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Photography by L. Carman

HAKEA FRANCISIANA

The cone flowered Hakeas—see description on page 343.

THE GENUS *HAKEA*

by Alec M. Blombery

The genus *Hakea* Schrad, which belongs to the family Proteaceae was named by Heinrich Adolph Schrader of Germany in 1797, in honour of Baron Christian Ludwig Von Hake, a German patron of Botany. J. E. Smith (later Sir James Edward Smith) later named the genus *Conchium*, but by the law of priority, *Hakea* is the accepted name.

There are some 130-140 species in the genus all of which are endemic to Australia. The species consist of shrubs and small trees; the leaves are alternate and vary in shape from flat to terete and may be smooth, tough, rigid, toothed or divided. The flowers which are usually small are on a short pedicel in axillary clusters or racemes; the tubular perianth is almost straight and usually separates into 4 segments; the anthers are sessile on the upper end of the perianth lobes: the style is usually longer than the perianth and protrudes from a slit in the perianth before the stigmatic part is released, when the style then becomes straight or curved; the style is dilated at the summit into a disc or cone, bearing the stigma in the centre; the ovary is smooth on a short stalk; the gland at the base of the short ovary stalk is semi-circular to horse-shoe shaped; the fruit is a hard woody follicle and opens into 2 valves with two seeds which are usually broadly winged on the upper end. The fruit is often large and attractive.

In the flowering stage some species are difficult to separate from the genus *Grevillea* but the woody fruit and seeds with a broad wing on the upper end enable separation.

Bentham in his "Flora Australiensis" divides the genus into 4 sections, and further subdivides Section 2 into three series and Section 3 into seven series. Bentham's system of classification is still followed and is as listed below.

Section (1). *Grevilleoides*—Flowers in oblong or cylindrical or rarely short racemes, without any involucre. Perianth much revolute. Stigmatic disc oblique or lateral, flat or broadly conical. Tropical or sub-tropical species.

Section (2). *Euhakea*—Racemes usually short or reduced to sessile clusters, enclosed before their development in an involucre or bud of imbricate scales. Perianth revolute at least under the limb. Stigmatic disc oblique or lateral, flat or slightly convex, without any cone (except in *H. rugosa* and *H. rostrata*).

Series i. *Oblique*—Perianth pubescent. Torus oblique, the ovary at the shortest margin, the remainder occupied by a large very concave adnate gland.

Leaves entire. Species all Western.

Series ii. *Pubiflorae*—Perianth pubescent. Torus straight or rarely oblique, the gland thick or semi-annular. Leaves entire, toothed or divided.

Series iii. *Glabriflorae*—Perianth glabrous. Torus straight or slightly oblique, the gland semi-annular or none.

(Continued on page no. 367)

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The principal theme is the plants *Hakea* with emphasis on the "Needle Hakeas" as indexed on page 341. Other Proteaceae described are *Petrophile* on page 349, *Lambertia* on page 384 and *Banksia* on page 356.

Native Orchids and their propagation are given on page 369.

Eucalypts In Urban Development—page 364.

H A K E A S

Some results of trials in a limestone mallee area of South Australia by K. Warnes

"What have I done to deserve such neglect?" This could well be the anguished cry of the genus *Hakea*, for apart from listing three N.T. species in "Australian Plants" No. 18, there has been nothing written about one of our hardiest and most attractive groups of plants. Whether you want shelter or ornament, flowers, foliage, or even unique fruits you will find a suitable *Hakea*. My experience is limited, but if I make a start perhaps someone else will continue the story.

Because of our conditions few species have reached large proportions but the general health and appearance of my early plants has tempted me to try other species. I now have 24 in all and seed of many more to try. With certain species some care in site selection is necessary and occasionally I have planted up to three specimens before finding the right spot.

The initial plantings were in a clearing in mallee scrub where the soil is a clay-loam pH 7-7.5 with limestone rubble pH 8.5-9 at a depth of two feet. Rainfall has varied between 5½" and 18" since planting began, but despite this added water is given only in the first summer. Drainage has proved necessary if the first winter is a wet one.

I first tried *H. laurina* which grew rapidly to four feet but twisted off in a gale. *H. baxteri*, of upright slender habit is my best specimen, reaching 8' in six years. Flowers are insignificant but the fan-shaped leaves are always attractive. *H. elliptica* has reached 4' 6" in five years and its beautiful bronze new tips compensate for any lack of growth. *H. petiolaris* is of open habit attaining a height of 5' in three years and last year carried a fine display of "sea urchins". *H. francisiana* proved difficult and I lost my first two plants. A third has reached a bushy 5' in eight years while two others have grown to 4' and 3' and flowered in their second year. *H. trifurcata* is a rapid grower and the massed display of white buds and flowers lasts many months. A unique feature of this species is the flattened leaves which develop at flowering and are carried for many months among the normal trifurcate needles. The summer-flowering *H. undulatum* is one of the few to set seed here. *H. suaveolens* seems quite at home but *H. victoriae* and a replacement *H. laurina* are slow.

The only local member of the genus is *H. leucoptera*, a species which seems to occur in two forms. Around Owen it grows to only 5' and propagates mainly by suckers, whereas the dry-land form grows to small tree size and seeds freely. Very similar is *H. cycloptera* with sharp needles of an attractive smokey-blue. As this species flowers profusely in April it is a most desirable plant.

H. bucculenta, *multilineata*, *verrucosa*, *crassifolia* and *kippistiana* are young plants growing well, but *H. nitida*, *suberea* (syn. *lorea*) and *bakerana* are very slow. *H. erinacea*, *orthorrhyncha*, *purpurea* and two other species are showing quite severe chlorosis in an area of pH 8.

Despite the fact that few of these plants can be expected to reach full size under our conditions I intend to plant many more, for their hardiness, adaptability, showy flowers, and in many cases highly ornamental foliage and interesting fruits make them among the best of Australian plants.

HAKEA PURPUREA

by M. W. Hodge

I have heard the statement "*Hakea purpurea* is a plant Queensland can be proud of", and I most certainly agree. It is the most spectacular and popular of the Queensland species. Its natural occurrence in Queensland is restricted to the southern part of the state west of the Dividing Range in such places as Kogan, Tara, Gurulmundi and along the Moonie Highway, growing in the open and among trees.



Photography by Ron Hill—Reprinted from "Growing Australian Plants" by Noel Lothian (Director, Botanic Gardens, Adelaide) and Ivan Holliday—Available for \$4.00 incl. postage.

HAKEA PURPUREA

It is easily grown in Brisbane provided that it is planted in a well-drained position which receives full or partial sunlight for most of the day. I prefer not to use general garden fertilisers but I do not know of their effect on this species. The usual form seen in gardens has needle leaves which are once or twice divided to form up to 7 points. The form seen on the Moonie Highway has predominately simple undivided foliage measuring up to 2½ ins. long. Seed collected from this form has produced the same characteristic in garden-grown plants.

H. purpurea produces a mass of red flowers which appear on some specimens as early as June and on others well into September. It forms a rather large lignotuber and should be able to withstand heavy prunings. Flowering plants seen in the wild vary in height from about 1 ft. to 6 ft. Probably many of them are periodically burnt by bush fires. Old specimens grown in gardens reach a height of 6 ft. or more. In suitable conditions *H. purpurea* can be regarded as a long-lived garden plant.

H. purpurea may be propagated readily from seed which has matured on the plant, preferably for more than 12 months.

See on Page no. 361—HAKEA—The Cultivation In Brisbane.

See on Page no. 362—QUEENSLAND HAKEA.

NEEDLE-LEAVED HAKEA SPECIES

The species of *Hakea* that have thin pointed (terete) leaves are listed below together with a reference to where they occur naturally. Further articles describe these species in their areas of occurrence for easy identification and the page numbers of these references are also given below.



Photography by F. W. Humphreys

HAKEA PREISSII—CHRISTMAS HAKEA

Species in brackets have divided leaves with terete sharply pointed segments.
C—Central Australia or N.T.; N—N.S.W.; Q—Queensland; S—South Australia;
T—Tasmania, V—Victoria; W—Western Australia—occurring naturally.

Hakea adnata W 342, *H. arida* W 342, *H. bakerana* N 339, 354, (*H. bipinnatifida*) W 343, *H. brachyptera* W 342, *H. chordophylla* QNW 342, *H. circumalata* W, *H. commuata* W 342, *H. condolleana* W 342, *H. constabei* N 354, *H. cunninghamii* CW 377, *H. cycloptera* S 339, 346, 374, (*H. divaricata*) SCN 346, 374, (*H. ednieana*) S 346, 374, *H. epiglottis* T 375, (*H. erinacea*) W 339, 342, *H. fraseri* NQ 362, *H. gibbosa* N 354, 361, 362, *H. invaginata* W, (*H. ivoryi*) NQ 346, 374, *H. kippistiana* WS 339, 342, 346, 361, 374, *H. lehmanniana* W 343, *H. leucoptera* CQSN 339, 346, 361, 362, 363, 374, (*H.*

lissocarpa W 343, *H. lissosperma* NVT 346, 347, *H. lorea* Q 361, 377, *H. macraeana* N, *H. meissnerana* W 343, *H. microcarpa* QNVT 346, 347, *H. morrisoniana* WNQ 363, *H. muelleriana* VS 345, 346, 375, *H. nodosa* VST 346, 347, 374, *H. obliqua* W 342, *H. oldfieldii* W 343, *H. orthorrhyncha* W 339, 342, 361, *H. persiehana* Q 361, 362, *H. platysperma* W 342, *H. preissii* W 341, 342, *H. propinqua* N 354, (*H. pulvinifera*) N 342, 361, (*H. purpurea*) 339, 361, 362, *H. recurva* W 342, *H. rostrata* SVC 346, 374, 375, *H. rugosa* VST 390, 346, 375, *H. scoparia* W, *H. sericea* NVT 346, 347, 354, 361, *H. strumosa* W 342, (*H. suaveolens*) W 339, 342, *H. suberea* WQNS 393, 346, 363, 374, *H. subsulcata* W 342, 361, *H. sulcata* W 342, *H. tamminensis* W, *H. tephrosperma* NQV, *H. teretifolia* NVT 346, 354, 375, *H. trifurcata* W 339, 342, *H. ulicina* NVTs 374, 375, *H. varia* W 343, *H. verrucosa* 339, 342, 361, 377, *H. vittata* S 346, 374.

Hakea of West Australia

Species with cylindrical racemes of flowers.

Leaves flat—See front cover plate and species described opposite.

Leaves terete—Section 9—see page 377.

Species with flowers in terminal clusters, pedicellate.

H. ruscifolia. An erect shrub 3-6 ft. Stigmatic disc oblique. White fls.

H. corymbosa. Bushy shrub to 3 ft. Yellow fls. Stigmatic disc, erect cone.

Species with Sessile Axillary Clusters of Flowers.

A. Stigmatic disc oblique or lateral

B. Perianth glabrous—Leaves flat—Section 1 (Species not included this issue)

Leaves terete—Section 2 (See below)

B. Perianth pubescent or seruffy, Leaves flat & broad—Section 3 (not this is.)

Leaves terete or narrow-lin.—Sect. 4 (below)

A. Stigmatic disc with erect cone

C. Perianth revolute under the limb i.e. flowerhead curls under at end

D. Style 2-2.5 cm. long—Section 5 (see page no. 344)

D. Style under 1 cm. long—Leaves broad—Section 6 (see page no. 376)

Leaves narrow, linear, terete—Section 7 (below)

C. Perianth tube straight, limb erect—Section 8 (343).

NEEDLE-LEAVED SPECIES OF HAKEA OF W.A.

Section 2 (as above)

E. Leaves divided—*Hakea purpurea* (see page no. 340).

E. Leaves undivided. F. Rachis & pedicels glabrous

H. strumosa—Shrub 3-6 ft. Red flowers

H. commutata—Shrub 10-12 ft. Cream/pink flowers

F. Rachis & pedicels sparingly hirsute

H. circumalata—A bushy shrub 3-5 ft. Pink/purplish fls.

F. Rachis tomentose, pedicels glabrous

H. recurva—Leaves divaricate, thick, curving down—Shrub/small tree 10-15 ft. Yellow fl.

H. arida—Leaves erect 4-6 cm. Erect shrub 6-10 ft. White/yellowish fls.

H. verrucosa—Wide branches clothed with hairs. Shrub—See page no. 377

Section 4 (as above)

F. Torus oblique, gland almost vertical *H. obliqua*. Shrub 3-6 ft. White fls.
gland oblique *H. adnata*. Shrub 6-10 ft. White fls.

F. Torus straight

G. Leaves narrow linear, mostly flat but a few terete.

Leaves grooved below 12 cm. *H. orthorrhyncha*. Shrub 3-8 ft. White/red fls.

Leaves entire, not grooved, 3 cm. *H. condolleana*. Erect shrub 3 ft. Yellow/white fl.

G. Leaves terete (often mixed with a few oval flat ones)

J. Leaves divided—3 segments, *H. trifurcata*

numerous segments, *H. erinaceae*. Erect shrub 3-6 ft. White fl.

J. Leaves not divided, slender, perianth not above 2 mm.

H. brachyptera. Seeds winged all around. A low shrub

H. kippistiana. Seeds winged one side. Shrub 3-6 ft. White fls.

J. Leaves not divided, thick, perianth 4-10 mm.

H. platysperma. Leaves 8-12 cm. Erect shrub 3-6 ft. Yellow fls.

H. preissii. Leaves 1.5-3 cm. Tall shrub-small tree 6-10 ft. See page 341

Section 7 (as above)

Leaves sulcate (grooved) *H. sulcata*. Bushy shrub 3-6 ft. White fls.

Leaves slightly striate and angular *H. meissnerana*. Shrub 4-6 ft. White fls.

Leaves distinctly striate *H. subsulcata*. Bushy shrub 6-10 ft. Pink fls.

Leaves quite terete, smooth *H. subsulcata* var. *laevis*

Leaves channelled above *H. lehmanniana*. Bushy shrub 3 ft. Pale blue fls.

Leaves very variable, fruit with dorsal horns *H. varia*. Shrub 6-10 ft., white.

Section 8 (as above)

Leaves undivided *H. oldfieldii*. Bushy shrub 3-6 ft., white to yellowish fls.

Leaves divided 8-10 cm. pinnate *H. suaveolens*. Shrub to 6 ft. White flowers.
under 5 cm. segments divaricate

H. lissocarpa. Rhachis 3 mm., bushy shrub, 3 ft., flowers white. Page 373.

H. bipinnatifida. Rhachis 6-8 mm.

WEST AUSTRALIAN HAKEA

Species with Cylindrical Racemes of Flowers

These may be grouped as the flat leaved species as described below and as the terete or needle-leaved species, all trees 15 ft. or more as mentioned on page 377.

Hakea bucculenta C. A. Gardner, is an erect shrub 2-3 metres high. Leaves are linear, each 15 cm. long, 2 mm. wide, with a single median nerve. The inflorescence is a broad raceme to 12 cm. long, each 4 cm. wide when in flower, rachis glabrous. Fruit is ovoid, obtuse to rounded at apex, sutures not keeled. Distribution: Geraldton north to Hamelin Pool area of W.A.

Hakea francisiana F. Muell. A slender erect shrub 2-4 metres high. Leaves very narrow oblong, acute, each 15-20 cm. long. 5-8 mm. broad, many nerved. The inflorescence is a broad raceme, 6-8 cm. long (or more), each 4 cm. wide in flower, rachis glabrous or tomentose. Fruit ovoid, obtuse, sutures not keeled. Distribution: Northern Yorke Peninsula in S.A. westwards to Western Australia. There are different forms which may deserve specific or infraspecific rank. Colour plate on front cover.

Hakea grammatophylla (F. Muell.) F. Muell. The resemblance of the flower of this group of *Hakea* to *Grevillea* is illustrated when it is realised that the species was first named *Grevillea grammatophylla* F. Muell., subsequently changed to a variety of *H. multilinea* by Bentham and finally named as above. However *H. grammatophylla* is a broad rounded shrub, quite different in habit to the other members of this group and is found in Central Australia. *H. grammatophylla* is a rounded shrub each 1-1.5 m. high. Leaves very narrow oblong, each 15 cm. long, 5-10 mm. broad and many nerved. The inflorescence is a broad raceme, each 5 cm. long, 3 cm. wide in flower, rachis tomentose. Fruit ovoid, acuminate, sutures not keeled.

Hakea multilinea Meissn. An erect shrub to 3 metres high. Leaves are very narrow oblong, to 15 cm. long, 10-15 mm. broad, many nerved; apex obtuse to rounded. The inflorescence is of many short racemes close together on the branch; racemes each 2-5 cm. long, each 4 cm. wide in flower, rachis glabrous. Fruit broadly ovoid, obtuse to acute, the suture strongly keeled along margin on one side in both valves. It is known only from the Wongan Hills area and also 60 miles S.E. of York, W.A.

Hakea multilinea is characterised by its very short congested racemes and by the keels which run parallel with the suture in both valves on the ventral side of the fruit.

***Hakea* sp. nov.** i.e. is yet unnamed. A shrub 2-3 m. high. Leaves broad-linear, 10-15 cm. long, each 4 mm. wide, with numerous fine nerves. Inflorescence of narrow racemes 3-5 cm. long, 15 mm. diameter in flower, rachis glabrous. Fruit ovoid, acuminate, not keeled along suture. It is found north of Kalgoorlie to Laverton and Wiluna in W.A.

HAKEA—Species with orbicular concave leaves—Section 5

Hakea victoriae Meissn. "The Royal Hakea". Illustrated in full colour in Issue No. 40, pp. 185, this superb plant is described also. Its principal feature is colouring of the variegated leaves and their unique shape.



Blocks by courtesy of South Australian Museum

Artist: Alison Ashby

HAKEA CUCULATA (3/5 full size)

Hakea cucullata R.Br. The leaves are glaucous with smooth crinkled edges. An erect shrub varying from 3 to 10 ft.

Hakea conchifolia Hook. The leaves are shell-like, glaucous, the edge being bordered by short prickly teeth. The fruit are larger than that shown for *H. cucullata*. A shrub to 3 feet its white to red flowers appear in June.

NEEDLE-LEAVED HAKEA

Species of South-eastern Australia—Victoria & South Australia



Blocks by courtesy of South Australian Museum

Artist: Alison Ashby

HAKEA MUELLERIANA (3/5 full size)

The species of *Hakea* with needle type (terete) leaves that occur naturally in Victoria and South Australia are listed in the simple keys over the page and are then described. The species found in Tasmania are described on page 347 and those in the Sydney sandstone area on page 352, 354.

A Simple Key to the Ten Needle-Leaved Hakeas of Victoria

by J. H. Willis

1. Flowers hairless or almost so 5
Flowers distinctly hairy 2
2. Fruit S-shaped, with long incurved beak 4
Fruit never S-shaped, without an incurved beak 3
3. Leaves always straight-tipped; flowers in summer, densely hairy; fruit narrow, warty near base (bush of southern heaths, chiefly in Gippsland) *H. teretifolia*
Leaves often hooked at tip; flowers in spring, with few hairs; fruit broad and quite smooth (small tree of Mallee and Murray Valley plains) *H. vittata*
4. Leaves 2-6" long, ascending; fruit 1-2" long (shrub 3-6 ft. in Mallee, Grampians and far S.W.) *H. rostrata*
Leaves about 1" long, at right angles to stem; fruit hardly 1" long (low shrub to 2 ft. from Big Desert to Grampians and far S.W., also near Bendigo and sources of Macalister River) *H. rugosa*
5. Flower-stalks hairless 8
Flower-stalks downy 6
6. Leaves pliant, pale yellow-green; flowers minute, yellow (bush of swampy southern heaths) *H. nodosa*
Leaves rigid, dark green; flowers white or pink 7
7. Leaves widely spreading; flowers less than 6 per cluster, in winter and early spring; seed wrinkled (very widespread, tall irregular forest shrub) *H. sericea*
Leaves stiffly upright; flowers more than 6 per cluster, in summer; seed smooth (subalpine shrub or small tree with regular ascending branches) *H. lissosperma*
8. Flowers numerous (20 or more) in a short raceme; seed-wing whitish; leaves quite cylindrical, hoary (tall shrub of N.W. Mallee) *H. leucoptera*
Flowers usually less than 20, densely clustered; seed-wing dark; leaves often slightly flattened, never hoary (except when very young) 9
9. Fruit beaked, more than $\frac{1}{4}$ " wide; flowers very shortly stalked (Mallee shrub to 6 ft.) *H. muelleriana*
Fruit blunt, less than $\frac{1}{4}$ " wide; flowers on slender stalks (irregular subalpine shrub 3-6 ft. in E. Highlands) *H. microcarpa*

Key to Needle-Leaved Hakea of South Australia

Notes prepared from Blacks Flora of S.A.

- A. Fls. spreading, in long cylindrical racemes, without an involucre of bracts.
Trees or shrubs with rough corky bark.
- B. Leaves simple, 20-60 cm. long. *H. suberea* 1
- B. Leaves forked. Stigmatic disc flattish. Leaves 5-18 cm. *H. ivoryi* 2
Leaves 6-10 cm. *H. divaricata* 3
- C. Stigmatic disc conical. Leaves 2-4½ cm. *H. ednieana* 4
- A. Flowers usually erect and clustered, enclosed before expansion in imbricate deciduous bracts.
- D. Stigmatic disc oblique, flat or slightly convex.
- E. Perianth pubescent. Fruit 2 horned *H. vittata* 6
Fruit very obtuse *H. kippistiana* 7
- E. Perianth glabrous.
- F. Pedicels pubescent—Perianth yellow *H. nodosa* 8
Perianth white *H. vittata* var. 6
- F. Pedicels glabrous—Fls. in short racemes *H. leucoptera* 9
Fls. in sessile clusters *H. cycloptera* 10
- D. Erect stigmatic cone terminating the style and bearing the small stigma in its centre; buds enclosed in imbricate bracts resembling a small pine cone.
- G. Fruit rugose with an inflexed beak 30 mm. long, 20 mm. broad *H. rostrata* 11
Fruit smaller *H. rugosa* 12
- G. Fruit almost smooth with a straight acute summit *H. muelleriana* 14

(Continued on page no. 374)

HAKEA IN TASMANIA

A further article in the series on "Wildflowers of Tasmania" by A. M. GRAY

Nine species of the genus *Hakea* are recognised in Tasmania, a poor representation when one considers that 125-130 species are distributed throughout the Continent.

All species in Tasmania possess the needle-like leaves which are usually rigid and mostly very pungent, except occasionally in *Hakea nodosa* and *Hakea ulicina*.

Hakea nodosa R.Br. "Yellow Hakea". Usually a small shrub but in some situations up to 15' high. Erect with rather willowy branches. Leaves spreading or erect, cylindrical or sometimes finely linear, the substance thick, pale green in colour, apex blunt, hardly sharp. $\frac{1}{2}$ "-1 $\frac{1}{4}$ " long. Flowers small, yellow, clustered in the axils of the leaves. Fruits similar to but paler in colour than those of *H. lissosperma*.

Scattered in the N.E. of Tasmania, also on the Flinders Island group, S.A. and Victoria. A sparse but pleasing shrub that does well in fairly dry, sandy soils. It benefits well from clipping or pruning.

Hakea lissosperma R.Br. "Needle bush". *H. sericea* Schrad. & J. Wendl. var. *lissosperma* (R.Br.) Maiden & Betche. *H. acicularis* (Vent.) R.Br. var. *lissosperma* Benth.

In lowland situations a small tree up to 20' high but stunted and very compact at high altitudes in exposed localities. Branches thick and gnarled in older trees. Leaves 2-4" long, rigid and pungent, spreading or curved upward. Flowers white, in compact spikes in the axils of the upper leaves. Fruit with thick valves, very similar to those of *H. sericea* and *H. nodosa*, dark brown, warty.

Occurs very commonly on mountains and in areas of high rainfall, attaining an altitude of 4500' on some Tas. mountains where it becomes stunted and very wind pruned. Makes a pleasing plant in gardens in areas of good rainfall, its deep green, fine foliage makes a pleasing contrast as a specimen tree.

Hakea sericea Schrad. & J. Wendl. *H. acicularis* (Vent.) R.Br.

A large shrub or small tree up to 12' high, branches usually divaricate. Leaves spreading or sub-erect, terete, rigid and straight, apex pungent, 2-3" long. Flowers few in axillary clusters, white but often tinged with delicate pink. Although not on the Tasmanian mainland *H. sericea* is common on Islands of the Flinders group and is also common in Vic. and S.A. It is commonly planted in many gardens, here and on the Mainland states. A worthwhile plant in any suitable garden.

Hakea microcarpa R.Br. A shrubby plant, 2'-6' high with tough, leathery, needle-like leaves 1"-2" long, the apex long and sharp. Sometimes flat leaves with marked midrib and margins occur, thick, linear-lanceolate. The small flowers occur in little clusters in the axils of the leaves, followed by small leathery fruits $\frac{1}{4}$ "- $\frac{1}{2}$ " long and about $\frac{1}{4}$ " broad, obovate, oblique in outline. The surface of the valves is smooth and a short, deciduous projection occurs near the apex.

A common plant in scrubby or exposed areas, usually montane and occasionally on river banks. It occurs also in Qld., Vic. and N.S.W. Not very interesting as a garden plant although it would do well in wet, even water-logged situations.

PETROPHILE BILOBA

An article in series on Petrophile and Isopogon of W.A. by D. LEWIS, Bindoon, W.A.

Petrophile biloba

There is only one patch of *Petrophile biloba* in this district (Bindoon, W.A.) and this is along the banks of a winter stream in a deep gully. The shrubs branch about a foot above ground level, generally having no more than three to four branches. The branches remain upright and do not hang over even when in flower. The largest bush I measured was seven feet eight inches high by three feet wide. Bushes are usually smaller flowering when only 18 inches high. In gardens this shrub is likely to be a different shape. A friend's plant is a solid bush the same width as its height.



Photography by F. W. Humphreys

PETROPHILE BILOBA

Seedlings leaves are fine and soft. From five to nine little leaflets spread out like a fan. These first leaves seldom remain on the shrub more than two

(Continued on page no. 360)

PETROPHILE

THEIR CULTIVATION IN SOUTH AUSTRALIA by KEN STUCKEY

South Australia has one specie in this genus of plants, *Petrophile multisecta*, endemic to Kangaroo Island. The greater proportion of species are in the small shrub range of 3 to 6 feet with a tidy growth habit and wide variation in foliage. There are two W.A. species of *Petrophile* which are prostrate and make excellent rockery or ground cover plants.



Photography by Joe Glass.

PETROPHILE DRUMMONDII

To the casual observer it is often difficult to distinguish between *Isopogons* and *Petrophiles* but the common names of 'drumsticks' and 'cone bushes' are very applicable to the ripened head or cone. The bracts or scales in the flowering head of the *Isopogon* are deciduous and after the perianth has fallen off the round or oblong head has a greyish white velvety texture resembling the head of a drumstick. The *Petrophiles* have a persistent bract or scale which in many species develops into a hard, woody covering resembling a miniature pine cone. If there is still any

Editor's Note: The previous issue comprised articles submitted by growers and botanists in South Australia principally on wildflowers from that State. This article was also submitted but space would not permit its inclusion. The article is presented in two parts, *Petrophile* in this issue and the very closely related *Isopogon* in the next issue. Reports on *Isopogon* are requested from all States. Who can supply further notes on *Petrophile*.

doubt, the seed of these two genera are quite distinct. The small ovoid nut of the *Isopogon* is hirsute all over and has long hairs which fluff out after leaving the head reminding one of thistledown, whereas the nut of the *Petrophile* is always flattened with a fringe of hairs on the margins and on one face only, the other face being glabrous. In a few species the fringe of hairs is replaced by a membranous wing.

PROPAGATION

The plants described are all grown from seed collected in the spring of 1962 in Western Australia and the seed sown in the following autumn-late March, in 3 inch deep seed boxes in the open with 2/3 sand and 1/3 humus mixture. Seedlings were potted up into veneer tubes 6 inches deep and 3 inches in diameter, kept in the shade for two weeks and then placed in the open again. The plants were carried through to the following autumn and planted out after the first good opening rains, and since have never had any water other than rainfall. Losses have been practically nil and these two genera have proved to be the hardiest and most persistent of any genus of plants that I have tried to grow.

If collecting seed make sure only well matured heads or cones are taken, preferably over two years old and put in paper bags (never plastic bags) and store in a warm dry place until the heads and cones have properly dried out when they will open up and release the seed more freely. *Isopogons* often have only very few fertile seeds in a head but *Petrophiles* usually have the cones full of fertile seed.

PETROPHILE FOR YOUR GARDEN

The descriptions of the following plants are how they have grown in this locality and may not correspond to their behaviour in their native habitat or in another locality. They are growing in an open but sheltered site, in poor grey sand with a pH of 6.5 and a 28 inch rainfall.

P. anceps—a dense rounded shrub of 2 feet with 2 inch flat linear incurved leaves, dark green and thin on the edges. The yellow ovoid spikes of the flowers are usually 3-5 in a cluster on the ends of the branches and it makes an attractive show in the spring.

P. biloba—a specie that has been in cultivation for a long time and better known. It usually has a straggly upright growth 6-8 feet with short rigid leaves with three to four lobes. The soft pink and grey flowers with bright orange styles are numerous in the upper axils and very beautiful. It can be recommended for well drained open or semi shaded situations.

P. biternata—a stiff upright shrub with stiff flat, divided, recurved leaves, the yellow flowers are terminal.

P. carduacea—a robust shrub to 4 ft. and spreading 6-8 ft. The flat undulate leaves are deeply toothed and prickly, flowers are pale yellow in the upper axils and the fruit develops into an elongated cone 1-1½ inches long.

P. circinata—the prostrate form (near Lake Varley, W.A.), has terete divaricate leaves with a long slender petiole from the prostrate branches. The yellow flowers are almost sessile on the branches and not as showy as *P. longifolia* but the foliage is very attractive and there to see all the year!

P. conifera—a dense low shrub of about 2 ft., the rigid terete leaves are divided and divaricate. It makes a neat small shrub and is interesting even though the flowers are pale yellow and not very prolific.

P. divaricata—as the name suggests the terete divided leaves are very divaricate and it makes an attractive foliage shrub to 4 ft. The lovely soft

yellow flowers are numerous in the upper axils and makes it worthy of a place in any garden.

P. diversifolia—again the name is partly explanatory of the foliage, the juvenile foliage is soft and fern-like but the mature leaves are stiff flat and lobed. It has an upright habit and rather spindly growth to 6-8 ft. Flowers are whitish in the upper axils. It is an easy specie to propagate and we have seedlings coming up some distance from the original plants.

P. drummondii—an upright small shrub of 2 ft., leaves terete and divaricate with yellow flowers.

P. ericifolia—an erect shrub to 3 ft. with terete $\frac{1}{4}$ to $\frac{1}{2}$ inch leaves with yellow flowers, terminal and prominent on the previous year's growth. The young flower buds are very glutinous and the numerous long pointed brown bracts remain glutinous long after the completion of flowering. New growth is made from below the cone but within the bracts. It has numerous flowers in mid spring.

P. ericifolia var. *scabriuscula*—a slightly more spreading shrub with dark green $\frac{1}{2}$ inch terete leaves. The yellow flowers are terminal, but not so prominent, as many are produced on short lateral branches. Bracts are few and insignificant.

P. ericifolia var. *glabrifolia*—a spreading shrub to 3 ft., the weaker branches are more virgate, making a denser shrub. The $\frac{1}{2}$ inch light green leaves appear almost succulent. The yellow flowers are not particularly prominent as many are born on short lateral branches. Flowers late spring.

P. fastigata—a very attractive foliage shrub of 3 ft. and spreading to 4-5 ft. The terete leaves have a long petiole and are then divided several times, are upright and soft to handle and rather dense, making a soft, attractive bush. The conical 2 inch buds are terminal on the branches and often 3 to 5 in a cluster, lime green at the base and yellow at the apex and very attractive at this stage. The flowers open up yellow.

P. linearis—has lovely soft pink flowers of similar colouring to *P. biloba* only larger flowers and not so numerous. A straggly upright shrub of 2 ft. with flat, rather thick leaves. The specie does not thrive in local conditions and should do better in a heavier type soil.

Petrophile longifolia—a prostrate specie with terete 6-8 inch leaves growing upright from the prostrate branches. It forms a fairly dense cover with most of the yellow flowers born on the outside fringe of the shrub at ground level and is very attractive. It would be good for rockeries as a ground cover plant and does best in an open situation.

P. macrostachya—an open upright shrub with leaves on a long flattened petiole and divided into linear segments which are again divided. The yellow flowers are in the upper axils or terminal but not numerous, the fruiting cones are long and prominent.

P. media—one of the best yellow flowering species with the flowers terminal on upright, stiff branches, the 3" leaves are terete, stiff and pointed.

P. megalostegia—a small shrub of 18 inches with short terete leaves. Flowers are yellow and rather sparse.

P. propinqua—a very upright habit of growth to 6 ft., the slender branches have short flat divided leaves. The small bright yellow flowers are numerous in the upper axils and very showy.

P. seminuda—a small upright shrub of 2 ft., short terete leaves divided into 2 or 3 segments. Flowers are yellow.

SYDNEY HAKEA

A series on wildflowers of the Sydney Sandstone Area by A. M. BLOMBERG

The genus *Hakea* is well represented throughout the Hawkesbury Sandstone Area by 8 species, 6 of which are terete leaved and 2 have flat lanceolate to oblanceolate leaves.

Species with Flat Leaves

Hakea salicifolia is a large bushy shrub to small tree with narrow lanceolate to lanceolate leaves and numerous axillary creamish green flowers. It flowers during spring. The fruit is rough with a distinct beak as shown in the sketch.

***Hakea dactyloides*:** A small to large shrub with linear to oblong-lanceolate to oblanceolate leaves, 2 to 5 inches long. Where growing on heathland this species is usually an erect shrub 3 to 5 feet high with broad leaves and where growing in gullies it is often a large shrub with narrow leaves; there are numerous auxilliary clusters of cream flowers in spring. It may be separated from *H. salicifolia* by the 3 prominent veins in the leaves which are absent in the latter species and by the fruit which is only slightly rough while for *H. salicifolia* it is usually rough and tuberculate with a distinct beak.



HAKEA SERICEA *Hakea*—after Baron von Hake, a German patron of botany. *Sericea*—silky.

Blocks by courtesy of Canberra Botanic Gardens.

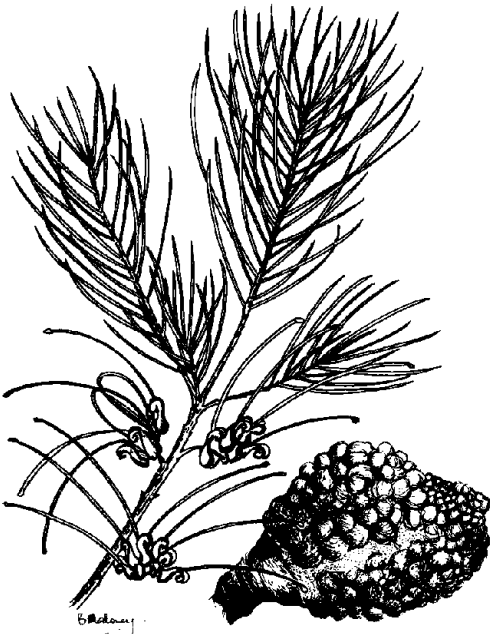
Hakea salicifolia



Hakea dactyloides
(Heath form)



Hakea dactyloides
(Forest form)



Hakea bakerana



Hakea propinqua

Species with terete (cylindrical) leaves

***Hakea gibbosa*:** An erect, bushy shrub, 3 to 9 feet high; the long, stiff, sharply pointed leaves, branches and new shoots are densely hirsute (covered with hairs); the flowers are cream, axillary in the upper leaf axils; the fruit is large, slightly rough with a short beak. Occurs in the coastal area on heathland and sclerophyll forest; flowers late winter and spring.

Hakea sericea is an erect shrub up to 9 feet high with sharply-pointed terete leaves and numerous small white to yellow axillary flowers in spring. It resembles *H. gibbosa*, but may be separated from the latter by the glabrous (smooth) or slightly pubescent branches and young shoots; the leaves are generally shorter and the fruit is rough with a distinct beak.

***Hakea constablei*:** A shrub resembling *H. gibbosa*; foliage less hirsute; fruit is larger and rougher and without a beak. Occurs in the Blue Mountains on the Narrabeen sandstone group, to the edge of the Hawkesbury sandstone.

***Hakea propinqua*:** An erect shrub, 6 to 9 feet high, with smooth, slender, shorter leaves than the former species; flowers small, white to cream, in upper leaf axils. Fruit large, rough, often tuberculate and attractive. Occurs on the coast and Blue Mountains. Flowers winter and spring.

***Hakea teretifolia*:** A straggling to tall shrub, often pendulous in growth; leaves long, hard, stiff and sharply pointed; flowers small, white, in upper leaf axils; fruit narrow and extended into a long, sharp point. Occurs on the coast and mountains, often on moist heaths; flowers spring and early summer.

***Hakea bakerana*:** A bushy, spreading shrub, 2 to 5 feet high, with slender, sharply pointed leaves; flowers large, light to deep pink, in clusters, produced well down the shrub on the older wood; fruit is very large, rough, tuberculate and attractive. Occurs on the Hawkesbury sandstone some 30 miles north of Sydney to the Narrabeen sandstone group south of Newcastle. This species has the most attractive flowers of the group; flowers winter.

"I am indebted to Betty Maloney for her work in illustrating the species described."

Cultivation and Propagation of the Hawkesbury Flora

As with other species of the Hawkesbury Sandstone, the species of the genus *Hakea* are readily cultivated and best results are obtained in well drained soil, particularly in garden beds in which the soil is raised 9 to 15 inches above the surrounding ground; this method gives the best results for most plants including native species.

It might be pointed out that Hawkesbury Sandstone species present no more difficulty in cultivation than plants from all parts of the world.

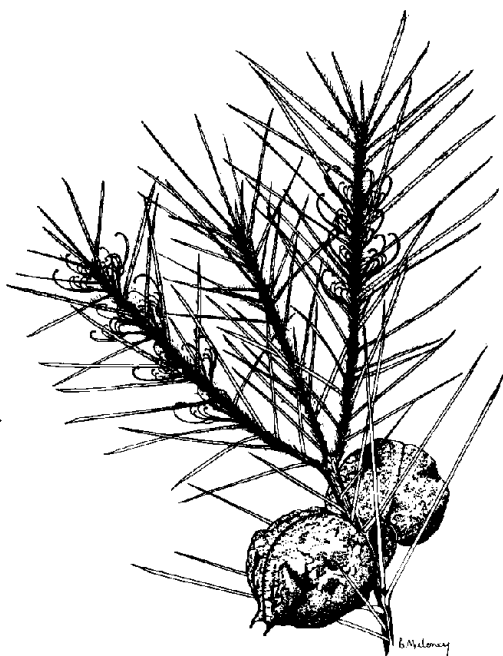
Attention was drawn in Vol. 5-40 to the attack of plants by nematodes (eelworm) and fungi. Plants from all parts of the world are subject to such attack and those of the Hawkesbury Sandstone are no more liable to attack than others. Where problems occur from infestation, sterilization of soil by steam and chemical means may be successfully carried out. The New South Wales Department of Agriculture produces an excellent booklet on soil treatment for such diseases, Bulletin 38, "Root Knot or Root Gall".

Hakea species are most readily propagated from seed which germinate three to four weeks after sowing. Seedlings should be transplanted into containers with a well drained potting soil, when the first or second set of leaves have formed and be then allowed to develop in the container for approximately 6 months before planting out.

Hakea teretifolia



Hakea gibbosa



Hakea constablei



Hakea sericea
(Colour plate on page 352)

BANKSIA

THEIR PROPAGATION AND CULTIVATION by K. L. REED, Barkly Nursery, Vic.

Banksia can at times be most frustrating in first attempts, but are very rewarding and worth a place of pride in any garden. After many failures in the first few years I can now depend on good results for each of the 30 species we offer for sale.

(A) Seed germination

Most species respond well from seed; a few can be tricky and slow under even ideal conditions. Contrary to general practice I sow quantities of seed into large plastic seed trays and prick off at first pair of leaves. Seed is sown into a very coarse open but rich mixture of peat, bush sand, mountain soil and coarse washed sand in equal parts, no fertiliser, pressed down and lightly covered and watered with fine spray and placed in glasshouse with unpainted glass. Trays are kept just moist almost to the point of dryness. Humidity and excessive moisture must be kept to a minimum, otherwise seed will rot even before shooting, or damp off occurs after they appear. If soil mixture is right this shouldn't happen. Germination takes usually from 3 to 6 weeks and 90 to 95% is certain. Sow seed no earlier than October or growth is slow and germination yield low, but no later than late February or too little growing time is left before the cold months in Melbourne. Pricking off is done into small plastic tubes into a similar soil mixture to above. After a few weeks in the glasshouse they are removed to hardening off frames for two weeks being gradually exposed to full sun and finally out into the open to weather fully.

Potting on or planting out is done when plants have well and truly used up all the root room in the tubes. The all important thing in growing banksias is the soil structure. A good open mix similar to that for sowing seed is best. Banksias I have found do not take kindly to very much phosphorus so a lot of market prepared fertilisers are out for them. They do like small quantities of nitrogen in slow release and extra potash is also beneficial to them. I use a fertiliser mixture made up of nitrogen, potash and trace elements plus small quantities of peat and humus.

While banksia species in some areas grow in poor sandy soils, they still use humus from leaves falling from associated growth etc., decaying into the soil. Like *Dryandra* they do well in rich soil also providing drainage is excellent. Water to a minimum when young and then only if really needed, as it is better to have them on the dry side rather than wet. I prefer myself to water in well after planting to remove air pockets from the soil. Tripod stake to keep wind disturbance to a minimum and mulch the ground with stones, dry leaves or buzzer chips and leave the watering after that to nature. Although in very young plants some watering is necessary in long dry spells.

Tip prune back any quick leggy growth as this tends to weaken and provide for greater wind disturbance. Regular tip pruning will ensure a sturdy bushier plant and a lot more flowers later on. Feeding is done with a little sheep manure around the plant on top of the ground but not against the trunk, a couple of handfuls twice a year. Sheep manure is rich in nitrogen. A little magnesium sulphate is necessary if leaves yellow. Soil pH usually preferred for most species is pH 6. Iron chelates will help correct alkalinity.

Editor's Note: While *Banksia* and *Hakea* are quite distinctive they both belong to the plant family *Proteaceae*. Methods of propagation and cultivation are very similar although *Hakea* may be harder when established. Our No. 41 issue was devoted principally to *Banksia* but as it is our policy to include a special article on propagation and cultivation, the one above will serve for both *Hakea* and *Banksia*.

A few species will do well in a higher pH but most prefer the lower. The plant must be able to extract sufficient quantities of iron and if pH is too high this cannot be done. The Iron chelates helps to overcome alkalinity chlorosis. A yellowing around the edge of the leaf and in between the veins often indicates a lack of potash and small regular doses can correct this.

In nature, banksias like other shrubs and trees growing in association or groups, they make up a community, the larger established trees supplying fertiliser in the form of mulch from their falling leaves that contain traces of various chemicals that break down with decay to feed the whole community. A young tree requires more nutrients in its vigorous growing years. As it nears maturity growth rate and requirements of certain types of chemicals are less. The larger trees provide shelter, food and protection for the younger until the younger matures and takes its turn in the cycle of nature.

Don't baby plants. If plenty of coarse material to assist in drainage is dug into the soil prior to planting, excess water they receive when watering the rest of the garden will soon run off.

FERTILIZE WHEN PLANTING

by W. E. Giles, Orange, N.S.W.

For quite a few years I have made a practice of putting a liberal dressing of sulphate of ammonia, say a dessertspoonful, into the bottom of the planting hole. The only genus that has shown any sign of resentment is *Grevillea*. However it may well be the damage is due to frost in our severe climate rather than to root burning.

All the *Myrtaceae* and in particular *Eucalypts*, the *Leguminosae* and other *Proteaceae* respond with vigorous growth and increased frost resistance. In my opinion the growth rate in the first year is at least doubled.

With *Telopea* (Waratah) which in former years I had found very difficult to establish, the response has been good. While none of the species are completely frost hardy the only one not established is the Tasmanian Waratah, *Telopea truncata*.

I have also used blood and bone in years gone by with pleasing results. Years ago I experimented with superphosphate as a top dressing for struggling *Eucalypts*. It caused vigorous growth of weeds that smothered the intended beneficiary. Any surface dressing reaches the weeds first which is the basic reason for mixing the fertilizer in the bottom of the hole.

FERTILIZATION OF NATIVES

by L. K. Bates, Mareeba, Qld.

Much has been said about not fertilizing natives. In a period of months I have given to over 100 species of young plants, liberal applications of Sulphate of Ammonia, animal manure, liquid fertilizer and a fertilizer containing the three main plant elements. In each case many plants showed a response, and in no case was the application to the detriment of the plant. I don't know whether the means justify the end, but some plant heights up to 12 months were:—

9 months: *Grevillea banksii* (54" and flowers).

8 months: *Hakea pycnoneura* (32"); *Melaleuca* sp. (39").

6 months: *Hakea gibbosa* (23").

5 months: *Hakea laurina* (12"); *Grevillea caleyeyi* (13").

Editor's Note: Reliable overall results have been achieved using blood and bone fertiliser. The article "Nutrition of *Grevillea robusta*", page 39 in our no. 29 issue, should be studied as it will serve as a guide to fertiliser application to all natives, particularly *Proteaceae*. Will readers report on their experiences as it is essential that we devote more attention to this aspect.

A KILLER DISEASE OF NATIVE PLANTS

by J. W. Wrigley, Curator, Canberra Botanic Gardens

Phytophthora cinnamomi is a soil borne organism which destroys the growing root tips of many species of plants given suitable soil conditions. Our present lack of knowledge of the precise mode of action of this fungus prevents us from saying why some species of plants are resistant and others rapidly succumb. It is a fact, however, from our own observations at Canberra Botanic Gardens that native species fall into both the above categories.

We do know the conditions which are favourable to the growth and spread of *P. cinnamomi* and knowing this we can derive a method of control.

The fungus spreads most rapidly in warm weather, the danger months for spread are therefore, October to March. In this period the fungus produces fruiting bodies called sporangia which when mature emit hundreds of actively swimming zoospores. The zoospores move along water channels in the soil and when a suitable host root is found they attach themselves to it.

It has been established that certain root exudates (probably amino acids) attract the zoospores to the root tip.

To combat this disease, the only effective method yet known is that of improving drainage. This makes conditions less favourable for the fungus to survive by preventing the spread of the zoospores. Methods of drainage improvement will obviously depend on the situation, but may involve the addition of coarse sand to an existing heavy soil; the building up of garden beds higher than surrounding areas by the addition of sandy soil; or the laying of agricultural pipes in poorly drained areas to remove excess soil moisture.

If a garden is built up with sandy soil, and retaining walls are constructed, then either the walls should be dry walls or sufficient weep holes should be provided to allow free release of water.

A gardener will ask how does he know if he has *P. cinnamomi*: It is impossible to be sure without recourse to a well-equipped laboratory. However, the common and most obvious symptoms in native shrubs is that firstly the foliage of either a branch or the whole shrub loses its turgor and becomes soft and dull. It appears to be suffering from dryness. In fact this usually happens in warm weather but after rain. The next step usually follows very quickly, the branch or shrub dying in a matter of a day or two. The reason for the death of a single branch is not certain. One theory is that only the roots feeding this branch have been infected. In this case the rest of the shrub may remain healthy for some time or if conditions are right the other roots are quickly infected and the whole plant dies in a matter of days.

P. cinnamomi has been isolated from many parts of Australia. It has caused serious losses in the Jarrah forests of South Western Australia. It has also been found in other States (Tas., N.S.W., Vic.) where some damage to Eucalyptus forests and other native plants has been noticed. In S.A. some damage to native plants has been observed.

It would be fair to say that a great number of "unaccountable" deaths of native plants in the Sydney area has been caused by *P. cinnamomi*.

It is probable that *P. cinnamomi* is very widely spread in nature but in an undisturbed natural environment there are other organisms present which keep it under control. It is, however, when man encroaches on such areas by clearing, building roads, etc., that drainage patterns are changed

and the ecological balance is upset. This is the time when *Phytophthora* becomes rampant and causes considerable plant deaths. Most, if not all the serious outbreaks of the disease in W.A. have been associated with road making and logging activities.

The parallel can, of course, be made in the home garden where the whole environment is artificial. If summer deaths are occurring in a native garden look towards (a) improving drainage or (b) planting a species which is resistant to *P. cinnamomi*.

From observations made at Canberra Botanic Gardens the following lists of susceptible and resistant species represent preliminary conclusions.

Susceptible species

Dryandra spp.
Most *Prostanthera* spp.
Kunzea pomifera
W.A. *Banksia* spp.
Daviesia mimosioides
Burtonia scabra
Eucalyptus spp. (Section *Renantherae*)
Many *Epacridaceae*
Some *Grevillea* spp.

Resistant species

Bauera rubioides
Melaleuca thymifolia
Darwinia leptantha
Eastern *Banksia* spp.
Eucalyptus calophylla
Eucalyptus diversicolor

SOUTH AUSTRALIA UPPER MURRAY AREA

Some Introduced Natives — by Ian Bond

Before listing some of the outstanding species, a few words on soils and climatic conditions would be helpful. The soils of these areas can be classified very broadly as sandy mallee. They vary in depth from a few inches to many feet. They overly subsoils predominantly clay marl in nature.

Climate is warm and dry in summer, and mild in winter. Average yearly rainfall is 10.5", most of which falls during the winter months. An unusual feature is the effect of microclimate on species, and this undoubtedly accounts for the success with plants such as *Eucalyptus globulus* and *Euc. perriniana*. This microclimate is brought about because of the influence of irrigation over many thousands of acres on each side of the River Murray.

Generally plants are selected for two distinct purposes, namely non-irrigated, such as along highway, or for breakwinds, or in gardens where water and fertilizer are given. Dealing firstly with the former category, the following species have been outstanding:-

Eucalyptus dundasii and *E. salubris* as street trees.

Casuarina glauca for highway planting.

Eucalyptus woodwardii, *E. torquata*, and "torwood" for brilliant colour under our warm, dry conditions.

Eucalyptus leucoxylon has performed very well, although generally only reaching a height of about 30 feet after 15 years or so. The form "rosea" has also grown extremely well on natural rainfall.

Under garden or park conditions, some of the best introductions are: *Eucalyptus spathulata* (also excellent in the first category).

Melia azederach (very hardy, some magnificent specimens on fruit blocks, where they are being irrigated).

Acacia iteaphylla (even on very poor soils).

Melaleuca incana, *Correa pulchella*, *Callistemon phoeniceus* and *Hardenbergia comptoniana*.

Eucalyptus globulus thrives on the better soils under irrigation. Two others are *E. perriniana* and *E. pulverulenta*.

PETROPHILE BILOBA—continued from page 348

years. Later leaves become as hard as cardboard. They are divided into three segments about $\frac{3}{4}$ of an inch long, the central segment pointing downwards. Each segment has a small central point and two larger pointed lobes raised above the central point like butterfly wings.

Flowers are axillary, the cluster of seven to eleven slender flowers encased in red tipped bracts. The fluffy flowers broaden towards the tips. Our local ones are pale pink with grey petals. When in bud they are just under an inch long but the petals are a little over a quarter of an inch in length. The style is a spark of bright yellow hanging from the throat of the flower. About halfway down each petal, stamens stand up like small wicks.

Petrophile biloba flowers during August.

Petrophile serruriae

Yellow flowering. *Petrophile serruriae* grows in thickets on gravelly hillsides north of Perth. The bushes nearly always branch from the main stem, a few inches above the ground. These branches are fairly upright but droop towards the ends.

Mature bushes are mostly shoulder high seeming to vary from 3 to 6 ft. in height and a little less than their height in width. Leaves of this graceful bush are like starched lace, about $1\frac{1}{4}$ inches long. Shoots are feather soft.

The flower heads are both terminal and axillary and in spring the last foot (more or less) of each branch is covered with golden balls of flower. The flowers are slender and slightly furry. When the buds open, the petals which are about half the length of the corolla tube, curl back revealing a yellow style hanging well out from the throat of the flower. (These flowers do not look like the ones on plate 4 of Blackall's key. In full flower they look like a crocheted ball. I am still hoping to find a grey flowering one like this photograph).

There is another variety which has the same leaf. This is growing in coastal sand at Wembley Downs, soon to disappear with home building. These bushes were so thick that I could not see over or through them. The ends of the branches did not droop over like ours. The flowers were pink and from memory looked more like the ones in the key. These bushes had very few flowers or seeds.

The yellow variety would not grow on the heavy clay soils that waterlog in winter, but surprisingly, I have a healthy plant of the coastal variety which I grew from a cutting.

PETROPHILE—continued from page no. 351

P. serruriae—there are two forms of *P. serruriae*, one has yellow flowers and the other pink. The yellow flowering form being more open in habit with short divided, rather dense leaves. The numerous small soft yellow flowers in the upper axils make an attractive showing on the arching branches. The pink flowering form has a much more compact habit of growth and flowers a month later.

P. striata—a small stiff shrub of 2 ft. with stiff divided short leaves. It has pale yellow flowers in the upper axils.

P. teretifolia—this is a late flowering specie, Dec.-Jan. and has very attractive soft pink flowers sessile on the spreading branches, the 3 inch terete leaves are rather sparse and do not hide the flowers which are carried on the old wood as well as on the previous years growth. A shrub of 3 ft. and rather spreading.

HAKEAS IN BRISBANE

by M. W. Hodge

In the past it was unusual to see Hakeas in suburban gardens not belonging to native plant enthusiasts, but lately they are found more frequently in the gardens of the not so dedicated.

Because of their similarity Hakeas are sometimes mistaken for Grevilleas and vice versa. When grown under the same conditions, the few Hakea species tried here appear to be more reliable than Grevilleas. I have attempted 60 species of Grevillea and 12 species of Hakea. Of these 40 species of Grevillea and 11 species of Hakea have survived. The losses were two plants of *H. victoriae*. Most of the plants included in both genera have been planted for more than 12 months.

Some of the Hakea grown in Brisbane include the following Queensland species: *H. dactyloides*, *H. florulenta*, *H. gibbosa*, *H. leucoptera*, *H. lalea*, *H. persiehana*, *H. plurinervia*, *H. purpurea*, and *H. saligna*. Species from other States include: *H. sericea*, *H. laurina*, *H. bucculenta*, *H. multilineata*, *H. orthorrhyncha*, *H. petiolaris*, *H. subsulcata*, *H. kippistiana*, *H. verrucosa* and *H. victoriae*.

I know of losses in *Hakea bucculenta*, *H. multilineata* and *H. victoriae* but there are mature healthy plants growing here. Established plants of *H. victoriae* lack the leaf colour seen on plants in other states. Perhaps the relatively warm winter is the reason. One of the few specimens of *H. petiolaris* seen here had its attractive foliage spoiled by fungal attack.

Good specimens of *H. verrucosa* and *H. kippistiana* have flowered in Brisbane in recent months but there appears to be some confusion among growers here in identifying the two species.

Specimens of *Hakea laurina* grown 80 miles away in Toowoomba flower better than specimens in Brisbane. It may find the cooler climate in the higher altitude more agreeable. Good specimens of *H. bucculenta*, *H. multilineata*, *H. kippistiana*, *H. orthorrhyncha* and *H. purpurea* are grown by enthusiasts on the Darling Downs. Frequently plants which dislike Brisbane's hot humid conditions grow well west of the Dividing Range provided they can withstand the severe frost.

Losses of plants which receive a low summer rainfall in their natural habitats are greatest in Brisbane during the humid summer months, particularly after prolonged periods of rain. With this in mind I have avoided conditions which allow the soil to hold excess moisture and encourage damaging soil-born organisms.

The top soil in my garden is approximately 12 to 18 inches deep over heavy red clay. I have provided good drainage and do not use heavy layers of organic mulch. I have not used fertilisers on Hakeas because of an unfortunate experience with fertilisers on Grevilleas.

FOR HAKEA OF QUEENSLAND—SEE OVER PAGE.

QUEENSLAND GREVILLEA—This is the principal subject of the next issue. Will readers please forward reports and colour slides.

PHOTOGRAPHIC COMPETITION

I am seriously handicapped in the illustration of our native orchids by the shortage of good colour slides. Let us have a little competition over the next flowering season with entries to close on 1st June, 1971. There will be two classes, the best slide of native *Dendrobium* and the best slide of an epiphytic orchid other than a *Dendrobium*. They are to be of an Australian species that has not been illustrated in previous issues of "Australian Plants" or "Australian Indigenous Orchids". Composition of the slide to be within the range of styles clearly set in the colour plates already published.

QUEENSLAND HAKEA

by M. W. Hodge

Queensland species do quite well here but unfortunately some of them are rarely seen even in native plant gardens.

Hakea purpurea (red flowers) has been a favourite for many years and is reliable when grown in open or lightly shaded, well-drained positions. It occurs in a number of districts in Southern Queensland west of the Dividing Range. See page no. 340.

Hakea lorea (pendulous cream flowers) is an open small tree up to 20 ft. It has 12" to 24" pendulous terete leaves. My specimen was very slow for the first 18 months but grew at a faster rate when almost overgrown by an *Acacia ixiophylla*. The *Hakea* then appeared to grow sufficiently to keep above the *Acacia*. It was planted in 1966 and is now about 7 ft. high. This species is rarely seen in Brisbane gardens. It occurs naturally in a number of areas of inland Queensland. I have seen it on the Atherton Tableland and near the Moonie Highway. This species is reputed to be an exception to the rule of *Hakeas* in that it readily releases its seed within a few months of flowering.

Hakea fraserii, a cream flowered species with terete leaves. It could easily be mistaken for *H. lorea*. I have only seen this species on one occasion, on the Condamine Highway, South Queensland. I do not know of any garden-grown plants. It has the same habit of releasing its seed as *H. lorea*.

Hakea leucoptera is an inland species which has needle leaves and white flowers. I have observed a number of specimens growing south of Torrens Creek. I know of only one specimen in Brisbane and it is reported to be in good condition.

Hakea persiehana is a cream flowered species with terete leaves from Mt. Molloy near Mareeba in North Queensland. A recent introduction to Brisbane growers.

Hakea gibbosa has needle leaves and white to pink flowers. It is a common plant in the Wallum (sandy coastal districts of South Queensland). It appears to do well in gardens but loses favour to the more popular *H. purpurea*.

Hakea florulenta is a broad leaved species with white flowers. The few specimens observed in gardens were in good condition. This species and *H. purpurea* have rather prominent lignotubers. It grows naturally in the Wallum and in the Brisbane metropolitan area.

Hakea saligna grows to a small bushy tree. It is favoured for its foliage rather than the flowers which are insignificant. It may be seen growing naturally in the Macpherson Range in South-east Queensland.

Hakea plurinervia, a broad leaved species with white flowers. It is well distributed along Queensland Coastal districts and is found growing naturally in the Brisbane metropolitan area. It is similar to *H. florulenta* for which it is often mistaken.

Hakea dactyloides, a broad leaved white flowered species from South-east Queensland. I do not know of mature specimens in gardens here.

DO YOU VALUE YOUR JOURNAL?

Available at cost price (\$1.20 plus 20c postage from Editor), is a beautiful green vynex covered gold lettered binder with the volume numbers on the spine. This issue concludes Volume 5, so you will now need one for Volume 6. Available without numbers or numbered 3, 4, 5, or 6.

HAKEA OF CENTRAL AUSTRALIA

The terete leaved *Hakeas* of the Northern Territory by J. R. Maconochie, Alice Springs, N.T.

Hakea divaricata L. Johnson, a cork bark shrub-tree 6-15 ft. high, with forked leaves forming dense clusters. The flowers are yellow and have a honey smell. Mostly in southern N.T.

Hakea suberea S. Moore, a cork bark shrub-tree also 6-15 ft. high, with linear terete leaves sometimes drooping, sometimes erect. The flowers are yellow and pubescent with a honey smell. Mostly in southern N.T.

Hakea morrisiana W. V. Fitz., a cork bark, shrub-tree 6-15 ft. high, leaves are linear flattened terete, often drooping. Flowers also greenish-yellow and pubescent. Rather rare in N.T.

Hakea leucoptera R.Br. "Needle leaved Hakea". A shrub to 10 ft. high with white flowers and needle like leaves, mostly erect on stems. It grows mainly in the southern N.T. region.

REVIEWS ON NEW BOOKS ON WILDFLOWERS

All wildflower books on the market are available from the Editor, "Australian Plants", 860 Henry Lawson Drive, Picnic Point, N.S.W. 2213.

Secrets of Plant Life by M. Sir

Price \$16.20 plus 40c postage

An odd sort of 239 pages book. The artist photographer has tried to illustrate by 300 large colour plates the growth pattern of plants. Written by a Frenchman and published by Collins in England, many common plants from pine trees to the dandelion are used (none Australian) to illustrate the secrets of plant reproduction. For instance 7 colour plates of a poppy show—1. The bud; 2. Bud partly open, enlarged 7 times; 3. The centre of the flower x 15; 4. The fruit; 5. Seed in the fruit; 6. Top of the seed capsule and 7. The opening for the seed to emerge enlarged 70 times.

Biology of Plants by P. Raven & H. Curtis

\$12.00 plus \$1.00 postage

A very well presented book, designed especially for the student but so carefully written that a layman interested in plants could learn the science. The introduction "The Beginning of Life" traces the evolutionary steps of the formation of our planet, the creation of life and the development of living things. The book concludes with a realistic look at "Man and the World Ecosystem", what is the future for man and plants? The sections of the book illustrate the coverage—1. The Cell; 2. Plant Development; 3. Photosynthesis and Respiration; Harvesting the Sun; 4. Soil and Water Relationship; 5. Genetics and Evolution; 6. Diversity of Plants; 7. Ecology. The outstanding feature of the book is its simple clear presentation with sketches while still examining the technical aspects fully. For instance an adequate coverage of the advances made in the fields of molecular biology and cellular physiology so necessary to the study of plants is very clearly enunciated.

The Animals Noah Forgot by Banjo Paterson and illustrated by N. Lindsay—Price \$1.50 plus 20c post.

An Australian classic. Poetic tales of Australia's native animals for children. 72 pages.

MORE BOOKS IN THE PERIWINKLE SERIES

Price \$1.50 each plus 10c postage

Australian Lizards by Keith Davey.

The largest Australian lizard grows to a length of almost 8 ft., the smallest is only 2 inches. There are lizards without legs, lizards with a third eye on top of their head. Some can bark or squeak. These are some of the facts I learned from this marvellous little book. With 42 lizards shown in full colour and many in black and white photographs and the marvellously simple text characteristic of these charming little 110 page books, this is an ideal gift for that young enquiring mind.

Australian Marsupials by Keith Davey.

We all know a little of our unique Australian mammals. Here is an opportunity to not just gaze in wonder at the many beautiful colour plates in the book, but to learn about them from a very simply written text. The sections of the book include: What is a Marsupial? Mice, Native Cats, Tasmanian Devil, Ant-eater, Tasmanian Wolf, Moles, Bandicoots, Possums, Gliders, Koalas, Wombats, Kangaroos, Wallabies.

A Pictorial Encyclopaedia of Australian Wildlife by Harry & Claudy Frauca.

The Periwinkle series of little books covers all facets of Australian Wildlife as in the two books above or the other books previously reviewed as listed below. This book glances over the entire field, the 240 species being illustrated and described in sections headed—Jellyfish, Crabs, Snails, Slugs, Shells, Worms, Spiders, Centipedes, Insects, Fish, Frogs, Snakes, Lizards, Tortoises, Birds, Mammals.

Gold Prospecting by Derrick Stone and Doug Stone.

This book by two experienced prospectors tells where to look for gold and how to find it. It describes the conditions under which gold may be found, the selection of a suitable site, prospecting methods and equipment necessary. The gold bearing areas in each State are described in detail.

Other Periwinkle Books—Previously reviewed and also available from Editor at \$1.50 plus 10c postage

Australian Rocks and Minerals; Australian Sea Shells; Australian Spiders; Australian Insects; Australian Pond and Stream Life; Australian Frogs; Australian Alpine Life; Australian Gemstones; Australian Desert Life; Australian Seashore Life; Australian Eucalypts; Common City Birds; Wildflowers of the Sydney Region; Trees of the Sydney Region; Wildflowers of South-east Australia; How to Find Australian Gemstones.

EUCALYPTS IN URBAN DEVELOPMENT

by C. D. Boomsma

Introduction

The world's rapidly increasing population is expected to double within the next thirty years, and as the bulk of the population is concentrated in cumbersome cities, it is not surprising that the scope of tree planting in cities is shrinking for the competition of available space between traffic ways, industrial and commercial buildings becomes keener as years go by.

This is accentuated by legislation to limit the choice of species on public areas within twelve feet of underground sewer lines. (In S.A.).

Besides the loss in aesthetic appeal through the reduction of the number and the size of trees on many public areas there has been an increase in air pollution originating mostly from automobile exhausts, and industrial gases. A stage has been reached already in some overseas cities where the basic photosynthesis process of plants has been affected. This vital growth process includes the fixation of carbon dioxide derived from the atmosphere with an accompanying release of an equal amount of purifying oxygen.

The maintenance of an acceptable level of atmospheric purity is vital to the continued expansion of urban development and adequate tree planting can be of considerable assistance in achieving this goal. Fortunately the Mediterranean type of climate of Adelaide favours the growth of a wide range of species.

Briefly, the annual average rainfall approximates twenty one inches, about two thirds of which falls in the cool six winter months, and the balance in the warm summer months.

Frosts are uncommon while a few days each year exceed 100°F in summer. Wind storms exhibiting speeds of 40-50 m.p.h. occur annually so that a tree must be wind firm to succeed. Even so some storm damage to trees always occurs after a storm of fifty miles per hour.

A range of soils occurs in the metropolitan area from alluvials along waterways; sandy loams and loams on the plains, often with lime in the subsoil; to sands along the present coast and in deposits dating from the near past; and clay-loams with clays which crack on drying out in summer. Rocky soils are not uncommon in the foothills.

Street Planting

Perhaps the most noticeable development has been the increased number of plants established in the recent five year period, but a retreat in the mature size is expected as the choice of species in sewered areas is restricted by legislation to those which are expected to result in less damage to the underground pipelines.

One immediate result is the exclusion of massive tree species from rather narrow streets (usual width equals one chain), and so the growing of an imposing shady avenue there is now prevented. With the progressive narrowing of footpaths, increase in overhead wires, and widening of traffic ways there is sufficient space in many areas for only the smallest of trees (or shrubs).

Eucalypts capable of exceeding a height of thirty feet are therefore firmly excluded from streets of one chain width.

List 1 of *Eucalyptus* species planted as street trees in three or more metropolitan districts in South Australia in 1966.

	No. planted	No. of districts
<i>Euc. erythrocorys</i>	150	7
<i>ficifolia</i>	80	3
<i>forrestiana</i>	200	6
<i>gardneri</i>	148	3
<i>lansdowneana</i> ..	179	3
<i>lehmannii</i>	251	4
<i>platypus</i>	310	6
<i>sargentii</i>	181	6
<i>spathulata</i>	1231	15
<i>stricklandii</i>	991	11
<i>torquata</i>	1255	13
<i>steedmanii</i>	278	5
<i>stoatei</i>	278	8

List 2—*Eucalyptus* species planted in less than three districts.

	Number planted
<i>Euc. brachyphylla</i>	50
<i>caesia</i>	44
<i>calophylla</i>	12
<i>calycogona</i>	104
<i>campaspe</i>	59
<i>cneorifolia</i>	80
<i>cosmophylla</i>	46
<i>diptera</i>	17
<i>erythronema</i>	34
<i>gracilis</i>	46
<i>incrassata</i>	69
<i>leucoxydon</i>	59
<i>leucoxydon</i> var. 'Rosea' ..	65
<i>maculata</i>	17
<i>morrisii</i>	72
<i>nutans</i>	37
<i>occidentalis</i>	15
<i>rhodantha</i>	15
<i>rugosa</i>	15
<i>salmonophloia</i>	19
<i>tetraptera</i>	40
'Urrbrae Gem'	68
<i>viridis</i>	12

It is apparent from the small number planted of some species, and their restriction to a single district that it would be premature to draw conclusions at this early stage of less than five years of age.

A progress report however should be made at age fifteen to twenty years to include the usual features required in street trees plus additional features associated with a particular district or project. The usual features include vigour of growth, appearance as a street tree, wind firmness resistance to branch fracture and freedom from diseases and insects. A simple rating of three classes, satisfactory, undetermined and unsatisfactory should permit a comparison of species performance.

Variability in performance is expected since there is considerable variability in the seed sources and even in seedlings grown from a single source. This has been overcome by developing an acceptable vegetative method of propagation from the selected tree in other genera, but the limited attempts to vegetatively propagate Eucalypts in Australia commercially have so far failed despite encouraging reports from overseas.

Eucalypts in Parks

Perhaps this venue offers the most scope for displaying the full range of features of the large tree form which requires adequate open surrounds to permit their full appreciation.

The blending of colours on the trunk into the surrounding landscape can be quite unobtrusive but uniquely effective. Equally, the vertical hang of the foliage permits a dappled shade under the crown which further aids the merge into the landscape and so softens the view.

In contrast, some species have showy imposing features such as the terminal masses of scarlet blossom of *Euc. ficifolia* (Red Flowering Gum) and similar masses but white in *Euc. calophylla* (Marri) and *Euc. bloxsomei* (Yellow Jacket).

The milk white shopely trunk of *Euc. citriodora* (Lemon Scented Gum) has led to it being mistakenly called Ghost Gum by some; in contrast there is the reddish-brown deeply furrowed bark of *Euc. sideroxylon* (Red Iron Bark).

The erect straight trunk of *Euc. maculata* (Spotted Gum) has interesting

mottled colours in patches, while the thick gross stubby trunk of *Euc. camaldulensis* (River Red Gum) is balanced by an umbrageous crown of massive branches and copious foliage.

One of the best known species, *Euc. cladocalyx* (Sugar Gum) is noted for its fast growth rate. Its erect trunk supports a crown of branches and terminal clusters of foliage to give a storied umbrella effect.

The selection of species for parks should fit the specific requirements of a particular park. For example species for parks with a high rate of public patronage should not drop branches as in some species of *Eucalyptus* viz. *E. camaldulensis* (River Red Gum). Damage to buildings, car parks, etc. due to fracture of overhanging long branches during wind storms should be avoided either by a programme of shortening the branches, or selection of branch firm species such as *Quercus* (Oaks).

And finally an increase in the number of Australian flowering trees brings an increase in the number of native birds and insects particularly if the tree has a long flowering period as in *Euc. leucoxylo*n (S.A. Blue Gum).

Eucalypts in the Home Garden

If every home garden had a range of native plants, then one result could be a reduction in the rate of the disappearance of Australian birds. If the expansive park offers the best venue for planting Eucalypts of large mature size then the home garden offers the least area free from the complications of branch overhang and drop, extensive root competition and pipe damage, and litter fall in gutters etc.

If smaller species are chosen the scale of aesthetics is usually more than satisfied and the mechanics of maintenance simplified.

Town planning authorities have reduced already the minimum area of a house block by sixteen percent during the decade 1960-69 so that the outlook is for close settlement as the competition for space in the metropolitan area becomes keener.

Fortunately there is quite a range of small to medium sized Eucalypts suited for the home garden, a selection of which includes:-

Botanical Name	Common Name	Expected ht. ft.
<i>E. blossomei</i>	—Yellow Jacket	20-25
<i>E. cneorifolia</i>	—K.I. Narrow Leaf Mallee	20-25
<i>E. eremophila</i>	—Tall Sand Gum	15-20
<i>E. erythrocorys</i>	—Red Capped Gum	15-20
<i>E. erythronema</i>	—Lindsay Gum	15-20
<i>E. ficifolia</i>	—Scarlet Flowering Gum	20-25
<i>E. flocktoniae</i>	—Merrit	20-25
<i>E. foecunda</i>	—Slender Leaved Mallee	10-15
<i>E. forrestiana</i>	—Fuchsia Gum	15-20
<i>E. gardneri</i>	—Blue Mallet	30-35
<i>E. gracilis</i>	—Yorrell	15-20
<i>E. grossa</i>	—Philips River Gum	10-12
<i>E. kruseana</i>	—Kruse's Mallee	6-10
<i>E. lansdowneana</i>	—Pt. Lincoln Mallee	12-15
<i>E. lehmannii</i>	—Bushy Yate Gum	12-15
<i>E. macrocarpa</i>	—Rose of the West	10-12
<i>E. megacornuta</i>	—Warty Yate Gum	12-15
<i>E. nutans</i>	—Nodding Gum	10-12
<i>E. pachyphylla</i>	—Thick Leaved Mallee	8-10
<i>E. platypus</i>	—Round Leaved Moort	12-15
<i>E. pyriformis</i> subsp. <i>youngiana</i>	—Ooldea Mallee	10-15
<i>E. salubris</i>	—Gimlet	20-30
<i>E. spathulata</i>	—Swamp Yate	20-25
<i>E. stricklandii</i>	—Yellow Flowering Gum	15-20
<i>E. torquata</i>	—Coral Gum	15-20

To assist in making the final selection descriptions should be consulted in reference books including the Tree Planting Guide for Rural South Australia

which is available from the Conservator of Forests, Box 25, Rundle Street, Adelaide, for 70 cents posted. Besides the technical directions to assist tree planters, it includes the descriptions of over 200 tree species.

Further assistance can be obtained from an inspection of plantings at the Adelaide Botanic Garden, and the Waite Agricultural Research Institute where examples of most of the listed species can be seen. It is usual to make arrangements at both institutions before the inspection.

Having made the selection, be careful not to overplant, that is not to plant too many trees in too small an area as the intense competition between closely planted individuals reduces their ability to express their full potential.

By not overplanting, the need to later remove a mature tree can be avoided. This is understandably a costly operation when the tree is located in a built up area with overhead wires.

THE GENUS *HAKEA*—continued from page no. 338

Section (3). *Conogynoides*—Racemes usually short or reduced to sessile clusters, rarely elongated, enclosed before their development in an involucre or bud of imbricate scales. Perianth glabrous, revolute under the limb. Stigmatic cone erect or scarcely oblique.

Series 1. *Longistylae*—Leaves flat, entire, oblong-lanceolate or narrow. Style at least twice as long as the perianth. Stigmatic cone long and narrow. Western species—one also central.

Series 2. *Petiolares*—Leaves broad, triplinerved and reticulate (the veins prominent or obscure) tapering into a distinct petiole. Style not twice as long as the perianth. Western species.

Series 3. *Sessiles*—Leaves broad to oblong lanceolate, 3 or more nerved and reticulate, sessile or nearly so. Western species.

Series 4. *Nervosae*—Leaves lanceolate or linear, prominently 3 or more nerved (rarely 2 or 1 nerved when very narrow), smooth between the nerves.

Series 5. *Uninerves*—Leaves narrow or small, flat, 1-nerved with nerve-like margins. Fruit valves without a dorsal appendage. Western species.

Series 6. *Enerves*—Leaves mostly flat, obscurely penniveined, the midrib not prominent, entire prickly toothed or lobed. Fruit valves with dorsal horns or protruberances. Western species.

Series 7. *Teretifoliae*—Leaves linear-terete entire, usually angular or striate (rarely a few flat ones intermixed). Fruit valves without appendages. Western species, except for *H. flexilis*.

Section (4). *Manglesioides*—Racemes short or reduced to sessile clusters; enclosed before their development in an involucre or bud of imbricate scales. Perianth glabrous, straight, the limb erect in the bud. Stigmatic cone erect. Western species.

From the above it will be seen that Bentham divided the genus into sections based on floral arrangement and characters and that the shape and nature of leaves can vary considerably within one section.

Although many of the species have small flowers which are often cream in colour, there are a number which have most attractive inflorescences. The diversity of foliage and the woody fruits alone make the plants interesting specimens for cultivation. Those species with terete leaves are commonly called "Needle Bush" due to their sharply pointed ends. The leaves vary

in colour from dark green to grey-green and may be simple or divided. Amongst those with simple leaves is the bushy *H. bakerana* with racemes of large pink flowers; the erect growing *H. propinqua* with grey green leaves, cream flowers and large attractive fruits; *H. orthorrhyncha*, a tall shrub with stiff leaves and racemes of deep red flowers and pointed fruits resembling a bird's head; the "Cork-bark Trees" such as *H. lorea* with long thick dark green leaves two feet or more in length, and large racemes of cream-green flowers; *H. cunninghamii* with stiff leaves approximately one foot in length and racemes of pale yellow flowers; *H. ivoryi* with grey green divided leaves and greenish yellow flowers; *H. purpurea*, a bushy shrub with divided leaves and racemes of large red flowers.

In contrast with the terete leaved species is the stiff upright *H. victoriae* with stiff, tough, toothed, fan-shaped, variegated coloured leaves with clusters of small cream flowers in the axils; *H. ruscifolia* with broad dark green toothed leaves and terminal racemes of white flowers; *H. cucullata*, an erect growing shrub with stiff broad leaves and racemes of pink flowers.

Amongst the entire flat leaved species, is *H. laurina* and *H. petiolaris* with red cream "Pin Cushion" like inflorescences; the flat leaves are grey-green and in *H. laurina* lanceolate to linear-lanceolate and in the latter species broadly lanceolate; *H. dactyloides* may vary from a small shrub with broad leaves to a tall shrub with narrow lanceolate leaves with cream flowers; the widely grown *H. salicifolia* a large bushy shrub to small tree with smooth oblong to lanceolate leaves and clusters of small cream flowers; *H. multineata* a tall erect to spreading shrub with long linear-lanceolate to linear leaves with straight veining and large spikes of pink to red flowers; *H. bucculenta* a bushy shrub with long narrow light green leaves and large spikes or orange to red flowers.

From the species mentioned it can be seen that the genus contains numerous interesting plants for the garden.

PAST ISSUES OF "AUSTRALIAN PLANTS" AVAILABLE

VOLUME No. 1, issues 1-12, no longer available bound but all issues available separately at 45c each except nos. 2, 3, 4 & 11, i.e. \$3.80 incl. postage.

VOLUME No. 2, issues 13-20, all available only fully bound at \$6.00 plus 20c postage. Bound in this volume is also "A Descriptive Catalogue of Western Australian Plants".

VOLUME No. 3, issues 21-28, all available only fully bound at \$6.00 plus 20c postage. Including also "Catalogue of Cultivated Australian Native Plants" valued at \$3.00.

VOLUME No. 4, issues 29-36, all available only fully bound at \$6.00 plus 20c postage. Including "Western Australian Plants for Horticulture—Part 1" valued at \$3.00—see below.

VOLUME No. 5, issues commencing No. 37. Past issues are 45c each plus 5c postage.

Other Books by the Society

WEST AUSTRALIAN PLANTS FOR HORTICULTURE is the latest book by this Society available from the editor for \$3.00 plus 20c postage. The format of the book generally is to have simple but adequate descriptions (using simple features that anyone can distinguish) of three species in one genus with a full colour plate of one of them on the opposite page. Directions as to cultivation are given for each species. Hundreds of West Australian wildflowers are also described. This is the style of book we recommend and is excellent value at this low price. It is proposed to produce more in this series on wildflowers from other states if readers will support us by buying the first one, providing the money to produce the next one.

SPIDER ORCHIDS

SOUTH AUSTRALIAN CALADENIA—Part 2 by R. C. NASH—Copyright

Part 1 gave cultivation methods for *Caladenia tessellata*, *C. gladiolata*, *C. clavegera*, *C. leptochila*, *C. ovata*, *C. reticulata*, *C. fitzgeraldii*, *C. rigida*, *C. patersonii*, *C. dilatata*, *C. filamentosa*, *C. bicalliata*.



***Caladenia menziesii* R.Br.**

Habitat: Throughout the Mt. Lofty Ranges and Kangaroo Island. Forms large colonies. Blooms September and October and at its best after a bush fire.

Compost, 50% sand and 50% rotted leaf mould for top 1/3 of the pots depth. For the lower one third of the pots depth use coarse washed sand with broken pieces of pot in the base. The middle one third of the root is filled with sand only. Place the pot in a moderately shady spot sheltered from the wind. Watering, keep the compost just damp. As this species multiplies very well vegetatively repotting will occur about every 2 to 3 years depending on the pot size used. I have never been able to get this species to flower. I have even tried burning leaves etc. on top of the pot as a bush fire seems to stimulate them in the wild. Plate no. 208*.

***Caladenia latifolia* R.Br.**

Habitat: This species is generally to be found in coastal sand hills and very sandy areas in the damper parts of the state. It even thrives in pasture land that has not been ploughed and has a few Eucalyptus trees left on it. Does not flower very often. Forms large colonies. Blooms September and October.

Compost and culture the same as that I have recommended for *C. leptochila*. Do not over water and use a deep pot as the new tubers will grow through the hole in the bottom of a shallow pot. Multiplies very well vegetatively. I have had very few flowers from this species even though I had over 100 plants for many years. Plate No. 212.

***Caladenia carnea* R.Br.**

Habitat: The Mt. Lofty Ranges, York and Eyre Peninsulas, the South East of South Australia. Quite a common species in some areas. A species of greatly varying sizes. Blooms September and October.

Compost and culture the same as that I use for *C. leptochila*. The pink forms of this species are sensitive to some forms of iron which makes them a very deep pink. Plate No. 219.

***Caladenia congesta* R.Br.**

Habitat: South East of South Australia. Blooms November.

Use the same culture recommended for *C. leptochila*. Plate 224.

***Caladenia angustata* Lindl.**

Habitat: South East of South Australia. Blooms November.

Same compost and culture as for *C. leptochila*. Plate 227.

***Caladenia caerulea* R.Br.**

Habitat: Bugle Ranges very rare. All small plants of *C. deformis* should be carefully examined as these two species are similar in appearance. Blooms Aug.-Sept. Rare. Plate 218. Culture as for *C. leptochila*.

***Caladenia deformis* R.Br.**

Habitat: Very widely distributed throughout the better watered parts of the state. Had used to be very common in some areas. July and August.

Compost and culture are the same as that I used for *C. tessellata* but do not plant in clusters. This species does multiply vegetatively and will form little groups of plants. I have grown this species from seed. Plate 223.

***Caladenia tutelata* Rogers.**

Habitat: A few parts of the lower Mt. Lofty Ranges near Adelaide and Colbura in the upper south-east. Very rare if not extinct now. Blooms Sept.

It would appear from my experience with the *Caladenias* that all of them can multiply vegetatively and many do grow from seed.

A light spraying of urea occasionally is beneficial to these plants.

* Plate Nos. are those in the book "Orchids of Australia" by W. H. Nicholls. Available from Editor at \$31.00 incl. postage. 476 colour plates.

TERRESTRIAL ORCHIDS FROM FLASKS TO POTS

ORCHIDS FROM SEED, Part 2—by B. C. KOWALD

Part 1—HOW TO FLASK TERRESTRIAL ORCHID SEED IN BOTTLES—Issue No. 42

Boil large open mouth glass jars in a "vacola" outfit together with plastic sheeting square and ties for covers. When cool put into them sphagnum moss pressing down with a bone knitting needle to form a depth of two inches. The needle should have been first dipped in "Captan" (a commercial fungicide). The moss need not be sterilised if new, but should have been wetted with boiled water (distilled preferably) and "aquisol". Put $\frac{1}{2}$ in. of unsterilized sheoak (*Casuarina*) leaves or working yeast in the bottles. Last thing before you put the plastic over top of bottle, it is best to spray with weak malathion spray; as red legged earth mite can eat up all the seedlings in no time. The sphagnum grows but that does not matter. Together with the yeast it seems to be the best mix. Put covers on till ready to transplant seedlings. Pour luke warm distilled boiled water into seedling flasks, shake gently using a knitting needle to loosen. Then pour into a sterilized china saucer. Rinse fingers and wrist with a fungicide. Using one or possibly two sterilized knitting needles plant the seedlings from the saucer to the jars just laying them on top of the sheoak leaves.

Tie the plastic sheet tops onto the jars tightly. If fungus comes in a week, just spray with "Captan". Put them where it is cool and with some light. You could leave them there a year if all is well. Give yeast or sheoak needles with a little aquisol every few months.

When you tip the seedlings out of bottles in 2 or 3 months time, just transfer the mix, with them in it to flat clean pans, and spray with a fine mist of weak fertilizer. You could leave them in the pans until they establish themselves. Once a fortnight for fertilizing. Keep sheltered from wind and give filtered sun in the morning.

Transplant into pots when big enough. Use a potting mixture of fine bark and *Casuarina* leaves well rooted with a little peat in. Mix with rain water and "Aquisol" or Warner's orchid mix or fowl manure. If transplanted when roots are growing and damaged, dip in captan. Two days later water with a yeast solution (working). They must have the enzymes or mycorrhizia in the yeast or the sheoak leaves.

Growing the Orchid Plants

I water them once a week. With the loose potting material they don't rot easily. If you put them in the natural ground outside they get fewer and fewer till you have none left. In the glasshouse it is too hot with no dew or gentle wind. I put mine in a shed open on the morning sun side with two window (fibreglass) panes in the roof. They get a little mist dew. The big ones in large pots I give liquid fowl manure about once or twice a month. At repotting time I give "Aquisol" or Warner's tabs and yeast twice. Withdraw water when they go a bit yellow as you could rot them. Soak sprinkle dampened bark and sheoak lightly on plants in the centre of the pot occasionally. We must save these quaint little beauties.

KNUDSON'S FORMULA (Formulae in No. 16 issue was incorrect)

Calcium Nitrate, 1.00 gm.; Monobasic Potassium Phosphate, 0.25 gm.; Magnesium Sulphate, 0.25 gm.; Ammonium Sulphate, 0.50 gm.; Sucrose, 20.00 gm.; Ferrous Sulphate, 0.025 gm.; Manganese Sulphate, 0.0075 gm.; Agar, 17.50 gm.; Water, 1000 ml.

Buy an oz. or so of each and just get the chemist to weigh out, grind and mix the ingredients. All told it works out about 30 cents a packet when finished.

BANKSIA

by JOHN WRIGLEY, Curator, Canberra Botanic Gardens

Every garden of Australian character needs at least one *Banksia*, for nearly all species are found wild only in Australia. About 50 species are known and most have been described in issues of *Australian Plants*. All are solid, spectacular shrubs or small trees with tough, handsome foliage with serrated edges, often large and holly-like, or small and narrow. They are healthy subjects, perfectly hardy to frost, and also to drought when established, though water should be plentiful in early years to hasten bushy growth. Most species grow at a medium rate and flower at about 3 years old.



Blocks by courtesy of Canberra Botanical Gardens

BANKSIA ERICIFOLIA. *Banksia*—after SIR JOSEPH BANKS, a famous British scientist who travelled with Captain Cook. *Ericifolia*—heath-leaved.

Birds and bees are attracted to the garden by *Banksias*, as the flowers are rich in nectar, and hence their common name of 'Native Honeysuckle'. They have, however, no connection with the Honeysuckle of the Northern Hemisphere.

Each stiff flower spike is actually a head of small flowers, crowded in rows, and in some species it appears outlined by "shiny curls". These are styles of the flowers which remain in a hooked position. In other species the styles open out straight and the flower spike then resembles a soft brush. Flowers generally form close on older wood, often sitting upright on horizontal branches, or deep in the forks of branches, with new growth projecting beyond. Dark woody seed cones follow and remain on the plant, opening only in extreme heat and releasing seed.

A NEEDLE HAKEA OF WESTERN AUSTRALIA

A plant in section 8—see page 343.



Colour photography by F. W. Humphreys

HAKEA LISSOCARPHA

HABIT—A single stemmed much branched, spreading, often flat topped, with the outer branches becoming pendant, dense, leafy shrub from 3 ft. to 5 ft. high and up to 10 ft. across unless pruned to shape.

HABITAT—An inland species found growing on plain or ridge country amongst other low scrub or low growing mallees on sand or sandy loam in 14" to 22" rainfall. pH is 6½-7.

Leaves are terete. 1/16" diameter, ½" to 1" long, divided into 3 or 5 spreading segments, rigid, pungent and dull green in colour.

"WEST AUSTRALIAN NATIVE PLANTS IN CULTIVATION" by A. R. Fairall

The published promised delivery in March, then July 1970. It has still not turned up. Those who have ordered the book can be sure of receiving it as soon as it is available.

HAKEA OF SOUTH AUSTRALIA—continued from page 346

The remaining three species of *Hakea* in S.A. are:

Hakea francisiana with flowers in large often red racemes with long many nerved leaves. See cover colour plate.

Hakea ulicina with narrow pungent pointed flat leaves 1-5 nerved leaved and flowers in short clusters.

Hakea baxteri with flat fan-shaped sharply toothed leaves.

Hakea suberea. Corkbark Tree, 6-7 m. high with corky bark. Leaves 20-60 cm. long, terete, 2½ mm. diam. The grey to pale yellow flowers are in racemes 10-15 cm. long, axillary, dense. Fruit 35 mm. by 25 mm. broad, ovoid, curved towards the summit. Arkaringa Creek, Everard Range, Musgrave Ranges, Western and Central Australia.

Hakea ivoryi. Tree to 10 m. with corky bark. Leaves terete, once or twice forked 5-18 cm. long, 1½ mm. diam. Cream flowers in dense racemes 3-9 cm. long. Fruit ovoid-lanceolate 3 cm. by 12 mm. with short incurved fragile pungent beak. Musgrave Ranges, Darling and Paroo Rivers of N.S.W. and Warrego of Qld.

Hakea divaricata. Tree 4-5 m. with corky bark. Leaves hoary with minute scales, terete 6-10 cm. long 1½ mm. diam., irregularly forked. The greenish yellow flowers are in dense racemes, axillary or paniculate 4-10 cm. long. Fruit ovoid-lanceolate, almost straight with a sharp brittle mucro 2-4 cm. by 10-15 mm. North of Coopers Creek and along Diamantina River, Central Australia.

Hakea ednieana. Small tree with furrowed bark. Leaves terete 2-4½ cm. long, hoary, bifid or trifid and then forked. The yellow-white flowers in cylindrical racemes. Fruit almost straight and oblong 2½-3 cm. by 8-10 mm. Flinders Range.

Hakea baxteri. Shrub about 2 m. high with fan-shaped leaves. The reddish flowers are in sessile axillary clusters. Eucla to Western Australia.

Hakea vittata. Shrub about 30 cm. high. Leaves terete, slender 4-6 cm. long; rusty tomentose when young, glabrous when adult. The few white to reddish flowers are in short axillary umbels or clusters. Fruit ovoid 17-20 mm. by 12-18 mm. Southern districts of S.A. to eastern Australia.

Hakea kippistiana. A stout shrub to 3 m. high. Young shoots golden pubescent; leaves terete, smooth, 3-10 cm. long. White flowers in dense axillary clusters. Fruit ovoid, 2-2½ cm. by 12-15 mm. Flinders Range to Far North; Eyre Peninsula, Central Australia.

Hakea nodosa. Shrub to 2 m. high. Leaves linear-compressed, pungent, 2-3 cm. long. Minute yellowish flowers in axillary clusters. Fruit 20-25 mm. by 12 mm., scarcely beaked. Mount McIntyre, south-east to Victoria and Tasmania.

Hakea leucoptera. Shrub 2-3 m. high. Leaves terete 3-9 cm. long, hoary, finally glabrous. White flowers in short axillary racemes. Fruit ovate-lanceolate, swollen in lower part 20-30 mm. long. Murraylands; Flinders Range to Far North - Central Australia. Natives obtain water from the roots.

Hakea cycloptera. Shrub with terete leaves 5-15 cm. long. Creamy glabrous flowers in axillary clusters. Fruit large, warted 35-40 mm. by 30 mm. Southern Eyre Peninsula.

Hakea rostrata. Shrub 1-2 m. high. Leaves terete 4-15 cm. long, slender. White flowers in axillary clusters. Fruit large 30-35 mm. by 20-25 mm., rugose, incurved from the middle. Flinders Range near Quorn, south-east to Victoria and Tasmania.

Hakea rugosa. Low spreading shrub to 70 cm. high. Leaves terete 2-3 cm., sometimes 5-6 cm. long. Small white to yellowish flowers in axillary clusters. Fruit similar to *H. rostrata* but smaller. S.A. to Victoria.

Hakea ulicina. Erect shrub 1-3 m. high. Branchlets tomentose, leaves glabrous, rigid, flat 4-20 cm. long 2-4 mm. broad and pungent-pointed; with prominent midrib beneath. Flowers white in short dense axillary clusters. Mount Lofty Ranges and southern districts to N.S.W., Vic. and Tasmania.

Hakea muelleriana. A rounded shrub under 2 m. high or sometimes a small tree; young shoots and leaves golden pubescent, adult leaves and branchlets glabrous. Leaves terete or very bluntly trigonous 2-7 cm. long 1 mm. thick, usually spreading horizontally, rigid, pungent-pointed. Flowers white in small axillary clusters. Fruit 2-2½ cm. by 1½ cm. smooth or slightly warty or wrinkled with a short straight beak, sometimes clustered. Murray lands, 90 Mile Desert, Kangaroo Is. to Western Victoria and N.S.W.

HAKEA IN TASMANIA—continued from page no. 347

Hakea rostrata F. Muell. ex Meissn. "Beaked Hakea". An untidy shrub, very compact, but with branches protruding giving the shrub an "unbalanced" appearance; 2-6' high. Leaves rigid, terete and sharply pointed, 2-5" long curved upwards or spreading. Sometimes, juvenile leaves occur that are somewhat flattened toward the upper half and with thickened margins and midrib. The flowers are in clusters in the upper leaf axils, white, cream or pale yellow. Fruit 'S' shaped, curved up then down at the base, the beak curved upward. The valves thick and warty.

Restricted to a few localities in Tasmania, especially on the Tas. Peninsular. Also found in Vic. and S.A. Not a very interesting plant in the garden.

Hakea teretifolia (Salisb.) J. Britt. "Dagger Hakea". *Banksia teretifolia* Salisb., *Hakea pugioniformis* Cav.

An upright, spreading shrub 3-10' high. Leaves cylindrical, sharply pointed, rigid spreading and straight, 1-4" long. Flowers few, in axillary clusters, white. Fruit 1-1½" long and about ¼" broad. Cone-shaped and tapering to a long, curved or straight apex. The valves covered, toward the base, with small pungent spikes.

A common plant in drier coastal areas of Tas., Vic., N.S.W. & Qld. This is a good plant for hedges etc. as its habit lends itself to this.

Hakea rugosa R.Br. A small shrub about 4' high, the branches spreading, diffuse. Leaves 1"-3" long, spreading, rigid, cylindrical, pungent. Flowers white or yellowish in the axils of the upper leaves. Fruit 'S' shaped as with *H. epiglottis* and *H. rostrata* but smaller, the valves having distinct wrinkles.

Quite common in South-east Tasmania as well as in Vic. & S.A.

Hakea epiglottis Labill. Usually a large shrub but occasionally reaching 15' in favourable situations. Leaves 1"-5" long, cylindrical, rigid, spreading in-curved up. The apex mucronate and sharp. Flowers in small clusters in the axils of the upper leaves, cream or yellowish. Fruit 'S' shaped as in the *H. rugosa* and *H. rostrata* and about ¾" long, the valves thick smooth or somewhat warty or wrinkled.

Hakea epiglottis is confined to Tasmania where it is common in wet heaths from sea-level to $\pm$ 3000'. A pleasing shrub for gardens in wetter areas, it benefits from regular light pruning.

Hakea ulicina R.Br. A small shrub $\pm$ 4' high, the branches divaricate. Leaves 1"-5" long, $\pm$ $\frac{1}{8}$ " broad, flat or triangular in cross-section, three longitudinal veins quite prominent, rigid and sharply pointed, spreading. Flowers in axillary clusters, white. The fruit $\frac{1}{2}$ "- $\frac{3}{4}$ " long, $\frac{1}{4}$ "- $\frac{1}{2}$ " broad, conical, with a short projection which is usually straight.

Found in Vic., N.S.W. and the Bass Strait Islands.

Hakea myrtoides Meissn. A diffuse shrub growing only to one foot high. The leaves of this plant have long pungent points but are small and broad. Not many *Hakea* have leaves of this type. Will readers report any other *Hakea* similar to that illustrated above. A plant in Section 6 from W.A.



NEEDLE HAKEA OF WESTERN AUSTRALIA



Blocks by courtesy of South Australian Museum

Artist: Alison Ashby

HAKEA VERRUCOSA

A species of Section 2—see page no. 342.

WEST AUSTRALIAN HAKEA—cont. from pp. 343

Section 9—W.A. species with cylindrical racemes of flowers with terete leaves.

A. Inflorescence glabrous *H. chordophylla*

A. Inflorescence pubescent or villous

B. Torus very oblique; racemes lateral; perianth appressed or silky *H. cunninghamiana*

B. Torus not very oblique; racemes axillary; perianth tomentose *H. lorea**

All these are trees 15 feet and more.

* We use *H. lorea* rather than *H. suberea* as the difference is hardly varietal when the whole range of variation is taken into account—R. D. Royce.

The herbarium of S.A. have chosen to use *H. suberea*—see pp. 346.

"West Australian Plants"—A Descriptive Catalogue (2nd Edition)

This fine book was one of the first produced by the Society and has been so widely acclaimed and received that a reprint has been necessary. The number of colour plates has been doubled but the real value of the book even for those who have a copy of the first edition is that fully revised, it is the only reference ever produced to the entire flora of Western Australia. New additions include the grass and fern families but the many hundreds of species added and names revised make this book a must for anybody interested in growing the western wildflowers.

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FRINGED HEATH MYRTLE



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MICROMYRTUS CILIATA. *Micro*—small; and *Myrtus*—a Myrtle. *Ciliata*—fringed, alluding to the fringe of minute stiff hairs round the leaves.



MICROMYRTUS CILIATA—Growing naturally in the Grampians of Victoria—see page 382 for a description. A full description of the "Heath and Honey Myrtles" was given in our No. 30 issue.

HYPOCALYMMMA ANGUSTIFOLIUM

Blocks by courtesy of Canberra Botanic Gardens

HYPOCALYMMMA ANGUSTIFOLIUM. *Hypocalymma*—from two Greek words, under, and a veil—alluding to the calyx. *Angustifolium*—narrow-leaved.

All species of the beautiful *Hypocalymma* were described and illustrated in full colour in our No. 31 issue.

WILDFLOWERS FOR ROCKERIES

Two plants ideal for rockeries are *Micromyrtus ciliata* and *Hypocalymma angustifolium*.

The 'Pink-flowered Myrtle' *Hypocalymma angustifolium*, is a small shrub related to the Tea-tree (*Leptospermum*) and the Bottlebrush (*Callistemon*) and common in W.A. It is unusual and dainty when flowering for a few weeks in spring and does best when found a position sheltered from strong winds.

It is frost hardy but not a tough subject either in winter storms or summer heat. Growth is dry and fragile and an exposed plant is liable to be blown sideways, becoming a poor shape, with bare wood. In shelter, however, with adequate water and with yearly pruning for bushy growth, a more lush plant results which will live a good number of years with continued care. When five years old it will probably be a dense shrub 3 ft. high with flexible, thin branches weeping to cover the ground 5 ft. across.

Editor's Note: Our No. 42 issue was devoted to plants for rockeries and small gardens the principal article being by John Wrigley, Curator, Canberra Botanic Gardens. He has now supplied us with the blocks and descriptions of two further species ideal for rockeries.

Leaves are up to an inch long and linear. They emerge from the greyish papery stems in opposite pairs either at right angles or reflexed and the effect is spiky. When bruised their perfume is sweet and spicy.

General appearance through the year is dull or inconspicuous, but the flowers always attract attention when the season begins in October, or even mid-September in early years. They are set close on the stems in whorls of three or four in the axils of the leaves, and like them are very regular and neat. Opening first at the stem tips, flowers are cup-shaped with stamens very prominent giving a fringed effect. Colour may be white, cream or pink and the pink forms deepen to red with age so that there is always a range of soft carmine tints along the stems. Bees are often seen visiting the small flowers.

New tips are growing as flowering passes, and these when half ripe are used as cuttings for propagation. Seed has not been found here. Most nurseries dealing in native plants stock this shrub, and when planting out the local, lighter soils are suitable, as long as free from lime. From early stages it is a good plan to give a mulch of leaf mould or compost around a young plant to keep the soil cool, along with light trimmings for bushy growth. With adequate water it then grows away quickly and flowers while young. Serious pests and diseases have not been noticed.

This is a very pretty shrub for cutting, easy to arrange and living in shallow water for a long time. It will sometimes dry out if left, keeping enough colour for use in dried arrangements.

Micromyrtus Ciliata

The 'Fringed Heath-myrtle' is graceful in appearance, yet tough, and remains healthy for years with little or no attention. Once established and bushy it stands drought well, or if any branches should die out it regenerates well after watering later. However, adequate water ensures more lush and continuous growth, and must be given for the first years after planting. Habit varies from prostrate to upright, and the low forms are specially attractive. With age it may spread over 9 ft. across, slowly reaching 3 ft. high, with long arching and tapering branches. In a sunny position growth is dense and stiff, an excellent ground cover for keeping down weeds. It is spectacular in a large rockery and lends itself to landscaping design around the walls of buildings, as well as to any slope or front of border.

Towards the end of winter the shrub brightens to carmine as flower buds with reddish calyces develop. Stemless they outline the branches in clusters at the end of short lateral stems and open first low on the branches. Flowers are cup-shaped with five rounded petals, white or flushed pink or red, often mingled on the same plant. They age to deeper reds and remain firm for many weeks thus extending the season of colour till the end of November. In some years stray autumn flowers appear.

Good seed is difficult to obtain and propagation is by means of cuttings of stem tips taken when half ripened. When planting out they should be given light soil, free from lime, and they then grow quickly, coming into flower while young. Pruning is optional and a little light trimming is effected if sprays of flower are cut for decoration. These are easy to arrange and long-lasting in shallow bowls of water. Sometimes as they dry out slowly such stems will keep enough colour to be useful in dried arrangements.

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The well known "Honey Flower" *Lambertia formosa* was shown in colour in the front cover of our no. 41 issue. It is a feature of the Sydney sandstone flora. The plant above is from Western Australia growing 3 to 6 feet high. The attractive flowers make it a good ornamental species particularly as it flowers on and off throughout the year.

END OF VOLUME No. 5

An index will appear as a lift-out supplement in our next issue. As with all our volumes except No. 1, they are available fully bound, stiff vynex cover and gold lettered for \$6.00 plus 20c postage. Volume No. 5 will be available early December in time for use as a Christmas gift.