTRALIA

by A. W. DOCKRILL

This genus is represented in Australia by a single species.

C. veratrifolia Thou. Ex Bl., Orch. Arch. Ind. 125, t 42, 43 (1855).

Corymborchis veratrifolia Bl., Flor. Java N.S. 105, t 42e, F1 (1858); J.J. Sm. Orch. Java Fig. Atlas 2: t 99 (1909); Holttum, Flor. Malaya 1:144-5 (1957).

Corymbis veratrifolia Reichb. f., Flora 184 (1865); Benth., Flor. Austr. 6: 311 (1873); F. M. Bail., Qld. Flor. 5:1559 (1902); Schltr., Die Orch. von Deutsch Neu Guin. 95, t 38 no. 131 (1914).

Corymbis thouarsii Krzl., in K. Schum. et Laut., Flor. Dtsch. Schutzg., Suds p. 241 — not of Reichb. F.

Corymbis longifolia Ridl., Flor. Malay. 4:208 (1907).

A terrestrial glabrous plant 40-140 cm. tall. Rhizome short, $\pm$ horizontal subterranean. Roots up to 45 x about 0.2 cm., wiry and woolly. Stem 4-8 mm. diam., woody; bracts sheathing, soon drying. Leaves 6-15, distichous, 18-32 x 5-10 cm., sheathing, ovate to obovate, acute, thin in texture, ribbed and fluted, margins somewhat undulate. Inflorescences 1-4 from the axils of the leaves, corymbose-paniculate, 5-20 cm. diam., containing from a few to about 60 green and white flowers. Flowers fragrant, not long-lasting, delicate in texture, spidery, the segments irregularly curved, curled and undulate. Dorsal sepal 25-30 x 2-3 mm., green, lanceolate, concave. Lateral sepals 20-25 x 2-3 mm., green, linear-falcate to lanceolate-falcate. Petals 25-30 x 3-4 mm., frosted white, lanceolate but variously curled. Labellum consisting of a deeply channelled, narrow, column embracing basal portion and an apical lamina at right angles to it; basal portion 14-18 x about 2 mm., on its disc are 2 barely-discernible long raised lines which diverge on the lamina and end in small callosities; apical lamina 6-8 x 8-12 mm., white, frosted, cordate or oval, margins crenate and deeply and irregularly undulate, apex decurved. Column 9-10 x about 1 mm.; wings a mere thickening at the apex. Stigma at the apex of the column, its base produced into 2 short obtuse or rounded arms. Rostellum at the apex of the stigma, very prominent, at least 1 mm. long, slender, deeply bifid. Anther erect at the back of the apical portion of the column, about 5 x 1 mm., shallow, dark brown, ovate with a rather long rostrum. Pollinia 2, very slender, longitudinally grooved, recticle, the groups and grains slender, and arranged in rows; stipes short lorate; retinaculum rather large, peltate. Capsule averaging about 25 mm. long, strongly ribbed.

Flowering Season—Usually December to March in Australia, but somewhat irregular.

Distribution—Tropical North-East Queensland, extending to New Guinea, Indonesia and Malaysia.

This tall plant, when not in flower, resembles a small palm rather than an orchid. It grows on the floor of lowland rain forests, with its rhizome and roots rather deeply and very firmly embedded in the soil. It is fairly readily cultivated in the tropics either in large pots or planted directly in the floor of the bush-house. It is strictly a tropical plant and is very impatient of the cold and drying out of the roots during transport and its range is almost entirely within the North Queensland floral reserve, so consequently it should not be sought by southern growers.

WILDFLOWERS OF CENTRAL AUSTRALIA—Continued from page 222

Kochia tomentosa, resembles *K. georgei* somewhat but fruit smaller. Up to 3 ft. in height this very hardy plant grows in arid sandy soil and I have raised it successfully from seed in a rockery. Leaves linear, succulent, bluish, slightly hairy. Fruit usually golden winged but I have seen red winged fruit on specimens growing on top of red sandstone hills south of Alice Springs.

Should a gardener be troubled with a patch of "hard" ground, which is clayey or saline, try one or two species of the perennial Saltbushes—they are used to "tough" soil.

THE GENUS CASUARINA IN AUSTRALIA

This will serve as an index to our articles (some in a previous issue) on *Casuarina*, all Australian species being listed and any references will have the page number in (). The West Australian species have been taken from our publication "West Australian Plants" the reference in () after W.A. referring to their habitat as there defined.

- C. acutaria* F. Muell. A small shrub, 3ft., white sand. W.A. (Se).
- C. acutivalvis* F. Muell. An erect shrub in thickets 10-20ft. Loam or gravel, W.A. (Sa, Eco).
- C. baxteriana* Miq. An erect shrub 3-12ft. on river flats. W.A. (Ssw)
- C. campestris* Diels. An erect shrub 3-10ft. Gravel or granite areas, W.A. (Sia Eco).
- C. corniculata* F. Muell. "Tamma". Shrub in thickets 6-12ft., gravel and sand, W.A. (Eco).
- C. cristata* Miq. "Belar" (Black Oak in S.A.). A dry inland species occurring in alkaline soils and calcareous sands. Usually a tall tree to 30ft. but often to 60ft. Inland areas of all mainland southern States (pp. 186, 187, 231, 239).
- C. cunninghamiana* Miq. "River Oak". Always a tree, sometimes to 100ft. with the same drooping foliage as *C. equisetifolia*. Along streams in N.S.W. and Qld. (pp. 186).
- C. decaisneana* F. Muell. "Desert Oak." A species of the sandy semi-desert of all mainland States, often to 40ft. (pp. 185, 231).
- C. decussata* Benth. A tree, 25-50ft. of the karri & jarrah forests of W.A. (Ssw).
- C. dielsiana* C. A. Gardn. A tree, 15-20ft. in red stony loam of W.A. (Si, Eau).
- C. distyla* Vent. "Shrubby Sheoke." An erect spreading shrub, very rarely a small tree, 3-15ft. N.S.W., Vic., Tas. (pp. 231).
- C. drummondiana* Miq. A dense shrub 1-3 ft. of the gravel and sand heath of W.A. (Sa).
- C. equisetifolia* Forst. "Ironwood." A coastal and seaside species, always a tree, sometimes tall to 100ft. The tropics of Qld. & N.T. (pp. 230).
- C. equisetifolia* var. *incana*. Benth. A tree mostly to 25ft. of N.S.W. and Qld. (pp. 186).
- C. fibrosa* C. A. Gardn. A small dense shrub to 3ft. of the quartz and heath of W.A. (Sa).
- C. fraseriana* Miq. A spreading tree to 50ft. of the woodland and forests of W.A. (Sdsw).
- C. glauca* Sieb. ex Spreng. "Swamp Oak or Grey Buloke." Occurs on river banks as well as in swampy situations and near subterranean water in dry inland places. Often on estuaries and other salty situations. Vic., S.A., N.S.W., Q. (pp. 186).
- C. grevilleoides* Diels. A small shrub 8"-12" on quartz hills of W.A. (Sa)
- C. helmsii* Ewart & Gordon. An erect shrub of stony granite hills, 10-19 ft., S.A., W.A. (Eco).
- C. huegeliana* Miq. A spreading tree to 30-40 ft. on granite. W.A. (Sadse).
- C. inophloia* F. Muell. "Stringybark Oak." The loose fibrous and flaky bark of this tree (20ft.) of rather dry sandstone country is distinctive. Qld., N.S.W. (NW slopes).
- C. littoralis* Salisb. (*C. suberosa* Otto & Dietr). "Black Sheoke". A tree to 30ft. on a wide variety of country in dry sclerophyll forests of Qld., N.S.W., Vic., Tas. (pp. 186, 231, 232, 235).
- C. luehmanni* R. T. Baker "Buloke." A tall tough-barked tree of the moderately dry inland of Vic., S.A., N.S.W. & Qld. (pp. 186, 231, 235).

- C. microstachya* Miq. A shrub to 3ft. on sand heaths of W.A. (Sads).
- C. muelleriana* Miq. "Slaty Sheoke." Usually a reddish coloured rounded shrub but sometimes seen as a small tree, 3-8 ft. Sclerophyllous mallee and heath of Vic. & S.A. (pp. 231, 232).
- C. nana* Sieb. ex Spreng. "Stunted or Dwarf Sheoke." A dense, low and much branched shrub to 3ft., occasionally more. Sandstone heathy country of Vic. and N.S.W. (pp. 231).
- C. obesa* Miq. "Swampy Oak." A spreading tree to 30ft. Swampy flats of W.A. (Sads).
- C. paludosa* Sieb. ex Spreng. "Swampy Sheoke." Shrub to 5ft. in heaths often poorly drained in N.S.W., Vic., S.A., Tas. (pp. 231).
- C. pinaster* C. A. Gardn. An erect shrub, 6-12ft. on gravel and sand of W.A. (Ss).
- C. pusilla* Macklin. "Dwarf Sheoke". A low rounded shrub, often cushionlike, 2-4ft., of the heaths of Vic. & S.A. (pp. 230).
- C. ramossissima* C. A. Gardn. A shrub to 3ft., gravel, W.A. (Sa).
- C. rigida* Miq. Usually a small rounded and bushy but sometimes seen as a small tree. Tas., N.S.W. Qld., S.A. (pp. 231).
- C. striata* Macklin, "Small Buloke." Sometimes a small tree but usually a spiky shrub very variable in habit, to 6ft., laterite, S.A.
- C. stricta* Ait., "Drooping Sheoke or Hill Oak." Usually a tree but sometimes seen as a small dense shrub. The male tree is generally more shapely and the branchlets more pendulous than in the female tree. To 30ft. Tas., Vic., N.S.W., S.A. (pp. 186, 187, 231, 232).
- C. tessellata* C. A. Gardn. An erect shrub, 10-15ft. in thickets. Granite loam of W.A. (Eau).
- C. torulosa* Ait., "Forest Oak." Usually a tall tree to 70ft. but may occur as a small tree, of mostly wet sclerophyll forest in N.S.W. & Qld. (pp. 156, 187, 235).
- C. thuyoides* Miq. Slender shrub 3-6ft. Wet places in W.A. (Sads).
- C. trichodon* Miq. A dense shrub, 6-10ft., on sandstone and quartz. W.A. (Sse).

THE SONG OF THE SHE-OAK

The She-Oak loved the ocean
And bent till each drooping tress
Swung back from the sapphire wave again,
Agleam with his bright caress.

She was so lone and sombre,
He was so gracious and free,
Small wonder she gave her heart to him
And echoed his melody.

Now hath the ocean vanished
From the midlands far away,
And green lie the slopes of the valley
Where once dreamed the azure Bay.

Still, in her isolation
When the winds are on the wing,
Deep within the heart of the She-Oak
Is the song he used to sing.

Mary F. Smith

THE FAMILY CASUARINACEAE

by J. ROS. GARNET

Having been incautious enough, when writing of Casuarinas as street trees, to leave room for the inference that I knew more than I really do (or did) about the members of the genus, the editor has taken me up on it and actually invited "a botanical dissertation" on them.

I know too little about the endemic Westralian species to think of including them but, with the connivance of the editor, I am going to deal with the others and, as well, provide a key which will allow one, in the field, to identify the seventeen species which, it seems, grow in the other States.

One or two familiar names are absent from the key but the species they represent are there, under their presently accepted name. It is possible that one or two of the names I have used may themselves be supplanted some day as a consequence of further botanical research having demonstrated the need for a change. It is not a bit unusual for a species of plant (or animal) to be known in different places by different scientific names but only one of them is valid. A case in point is *Casuarina suberosa* which has been shown to be merely a form of *C. littoralis*. Another is *C. lepidophloia* which had been already described as *C. cristata*.

My authorities for much of the technical description in the article which follows include Benthams, Mueller, Bailey, Ewart, Black and Ellen Macklin and I am thankful that their works were available to supplement my own field experience and knowledge of the genus. However, in using the key and any supplementary descriptive matter one should remember that plants, like human beings, can be tricky. They do not always run true to type but, if the observer uses his nous he will be able to allow for those disconcerting departures from the "normal" which, otherwise, could leave him with the impression that he may have found an undescribed species. To use the key one will need nothing more than good powers of observation, an ability to think of dimensions in terms of millimetres instead of inches for to remember that there are 25.4 millimetres in an inch) and a good pocket lens. The lens will be needed for counting the leaf-teeth or for examining the branchlets for evidence of the presence or absence of ribs, of their angularity or smoothness and, in the last resort, for looking closely at the structure of the female cones.

The drawings on page 232 will help to identify many of the terms used in the key. Two of the drawings, used with acknowledgements to Miss Macklin, are included to show that the identification of species of Casuarina can be really a problem to the observer in the field unless he is equipped with apparatus for cutting thin sections of branchlets, staining the sections and examining them under the microscope. Some of the characters formerly used to determine species, although quite distinctive, are now recognised as being of little value for that purpose because they are inconstant or too variable. For instance, it does not signify much whether a plant is dioecious or monoecious. The size and shape of the female cone, the length of its stalk and the acuteness of its valves vary markedly within a species. Even characters such as diameter and length of internode of the deciduous branchlets (as used in the key) vary from specimen to specimen although the average length seems to be fairly constant. The angularity of the branchlets has some importance because it depends upon their anatomical structure—the longitudinal ridges being either rounded or flattened, wide or narrow, deep or shallow and hairy or hairless. The number, size and shape of the teeth in the sheathing ring at the nodes of the branches and branchlets are fairly specific but, as the key shows, there is likely to be some overlapping as between species.

Where there is a possibility of two or more species having exactly the same number of leaf-teeth other characters must be taken into account in identifying a plant. If the plant possesses female cones their structure will furnish the required clues. One needs to look at the shape of the valves (bracteoles) and their dorsal protuberance—that line of woody tissue which separates the lines of valves from which the seeds are shed. If it happens to be a flowering male plant, an inspection of the spike of flowers, especially those on the tips of the deciduous branchlets, will help. The average length of the spikes seems to be characteristic of a species.

Despite the shared characters, there are invariably enough obvious unshared ones to make it possible for an observer to track down the species by the sort of process of elimination by which a "dichotomous key" is meant to operate but, remember, the key is not meant to take the place of a full description. It omits plenty of quite important or obvious distinguishing characters of a kind which are invariably mentioned in descriptions of species. And, anyhow, in the field, the task of identification is much easier than might appear. With experience and an acquaintance with the habitats favoured by the various species most of them are recognizable without much trouble. It is the anomalous plant which causes bother. Its irregularities might be due to hybridization or even mutation. The best thing to do with that sort is to pack off a specimen to the National Herbarium and let systematic botanists worry over it.

Casuarina is the sole genus in the family Casuarinaceae. The plants are angiosperm phanerogams—in other words, flowering plants—which were first described by Rumphius as long ago as 1755. Most of the species are Australian but one, *C. equisetifolia*, is found in East India and New Caledonia while the non-Australian *C. nodiflora* is found in some of the Polynesian Islands. Anatomically *Casuarina* has affinities with gymnosperms as, for example, with Horsetails (*Equisetum*) and *Ephedra* by reason of the stem being jointed at every node but, in other respects, its members are flowering plants which develop true seeds. The most conspicuous characters of *Casuarina* are in the apparent absence of leaves, the possession of long wiry and jointed deciduous branchlets, the frequent separation of sexes where

male flowers occur on one tree and female flowers on another, the peculiarity of the flowers themselves and the development of woody cones which, superficially, look like cones of the gymnosperms pines and in the winged seeds which are contained in the cones.

The Casuarinas are wind pollinated and, for this form of pollination to be effective, extraordinary large volumes of pollen are produced. Being a rather "hit or miss" method of fertilization it is surprising that so many of the cones are regular in shape, that the full number of ovules have been successfully pollinated.

The species range in size from a small cushion plant six inches or so in height (*C. pusilla*) to tall trees of 50 or more feet (*C. cristata*). In fact, Mueller asserts that *C. equisetifolia* may grow as high as 150 feet but such a dimension seems not to have been recorded for any Australian specimen. A number of the species grow as shrubs in one place and as small trees in another. *C. stricta* and *C. muelleriana* are examples. Some flourish in the tropics (*C. equisetifolia* and the extra-Australian *C. nodiflora*) and others

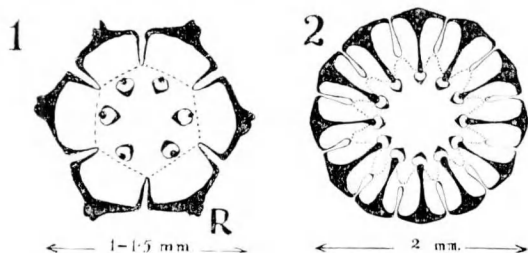


FIG. 1—Cross section of a deciduous branchlet of *Casuarina muelleriana*, showing grooves and prominent ribs (R) corresponding to the midribs of leaf-teeth (after Macklin).

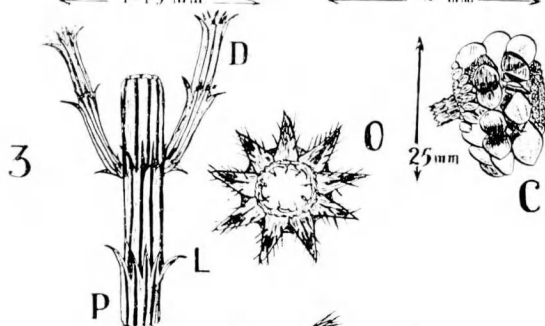


FIG. 2—Cross-section of a deciduous branchlet of *Casuarina luehmannii*, revealing the apparent absence of ribs and grooves and the consequent cylindrical character of the branchlet (after Macklin).

The black T-shaped cells typify a group of species which includes *C. stricta*, *C. rigida*, *C. distyla*, *C. paludosa* and *C. cristata*. Such T-shaped cells are lacking in the group of species which includes, for example, *C. muelleriana*, *C. nana* and *C. littoralis*.

FIG. 3—*C. cristata*: Portion of permanent branchlet (P) and deciduous branchlet (D) with recurved leaf-teeth (L). A transverse section of a deciduous branchlet (O) of *C. cristata*, with leaf-teeth extended to show their shape and minutely hairy character. Side view of cone of *C. cristata* (C).

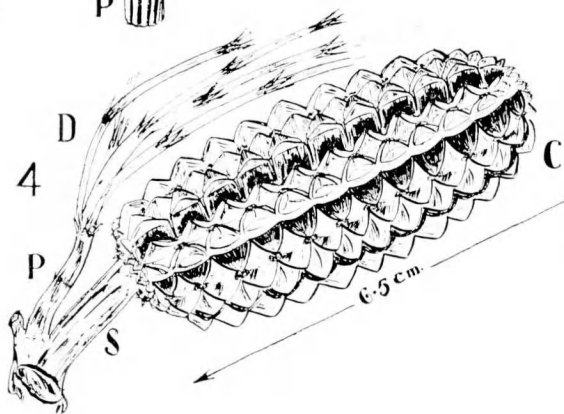


FIG. 4—*C. decasneana*: A stalked cone (S) with opened valves; portion of a permanent branchlet (P) with a whorl of four deciduous branchlets (D) showing the relatively long, acute leaf-teeth.

never penetrate beyond the temperate zone. Several of them seem to thrive best in arid places where the rainfall is below 14 inches and often irregular (*C. cristata* and *C. decaisneana*). The absence of leaves is but one of the adaptations which allow *Casuarina* to survive long droughts and, in the event of death through overlong drought, perpetuation of the species is made possible by another interesting character which is possessed by its seeds. Even though lacking in albumen and not enclosed by a tough impervious cuticle, the seeds remain viable for many years. Ewart mentions an instance of 60% germinating after storage for 10 years. I have obtained 100% germination in 5-year-old seeds of *C. decaisneana*.

I have mentioned the unusual form of its male and female flowers but, without having specimens in front of one, it may not be easy to picture their peculiar anatomy. However, botanists describe them succinctly in the following terms:

The male flowers occur in cylindrical spikes, generally along the ends of thin wiry branchlets which eventually drop off. The branchlets are thus

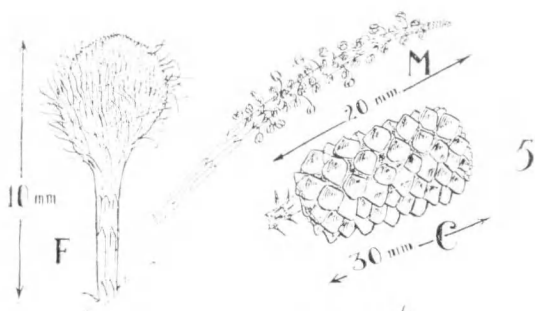


FIG. 5—*C. littoralis*: An immature female cone (F) showing the fringing exserted styles. A male flower spike (M). Cone with unopened valves (C).

FIG. 6—*C. stricta*: Portion of a permanent branchlet (P). An immature female cone (C) prior to emergence of the styles. Three internodes of each of two deciduous branchlets (D).

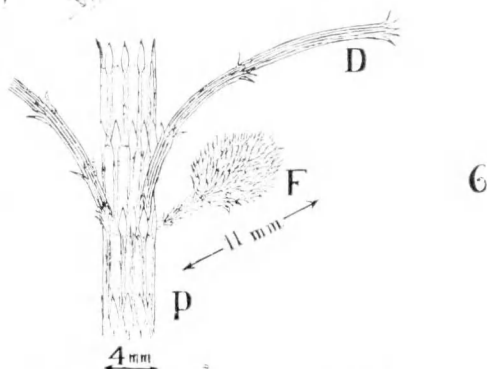
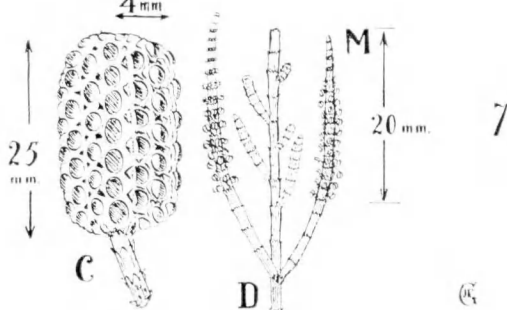


FIG. 7—*C. muelleriana*: Cone (C) with opened valves. Deciduous branchlets (D) in various stages of growth, showing the short internodes—with two male flower spikes.



"deciduous." Each flower is stalkless and solitary and emerges from the axils of whorled bracts which are joined at the base to form a sheath. Each separate flower (which is, in fact, nothing more than a single anther-bearing stamen) is at first enclosed within two tiny opposite bracteoles. These, as the stamen develops, are pushed off leaving only the long pendulous stamen. Since the flowers emerge in a whorl or ring and the rings are set one above the other along the length of the extremity of the branchlet, the flower spike has some resemblance to a catkin—the colour of which varies according to the colour of the pollen in the anthers. The spikes vary in length, very long, perhaps 3 or 4 inches, in some species and very short, less than quarter of an inch, in others but the average length is fairly constant for a given species. Often male spikes will be seen emerging from the older and permanent branches, but invariably from the axils of the whorled leaf-sheath at the nodes of those branches.

The female flowers occur as shortly stalked or quite stalkless globular or ovoid clusters at the axils of permanent branches. They have no petals or sepals and are simply a very short style which has two hair-like red or purplish stigmatic branches. They too emerge from the axils of whorled bracts but their cone-like clusters always arise on the non-deciduous "permanent" branches. As the solitary (or, occasionally, paired) flowers have no perianth at all they appear as a series of fringes of pistils one above the other, formed by the long and paired hair-like stigmatic branches. As these style branches are red or purplish in colour the fringed globular clusters become quite conspicuous when ready to receive the air-borne pollen.

From these little globes develop the woody cones which, generally speaking, characterize the species. Although the single flowers lack petals and sepals each style is embedded in what are, in fact, woody bracts and bracteoles. The bracteoles close over the ovule and when it is ripe they open like valves to release the seed. In some species the basal bracts enlarge and protrude beyond the valvate bracteoles. These are what are called the dorsal protuberance. In some they are rounded, in others pointed, in yet others they are practically absent or mere vestiges. All these small differences are used in differentiating species although it should be re-iterated that a much more certain method of identification relies largely upon a microscopical examination of the anatomy of the deciduous branchlets.

Editor's Note: Mr. Garnet has put considerable thought into presenting a key based on features readily distinguished by an amateur. As he made clear in the foreword, this could lead to error. However, a thorough key is a very difficult proposition and if presented would require the services of a very competent botanist indeed to even be able to use it.

KEY TO THE CASUARINAS OF EASTERN AUSTRALIA

- A. TREE WITH GREEN FOLIAGE
 - B 4 leaf-teeth at nodes of very slender deciduous branchlets *C. torulosa* Ait.
 - B¹ 5 or more leaf-teeth at nodes of slender, erect deciduous branchlets.
 - C Deciduous branchlets striate, palpably ribbed and angular; 1-1.5 mm. in diam.
 - D 5-7 but usually 6 short triangular leaf-teeth at nodes; internodes 5-8 mm. long *C. muelleriana* Miq.
 - D¹ 6-9 but usually 7 ciliate leaf-teeth at nodes; internodes 10-20 mm. long;
 - Cones valves not prominent but with a conspicuous dorsal protuberance *C. rigida* Miq.
 - C¹ Deciduous branchlets finely striate but not palpably ribbed or angular.
 - 6-8 but usually 7 leaf-teeth at nodes; Internodes less than 6 mm. long and about 1 mm. in diam. *C. littoralis* Salisb.
 - B² 5 or more leaf-teeth at nodes of slender and curved or pendulous branchlets.

- E Deciduous branchlets with 6-8 but usually 7 leaf-teeth;
Internodes less than 6 mm. long and about 1 mm. in diam.;
Branchlets palpably ribbed but not angular; Cone globular.
- F Male flower spike 16-20 mm. long;
Deciduous branchlets not conspicuously striate;
Cone small, about 12 mm. in diam.
Valves protruding about 2 mm. with no dorsal protuberance *C. equisetifolia* Forst.
- F¹ Male flower spike 12-15 mm. long;
Deciduous branchlets with fine striae;
Cone very small, 8-9 mm. in diam.
Valves prominent, with a broad, smooth-edged dorsal protuberance of about the same size as the valve *C. cunninghamiana* Miq.
- E¹ Deciduous branchlets with 9-12 short, pointed leaf-teeth;
Internodes 10-40 mm. long and about 1.5 mm. in diam; rough to the touch, palpably ribbed but not conspicuously striate;
Male flower spike 40-100 mm. long;
Cone globular or oblong, 20-60 mm. long and 10-40 mm. in diam.;
Valves with prominent pointed summits and the dorsal protuberance less than half as long as the valve and much the same shape, ovate-oblong or ovate-triangular *C. stricta* Ait.
- A¹ TREE WITH GREYISH OR HOARY OR GLAUCCUS FOLIAGE.
- G 4 leaf-teeth at nodes of rather short deciduous branchlets;
Cone oblong, from 1-4 inches long *C. decaisneana* F. Muell.
- G¹ 6-9 but usually 7 leaf-teeth at the nodes of the deciduous branchlets.
- H Deciduous branchlets erect or more or less curved, not palpably ribbed but the striae quite apparent, about 1.5 mm. in diam;
6-8 leaf-teeth at nodes;
Cone ovoid or narrow cylindrical, 25 mm. or more long;
Valves prominent and with a conspicuous dorsal protuberance *C. striata* Macklin
- H¹ Deciduous branchlets rather pendulous, cylindrical but palpably ribbed and perceptibly striate, less than 1 mm. in diam.; 6-9 leaf-teeth at nodes;
Cone with a long peduncle (or stalk), oblong or almost globular, depressed (or flattened) at the top, 20-25 mm. long, 15-17 mm. in diam. *C. inophloia* F. Muell.
- G² 9-16 leaf-teeth at nodes of deciduous branchlets;
Cone globular, flattened at summit;
Valves prominent.
- J Deciduous branchlets visibly striate but not palpably ribbed.
- K Deciduous branchlets about 1.5 mm. in diam.; 9-10 pointed and minutely hairy leaf-teeth which curve outwards as they age;
Cone about 25 mm. in diam. *C. cristata* Miq.
- K¹ Deciduous branchlets about 2 mm. in diam.; 10-13 leaf-teeth which remain appressed against the nodes;
Cones about 15 mm. in diam. *C. luehmanni* R. T. Baker
- J¹ Deciduous branchlets palpably ribbed, rather pendulous, more than 1 mm. in diam.; 10-12 or even 9-16 short appressed leaf-teeth;
Cone about 15 mm. in diam. *C. glauca* Sieb.
- A² SHRUB WITH GREYISH OR HOARY OR GLAUCCUS FOLIAGE.
- L 4-6 but usually 5 overlapping leaf-teeth at nodes of deciduous branchlets;
Male flower spike 6-12 mm. long;
Cone sessile (with no stalk), globular to oblong-cylindrical, about 15 mm. long, about 8 mm. in diam. *C. nana* Sieb.
- L¹ 6-8 but usually 7 triangular, appressed leaf-teeth at nodes of deciduous branchlets, not palpably ribbed but striae quite apparent;
Male flower spike 10-30 mm. long;
Cone ovoid to cylindrical, narrow, 15-20 mm. long;
Valves not prominent but with a conspicuous dorsal protuberance *C. striata* Macklin
- A³ SHRUB WITH GREEN FOLIAGE.
- M Deciduous branchlets cylindrical but not palpably ribbed.
- N 5-6 very short leaf-teeth at nodes of deciduous branchlets;
Male flower spike 4-8 mm. long;
Cone oblong-cylindrical, hoary, 20-25 mm. long, 15-18 mm. in diam.;
Valves rounded and prominent *C. helmsii* Ewart and Gordon
- N¹ 6-8 but usually 7 leaf-teeth at nodes of deciduous branchlets.
- O A low rounded shrub, often cushion-like, 25 to 100 cm. high;
Deciduous branchlets faintly striate, indistinct grooves not hairy, 0.5-1 mm. in diam.;
Internodes 4-8 mm. long;
Male flower spike 20-30 mm. long;
Cone sessile, globular or almost so, 10-20 mm. long;

- Valves elliptical, with rounded summits, not very prominent. Dorsal protuberance well-marked but shorter than the valves . . . *C. pusilla* Macklin
- O¹ A low erect shrub with bright green foliage; Deciduous branchlets sometimes perceptibly angular (polygonal) and striate, about 1-1.5 mm. in diam., with distinct hairy grooves; Internodes 5-10 mm. long; Male flower spike 10-20 mm. long (even longer in the S.A. variety *robusta*); Cone with short stalk, oblong, 15-20 mm. long and 12-15 mm. in diam. Valves elliptical, not very prominent, usually rather longer than the conspicuous and rounded dorsal protuberance . . . *C. paludosa* Sieb.
- M¹ Deciduous branchlets erect, angular and palpably ribbed; Leaf-teeth 5-9.
- P Deciduous branchlets striate, 1-1.5 mm. in diam. Dorsal protuberance of valves almost as long as valves.
- Q Leaf-teeth 5-7 but usually 6; Male flower spike 10-55 mm. long; Internodes of deciduous branchlets 4-8 mm. long; Cone with short thick peduncle, oblong or ovoid, 10-25 mm. long, about 15 mm. in diam; Valves not very prominent, elliptical, with rounded edges, dorsal protuberance conspicuous . . . *C. muelleriana* Miq.
- Q¹ Leaf-teeth 6-9 but usually 7; Male flower spike more than 80 mm. long; Internodes of deciduous branchlets 10-20 mm. long; Cone generally on a relatively long peduncle (up to 10 mm.), oblong or cylindrical, upwards of 30 mm. long and about 20 mm. in diam.; Valves not very prominent, elliptical, with sharp edges, dorsal protuberance conspicuous . . . *C. rigida* Miq.
- P¹ Deciduous branchlets not noticeably striate, less than 1 mm. in diam.; Dorsal protuberance of the valves shorter than the valves but conspicuous.
- R Leaf-teeth 6-8 but usually 7; Male flower spike 20-30 mm. long; Internodes of deciduous branchlets 5-10 mm. long; Cones almost sessile, globular or narrow-cylindrical, up to 35 mm. long; Valves not very prominent and with a shorter but conspicuous dorsal protuberance . . . *C. distyla* Vent.
- R¹ Leaf-teeth 9-12; Male flower spike 40-100 mm. long; Internodes of deciduous branchlets 10-40 mm. long; Cone globular, ovoid or cylindrical, 20-60 mm. long and 10-40 mm. in diam.; Valves prominent with a dorsal protuberance less than half as long as the valves; Deciduous branchlets long, pendulous, rough (or scabrous) not conspicuously striate . . . *C. stricta* Ait.

SOME QUEENSLAND CASUARINAS

by LEN MILLER

These members of our native flora are, for some unknown reason, rather neglected by the majority of native plant growers. To my mind they are very graceful trees and can become a great asset in many gardens. The Queensland species are very adaptable, and when grown in entirely different surroundings to their natural habitat, take on a refined and graceful appearance, making them a very desirable addition.

In Southern Queensland we have five species, all good garden subjects.

(Continued on page 239)

YOUR GUIDE TO NATIVE PLANT NURSERYMEN

Alexander Plant Farm—2 Winifred Street, Essendon, W5, Victoria.
 Amaroo Nursery—86 Lang Street, Padstow, N.S.W. One of the widest ranges of natives.
 Belbra Nursery—Box 12, Hall's Gap, Vic. W. and R. I. Stanton. The home of the *Thryptomene*.
 Boddy's Eastern Park Nursery—32 Denman St., Geelong, Victoria. 3,000 varieties.
 Clearview Nursery—W. Cane, Box 19 Maffra, Victoria. Specialist in developed plants.
 Deane's Orchid Nursery—157 Beecroft Road, Cheltenham, N.S.W.
 Denovan's Nursery—188 Marco Ave., Panania, Sydney, N.S.W. At nursery only.
 Greenbriar Drive-in Nursery—55 Britnells Rd., Briar Hill, Victoria. Large & varied selection
 McLeod, F. C. J.—Warrien Rd., Croydon, Victoria—Quality Plants.
 Narrabeen Nursery—1444 Pittwater Rd., Narrabeen Nth., N.S.W. Plants for coast.
 Parry, P. J.—"Floralands", Kariong via Gosford, N.S.W. A wide range. Postal orders taken.
 Tullamarine Plant Farm—8 Sharp's Road, Tullamarine, Vic. Closed Mondays.
 Willunga Nursery—21 Nelson Street, Thornleigh, N.S.W.

NATIVE PLANTS — USUAL & UNUSUAL

F. C. J. McLEOD

Wildflower Nursery

WARRIEN ROAD, CROYDON, VIC.

TULLAMARINE PLANT FARM

8 Sharps Road, Tullamarine

Phone: 30-7893

1 mile north of Essendon Airport
 Closed Mondays — Phone: 30-7893

— **SHRUBS, TREES, PERENNIALS** —
 Popular and Rare

YOUR GUIDE TO NATIVE PLANT SEEDSMEN

Nindethana, Box 5, Dripstone, N.S.W. For all Native Seed. Packets, ounce or pound lots.
 Australian Seed Co., Robertson, N.S.W. Bulk or packet lots. Stamped envelope brings lists.
 Western Wildlife Supply, Gilgandra, N.S.W.—Bulk supplies of natives and exotic tree and shrub seed to the trade—Special collections to order.
 King's Park Seed Supply, King's Park, Perth, Western Australia—see advertisement.

NINDETHANA NATIVE PLANT SEEDS

By Packet, Ounce or Pound
 Large selection. Send for free list.

NINDETHANA

(G. W. Althofer)

Box 5, Dripstone, N.S.W.

KING'S PARK AND BOTANIC GARDEN PERTH, W.A.

Descriptive Catalogue of W.A. Plants,
 13/6 post free; 24-page Coloured Booklet
 on King's Park, 6/6 post free; 1965 Seed
 List (new season's list), 3/- post free;
 Progress Report on Botanic Garden, 2/6
 post free; Seed 3/- per packet.

Wholesale Rates on Application

More than 300 Species . . .

Native and exotic trees and shrubs available from Forestry Commission nurseries at Pennant Hills, Dubbo, Forbes, Muswellbrook and Narrandera, N.S.W.

For free catalogue giving complete details and prices of species contact:

FORESTRY COMMISSION OF N.S.W.

44 Margaret Street, Sydney. Telephone: B 0236

F. C. PAYNE

WILDFLOWER GARDEN

Addison Ave., Athelstone, S.A.

Manager: H. R. Holliday

Telephone: 371825

AUSTRALIAN AND SOUTH AFRICAN PLANTS

See mature specimens of plants you buy.

Open Every Day

No Mail Orders

ALEXANDER PLANT FARM
(Doug. Twaits, Prop.)2 Winifred Street, ESSENDON, W.5.
Phone: 379-5163EVERYTHING FOR THE GARDEN
Specializing in Australian Native Plants**Greenbriar Drive-in Nursery**

AUSTRALIAN NATIVE PLANTS

Large and Varied Selection.

BRITNELLS RD., BRIAR HILL, VIC.

1/2 mile beyond Greensborough

Phone 43-1468. Open Weekends

AUSTRALIAN NATIVE PLANTS

GOOD SELECTION ADVANCED & SEMI-ADVANCED PLANTS AT . . .

DENOVA'S NURSERY — UU 8891

188 Marco Avenue, Panania, N.S.W.

SORRY NO MAIL ORDERS

PRESERVATION BY CULTIVATION

FLORALANDS

KARIONG, via GOSFORD, N.S.W.

A large variety of the most popular native plants at nursery
PHONE: Gosford 21142 P. J. PARRY**WILLUNGA NURSERY**

Trade Supplies of Native Plants

21 NELSON ST., THORNLEIGH

Closed weekends

PHONE 84-3709

NATIVE PLANTS

250 varieties of shrubs, rockery plants, ground covers, trees. Many displayed in a garden setting.

AMAROO NURSERY

86 LANG ST., PADSTOW, N.S.W.

Closed Wednesday. Tel.: 77-7342

Catalogue 1/3 Posted.

No Interstate orders.

BODDY'S EASTERN PARK NURSERYNATIVE PLANT SPECIALISTS
(3,000 varieties)Short Catalogue with Retail Price List
and full descriptions available.South African Proteas, Leucadendrons
and Leucospermums grown in variety.

Plants despatched all States

32 Denman Street, East Geelong, Vic.
Tel.: 91264**BELBRA NURSERY**

In the Heart of the Grampians

LARGE RANGE OF
AUSTRALIAN NATIVES

Inquiries: Box 12, HALL'S GAP

NARRABEEN NURSERY

74 AUSTRALIAN NATIVES

1444 Pittwater Rd., Narrabeen

Nth., N.S.W. — XX 2604

OPEN EVERY DAY

Specialist in plants for sea coast.

DEANE'S ORCHID NURSERY

Specialising in Australian Native Orchids

Send 8d. stamp for descriptive list. Plants sent anywhere.

Nursery open weekends only

157 BEECROFT ROAD, CHELTENHAM, N.S.W.

THE SOCIETY FOR GROWING AUSTRALIAN PLANTS

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

This journal is published by The Publishing Section on behalf of The Society for Growing Australian Plants and its member Societies as follows:

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

President: Mr. C. M. Taylor, 39 Addison Avenue, Roseville, N.S.W.

Secretary: Mrs. R. Bartholomew, 1431 Anzac Parade, Little Bay, N.S.W.

SOCIETY FOR GROWING AUSTRALIAN PLANTS—QLD. REGION:

President: Mr. P. Hamilton, Carnoola Street, Bardon, Brisbane.

Secretary: Mr. M. W. Hodge, 25 Barford St., Moorooka, Qld.

SOUTH AUSTRALIAN SOCIETY FOR GROWING AUSTRALIAN PLANTS:

President: Mr. R. Schahinger, 22 Kings Avenue, Burnside, S.A.

Secretary: Mr. E. J. Thompson, 115 Wattle Street, Fullarton, South Australia.

SOCIETY FOR GROWING AUSTRALIAN PLANTS—VICTORIA & TAS.:

President: Mr. F. Rogers, 108 Wanterna Rd., Ringwood, Victoria.

Secretary: (Sister) E. R. Bowman, 4 Homebush Cres., Hawthorn, E.3, Vic.

SOCIETY FOR GROWING AUSTRALIAN PLANTS—CANBERRA REGION:

President: Mr. G. E. Blakers, 46 Vasey Crescent, Campbell, A.C.T.

Secretary: Miss S. Rosengrave, Hotel Acton, Canberra, A.C.T.

WEST AUSTRALIAN WILDFLOWER GROWERS' SOC. INCORPORATED:

President: Mr. A. S. Mummery, Highview Rd., Greenmount, W.A.

Secretary: Mrs. J. Winzar, 8 Surrey St., Dianella, West Australia.

Membership is open to any person who wishes to grow Australian native plants.
Contact the Secretary of the Society for your State for information without obligation.

PUBLISHING SECTION FOR SOCIETIES

Managing Editor: W. H. Payne assisted by P. D. Leak

Sec.: L. Williams, Treas.: K. Coxhead, Dispatch by J. Birtles, N. Gane, C. Hubner, R. Greenaway, with families. Stencils: H. Bartholomew. Illustrations: A. Spurway and E. Ham.

Advertising and Sales Representatives in each State: N.S.W., P. D. Leak; Qld., W. W. Kilgour; S.A., I. G. Holliday, Tas., G. van Munster; W.A., F. Lullfitz; Vict., F. R. Jeffs

MAIL—Address mail to the Editor, 860 Henry Lawson Drive, Picnic Point, N.S.W.

SUBSCRIPTION—Members: Apply state Secretary above.

NON-MEMBERS: You may receive the next 4 issues direct to your home by forwarding an annual subscription of 12/-. Overseas subscriptions are 12/- sterling or 1½ dollars.

BOTANICAL PUBLICATIONS AND SCIENTIFIC PAPERS

We wish to advise Editors and Publishers that we are printing specialists in this field and would be glad to discuss the printing of these journals at your convenience.



SURREY BEATTY & SONS

Rickard Road, Chipping Norton, N.S.W.

Telephone . . . 602-6522, 602-7404

S.G.A.P. FEDERAL COUNCIL

The Society for Growing Australian Plants comprises the group of Societies from each State of Australia listed on the opposite page, linked by a Federal Council. This Council was fully constituted at a national conference in Sydney recently. While retaining their autonomy in every respect the State Societies feel that co-operative and co-ordinated action is essential now that the group has easily become the largest horticultural and preservation body in Australia. Just as this publication, the first product of such co-operation, has gained acceptance throughout Australia, in fact the world as hundreds of copies each issue go overseas, so can other ventures on a national scale hope for success.

To speculate at this early stage, on the objectives to be sought would be to belie our reputation for carefully planned and responsible activities. There is much to be done. While the Society and its publications are so widely accepted by the public and those in a position to judge, the respective governments in Australia do not as yet seek our council. The position with our native flora as regards its rapid extinction, or its considerable tourist potential, to mention just two aspects, is deplorable. The Federal Council will formulate plans to rectify these and any other matters of national importance. Whether we can interest the Government on this important aspect of our National Heritage remains to be seen. We hope that we are not too late and that all our elected politicians are not indifferent to challenge.

SOME QUEENSLAND CASUARINAS—Continued from page 235.

Casuarina cunninghamiana

C. cunninghamiana or "River Oak" is a tall tree of some 50 feet, being found mostly in the coastal belt. It has a rather fine foliage which tends to droop. Very adaptable providing the soil is deep.

Casuarina cristata

C. lepidophloia or "Belah" is also a tall tree found mostly on the Western Downs. Rather a coarse looking tree but very shapely and pyramidal in growth. An excellent tree as a specimen and I consider it ideal as a tall windbreak subject.

Casuarina luehmanni

Casuarina luehmanni or "Buloke", another tall tree from the Western Downs of good upright habit and very suitable as a garden tree and tall windbreak.

Casuarina inophloia

C. inophloia or "Thready Bark" is an entirely different tree in habit of growth. Only growing to about 20 feet it has no regular shape, and being of this irregular shape it is most attractive. The main trunk is fairly short and large and the bark as the name suggests is "thready", and would be about 3 inches thick.

Casuarina torulosa

C. torulosa or "Rose She-oak" is probably the most attractive of all. A slender tree with graceful drooping branches and foliage; its maximum height would be 25 ft. This is a tree which has a fairly wide range of habitat, from the Range country to the East and southern Downs. During the cooler months the foliage turns a bronze colour which adds to its charm.

All of these, with the exception of *C. inophloia* are raised from seed easily and are fairly fast growers. My *C. torulosa* are approximately 15 feet with 4 years growth. They are all subject to extreme heat and cold so would thrive almost anywhere. I would recommend them as being ideal for street tree planting.

FUSCHIA HEATH

Photography by Frank Hurley

Blocks by courtesy of John Sands Pty. Ltd.

EPACRIS LONGIFLORA

An easily grown garden shrub especially for that rocky position.

4. *Epacris longiflora* Cav.**Fuchsia Heath**

Throughout the year these most attractive straggly plants, 0.5-2 m. high, bear numerous scattered flowers which may be pendulous or horizontal. The long corolla-tube is usually red, but sometimes the upper portion may be white as are the lobes.

Found only in the coastal districts of N.S.W., usually in typical heath country, but it may occur in wet sclerophyll. When grown in cultivation, this species prefers to be grown in close association with other native plants.